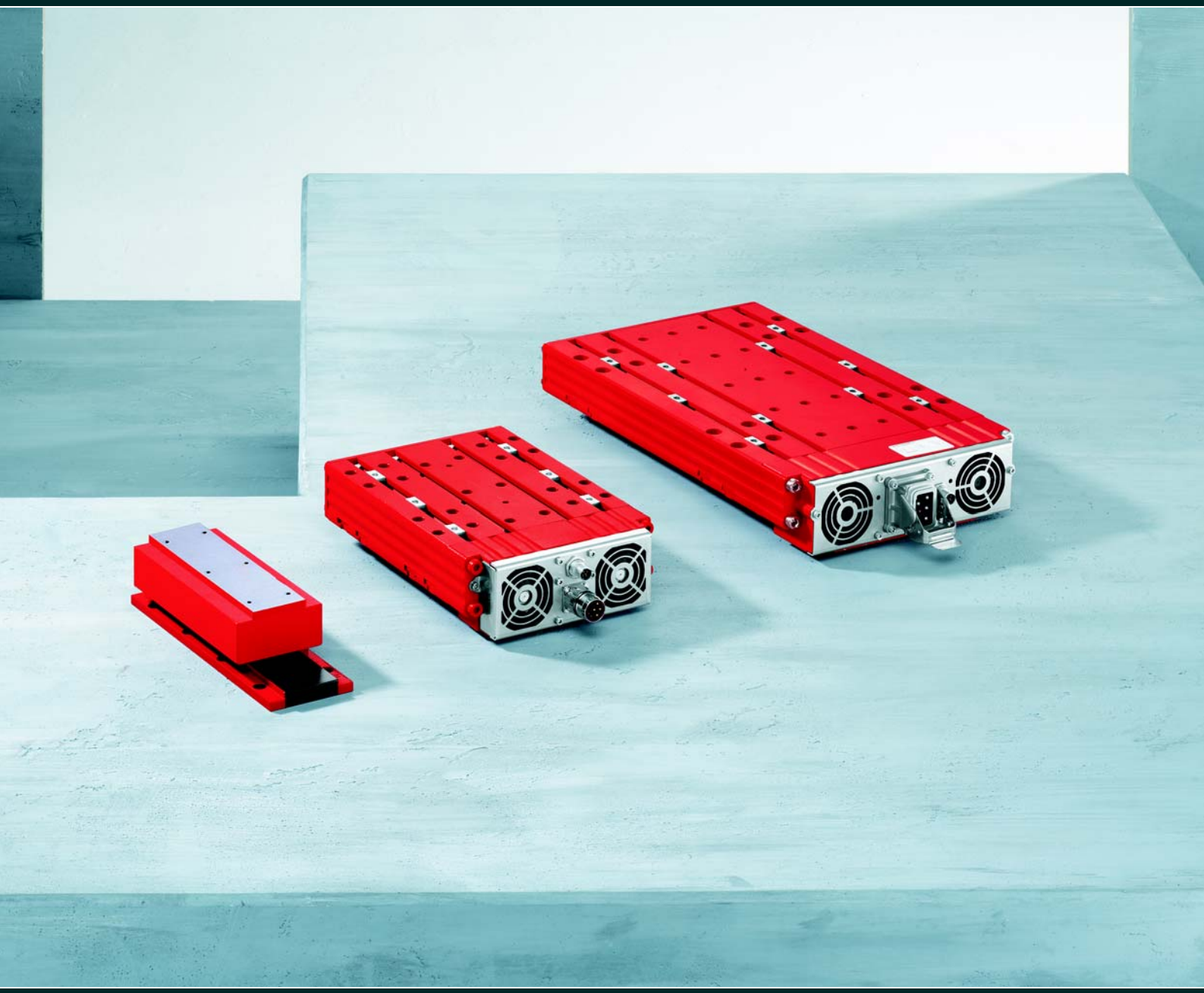
SEW EURODRIVE



SL2 Synchronous Linear Motors

Edition 06/2008
11658215 / EN

Catalog

SEW EURODRIVE

1 Introduction

1.1 The SEW-EURODRIVE Group of Companies

Global presence

Driving the world with innovative drive solutions for all branches and for every application. Products and systems from SEW-EURODRIVE are used in a multitude of applications - worldwide. SEW-EURODRIVE products are found in a variety of industries, such as automotive, building materials, food and beverage as well as metal-processing. The decision to use drive technology “made by SEW-EURODRIVE” stands for reliability for both functionality and investment.

Not only are we represented in all important branches of industry today we are found all over the world: With eleven manufacturing plants and 64 assembly plants in 46 countries and our comprehensive range of services, which we consider an integrative service adequately continuing our commitment to outstanding quality.

Always the right drive

The SEW-EURODRIVE modular concept offers millions of combinations. This wide selection enables you to choose the correct drive for all applications, each based on the required speed and torque range, space available and the ambient conditions. Gear units and gearmotors offering a unique and finely tuned performance range and the best economic prerequisites to face your drive challenges.

The gearmotors are electronically empowered by MOVITRAC® frequency inverters, MOVIDRIVE® inverters and MOVIAXIS® multi-axis servo inverters, a combination that blends perfectly with the existing SEW-EURODRIVE program. As is the case with the mechanical systems, development, production and assembly is carried out completely by SEW-EURODRIVE. In combination with our drive electronics, these drives will provide the utmost in flexibility.

Products of the servo drive system, such as low backlash servo gear units, compact servomotors or MOVIAXIS® multi-axis servo drives provide precision and dynamics. From single-axis or multi-axis applications all the way to synchronized process sequences, servo drive systems by SEW-EURODRIVE offer a flexible and customized implementation of your application.

For economical, decentralized installations, SEW-EURODRIVE offers components from its decentralized drive system, such as MOVIMOT®, the gearmotor with integrated frequency inverter or MOVI-SWITCH®, the gearmotor with integrated switching and protection function. SEW-EURODRIVE has developed hybrid cables to provide cost-effective functional solutions, independent of the philosophy behind or the size of the system. The latest developments from SEW-EURODRIVE: MOVITRANS® - system components for contactless energy transfer, MOVIPRO® - the decentralized drive control and MOVIFIT® - the new decentralized intelligence.

Power, quality and sturdy design combined in one standard product: with SEW-EURODRIVE, high-torque industrial gear units achieve large movements. The modular concept once again provides optimum adaptation of industrial gear units to meet a wide range of the most varying applications.

Your ideal partner

Its global presence, extensive product range and broad spectrum of services make SEW-EURODRIVE the ideal partner for the machinery and plant construction industry when it comes to providing drive systems for demanding applications in all applications and branches of industry.

1.2 Products and systems from SEW-EURODRIVE

The products and systems from SEW-EURODRIVE are divided into four product groups. These four product groups are:

1. Gearmotors and frequency inverters
2. Servo drive systems
3. Decentralized drive systems
4. Industrial gear units

Products and systems used in several group applications are listed in a separate group "Products and systems covering several product groups." Consult the following tables to locate the products and systems included in the respective product group:

1. Gearmotors and frequency inverters		
Gear units / Gearmotors	**Motors**	**Frequency inverters**
• Helical gear units/helical gearmotors • Parallel shaft helical gear units/parallel shaft helical gearmotors • Helical-bevel gear units/ helical-bevel gearmotors • Helical-worm gear units/ helical-worm gearmotors • Spiroplan® right-angle gear-motors • Drives for electrified monorail systems • Geared torque motors • Pole-changing gearmotors • Variable speed gear units/variable speed gear-motors • Aseptic gearmotors • ATEX compliant gear units/gearmotors • ATEX compliant variable speed gear units/variable speed gearmotors	• Asynchronous AC motors/AC brakemotors • Multi-speed AC motors / AC brakemotors • Energy efficient motors • Explosion-proof AC motors/AC brakemotors • Torque motors • Single-phase motors/single-phase brakemotors • Asynchronous linear motors	• MOVITRAC® frequency inverters • MOVIDRIVE® inverters • Control, technology and communication options for inverters

2. Servo drive systems		
Servo gear units / servo gear-motors	**Servomotors**	**Servo drive inverters / servo inverters**
• Low backlash servo planetary gear units/planetary gear-motors • Low backlash helical-bevel servo gear units / helical-bevel gearmotors • Explosion-proof servo gear units / servo gearmotors	• Asynchronous servomotors / servo brakemotors • Synchronous servomotors / servo brakemotors • Explosion-proof servomotors / servo brakemotors • Synchronous linear motors	• MOVIDRIVE® servo inverters • MOVIAXIS® multi-axis servo inverters • Control, technology and communication options for servo drive inverters and servo inverters

3. Decentralized drive systems		
Decentralized drives	**Communication and installation**	**Contactless Energy Transfer**
• MOVIMOT® gearmotors with integrated frequency inverter • MOVIMOT® motors/brakemotors with integrated frequency inverter • MOVI-SWITCH® gearmotors with integrated switching and protection function • MOVI-SWITCH® motors/brake motors with integrated switching and protection function • Explosion-proof MOVIMOT® and MOVI-SWITCH® gearmotors	• Fieldbus interfaces • Field distributors for decentralized installation • MOVIFIT® product range – MOVIFIT®-MC for controlling MOVIMOT® drives – MOVIFIT®-SC with integrated electronic motor switch – MOVIFIT®-FC with integrated frequency inverter	• MOVITRANS® system – Stationary components for energy supply – Mobile components for energy absorption – Line cables and installation material

4. Industrial gear units
• Helical gear units • Bevel-helical gear units • Planetary gear units

Products and systems covering several product groups
• Operator terminals • MOVI-PLC® drive-based control system

In addition to its products and systems, SEW-EURODRIVE offers a comprehensive range of services. These include:

- Technical consulting
- Application software
- Seminars and training
- Extensive technical documentation
- International customer service

Visit our home page:

→ **www.sew-eurodrive.com**

The website offers a great deal of information and services.

1.3 Copyright notice

1.4 Structure of the safety notes

The safety notes in this catalog are structured as follows:

Symbol	Signal word	Meaning	Consequences if disregarded
	**STOP**	Possible damage to property	Damage to the drive system or its environment
	**NOTE**	Useful information or tip. Simplifies handling of the drive system.	

2 Product Description and Overview of Types

Catalog contents

This catalog contains a description of SL2 synchronous linear motors including technical data, dimension sheets, project planning notes and information on additional components of a linear motor system. Additional information on SL2 synchronous linear motors, servo gearmotors and servo controllers can be found in the separate catalogs, system manuals and descriptions.

Additional publications

- Servo gearmotors
- MOVIDRIVE®
- MOVIAXIS®
- Application flyer
- Brochure

Internet

You will find the current documentation on SL2 synchronous linear motors in many languages on the SEW-EURODRIVE homepage (http://www.sew-eurodrive.com). Here, you can download the files directly or order a printed copy from SEW-EURODRIVE.

Manuals

- MOVIDRIVE® B
- MOVIAXIS® project planning manual

Startup/project planning notes

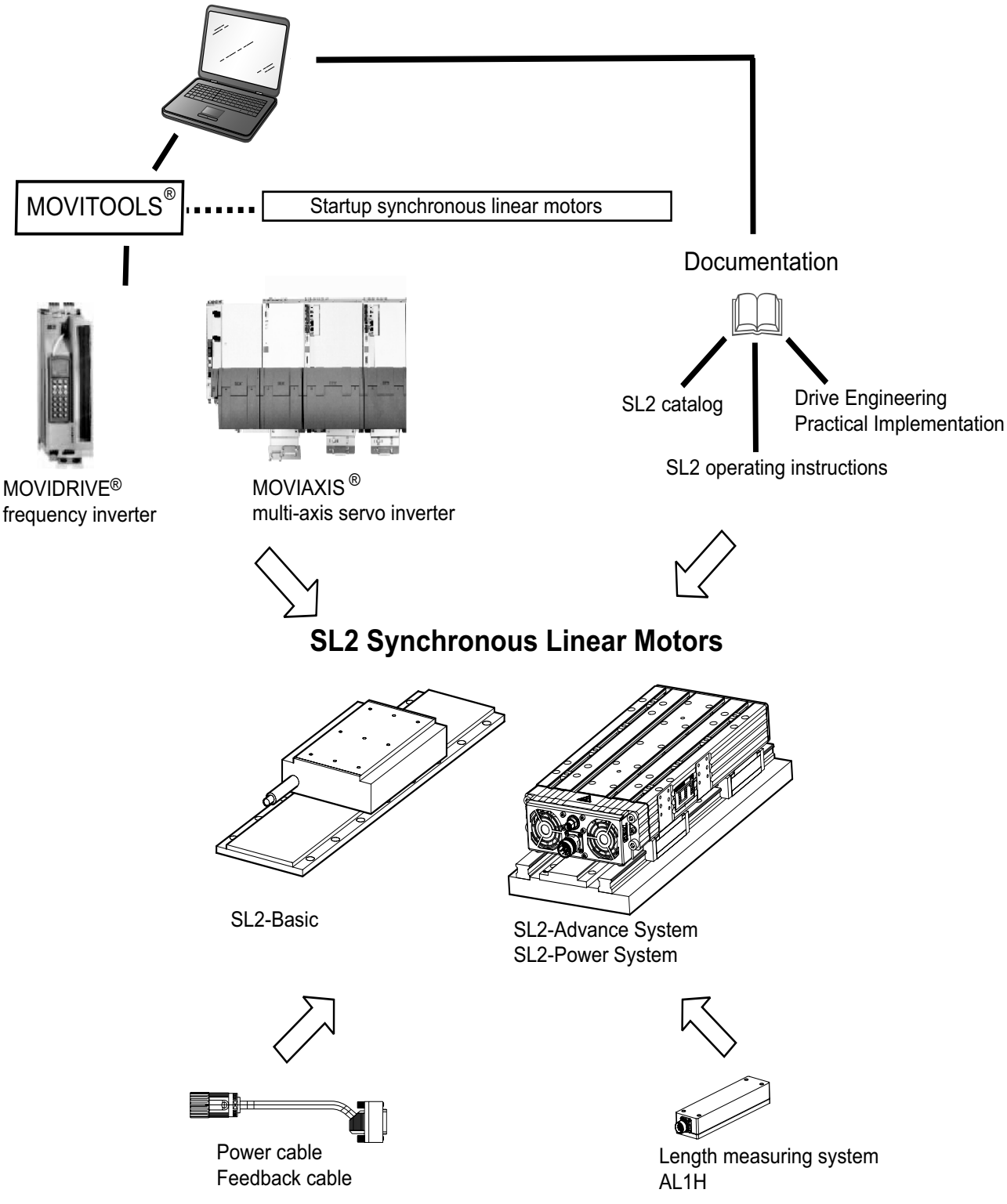
- "SL2 Synchronous Linear Motors" operating instructions

CAD data

CAD data is available from SEW-EURODRIVE for all sizes on request.

- 2D-DXF, DWG and TIF
- 3D-IGES, STEP

System environment

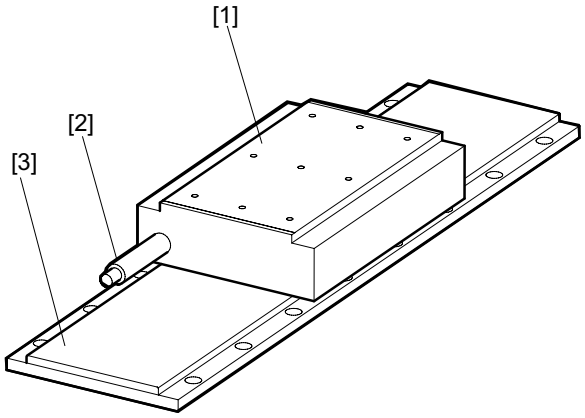


2.1 SL2 product designs

SEW-EURODRIVE offers **three** product designs for SL2 linear motors:

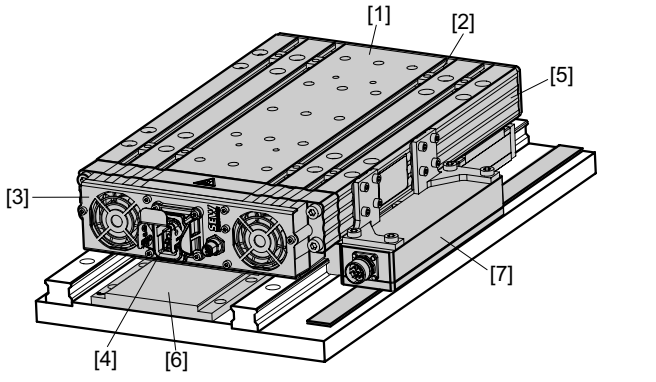
SL2-Basic	Motor package and secondaries
SL2-Advance System	Motor package integrated in cooling unit and secondaries. Prepared for installation of linear guides and the linear encoder.
SL2-Power System	Motor package integrated in motor cooling unit with forced cooling fan and secondaries. Prepared for installation of linear guides and the linear encoder.

2.1.1 SL2-Basic



[1] Primary
[2] Electrical connection in form of a cable extension
[3] Secondary with permanent magnets

2.1.2 SL2 Advance System / SL2 Power System



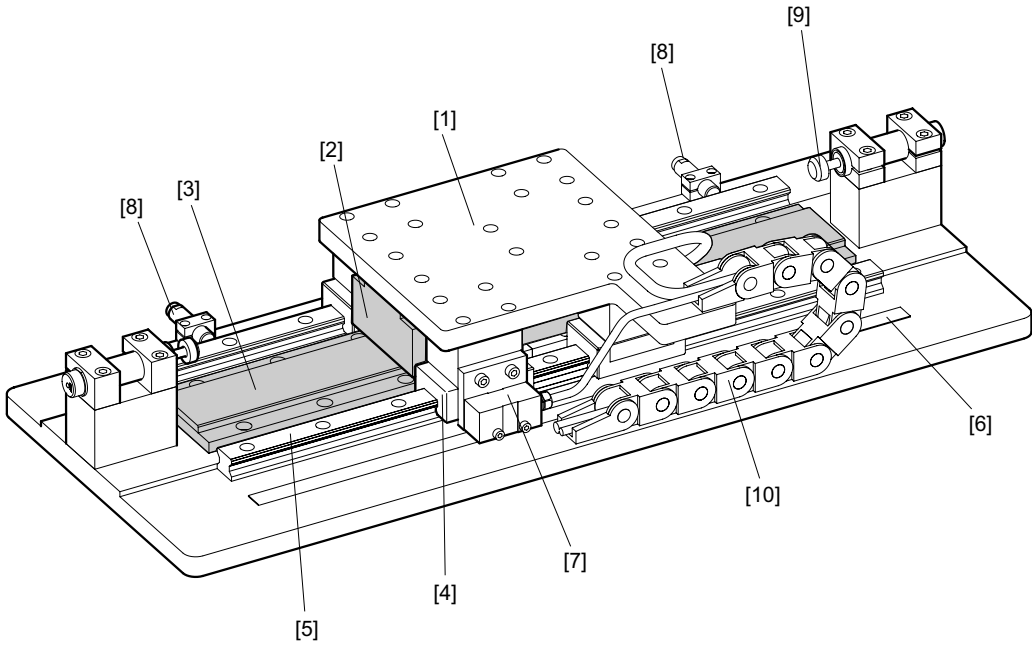
[1] Optional motor cooling unit
[2] Prepared grooves as retaining system for customer setup
[3] Forced cooling fan of optional motor cooling unit
[4] Electrical plug connector
[5] Primary (not visible) installed in motor cooling unit
[6] Secondary
[7] Linear measuring system

2.2 Functional description

2.2.1 The linear motor system

A complete and operative linear servo drive system consists of the following components:

The following illustration is a schematic overview of a complete system (SL2-Basic).



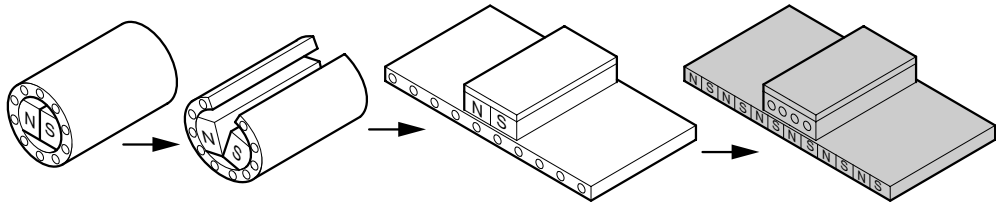
[1] Primary carrier
[2] Primary (SL2-Basic)
[3] Secondary
[4] Guide carriage
[5] Guide rail
[6] Ruler
[7] Measuring sensor
[8] Limit switch
[9] Buffer
[10] Power supply

2.2.2 Theory of operation

A linear motor, similar to a rotary drive, consists of two parts: a primary and a secondary.

Compared with a rotary drive, the primary corresponds to the stator. The primary includes the laminated core as well as the motor winding and the temperature sensor. The secondary represents the rotor consisting of the carrier material made of steel and the attached permanent magnets. The primary and secondary are encapsulated.

The rotary motor is basically cut open and pulled "straight." The functional principle corresponds to that of a rotary drive. In linear motors, however, it is the primary (winding) that moves and the secondary that is stationary.



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A linear motor requires an exact air gap. The data on the rated air gap are binding for achieving the performance data. An increase in the air gap will result in a reduction of the motor performance. Exact preparation of the mounting surface is the basic prerequisite for smooth system operation. The air gap is is set via the linear guide system and the mounting plate.

A signed travelling magnetic field is generated in the windings of the primary. The poles of the secondary and the resulting magnetic field of the primary will now generate a movement in the corresponding direction via the created thrust.

Exact commutation of the motor current requires travel information (motor position) per drive. This information is made available to the servo controller by a linear measuring system. The travel information is used for velocity control and positioning of the drive system.

In the servo controller, the motor is guided in CFC (current flux control) mode by the MOVIDRIVE ® B servo inverter from SEW-EURODRIVE. All functions associated with rotary servo technology are available in the linear servomotor system.

2.2.3 System components

You will find additional information on system components in section 5.

2.2.4 High attraction forces

High magnetic attraction forces between the primary and secondary for the motors listed above are caused by the high induction of the permanent magnets in the secondary in connection with the laminated iron core. These forces are also present in the de-energized state regardless of the currently developed thrust.

STOP	**STOP**
	Assemble motor parts carefully! **There is a risk of bruises due to high magnetic attraction forces. Observe the safety notes issued for this product.**

2.3 System description

2.3.1 SL2 series linear motors

SEW-EURODRIVE SL2 linear motors are designed as short stator motors. This technology results in maximum forces at small size and low weight.

Motors of the SL2 series are used whenever there is a need for precision, dynamics, repeat accuracy and high traverse rates. This motor series is characterized by the optimum force-density ratio accomplished by using one of the latest winding technologies and the laminated iron core.

This motor system is perfectly suited for many applications, including highly dynamic and flexible processing machines, material handling environments as well as pick-and-place applications.

Criteria for the selection of an SL2 include the following:

- Excellent positioning behavior even at high traversing rates of up to 6 m/s (also with absolute encoder)
- High stiffness of the control system in connection with the servo controller MOVIDRIVE® und MOVIAXIS®
- There is no backlash or spring effects associated with mechanical transmission components
- No wear due to contactless energy transfer
- Low noise development
- Minimum downtimes when system faults occur
- Good synchronous operation accuracy
- High degree of protection, IP65
- Low-overhead system through convection cooling
- Optimized handling for operator due to motor cooling unit (additional information on motor cooling unit in section 2.8)
- Advantages for the user:
  - SL2-Advance System:
    Fast and simple task handling through optimized, highly dynamic motor cooling unit for flexible mounting of components by the customer.
  - SL2-Power System:
    In addition to the SL2-Advance System, the rated power (rated thrust) is increased by installation of forced cooling fans without an increase in weight.
  - SL2-Advance System / SL2-Power System
    Allow for optimum and fast integration of the drive system in the plant. The performance characteristics of the systems enable excellent machine performance

2.3.2 Design of the SL2 synchronous linear motor

- The primary consists of the laminated iron package and the installed, interconnected windings. The system is encapsulated, convection-cooled and reaches its rated cooling by mounting of a sufficiently large metallic mounting platform to the flange surface of the motor (SL2-Basic).

  There is no need for heat exchangers, water channels and the high maintenance efforts required with liquid cooling.
- The motors are available in several widths and lengths.
- The housing of the motor cooling unit is used as supporting structure in the SL2-Advance System and SL2-Power System. This frame offers mounting options in form of slots for commercial T-slot nuts (e.g. Bosch-Rexroth aluminum profile systems) so that customers can install different loads.
- The SL2-Advance System with motor cooling unit in standard design makes for an effective heat distribution (rated cooling) as well as high mechanical stiffness at the lowest weight and dimensions.

  The SL2 Power System offers a performance increase through better cooling characteristics by up to 1.5 x rated power.
- The SL2-Advance System and SL2-Power System offer prepared mounting surfaces on the motor cooling unit for installation of linear guide systems and encoder systems. (For detailed information on motor cooling units, refer to chapters 4.2, 4.3, 4.8 and 4.10)
- There are floating bearings located at the mounting site for guide carriages on one side of the motor cooling unit in the SL2-Advance System and SL2-Power System to compensate for the heat expansion of the aluminum heat sink.
- The motor winding in the motors has been adapted to the MOVIDRIVE® servo inverter and is efficiently protected from thermal overload by integrated TF or KTY temperature sensors with evaluation in MOVIDRIVE® and MOVIAXIS®.
- The secondary consists of a basic body with attached permanent magnets made of steel. The magnets are protected from external influences by encapsulation.
- The secondaries come in different lengths; they can be lined up to cover extended travel distances.

2.3.3 Advantages / limitations

An SL2 linear motor offers advantages, particularly when:

- There is a need for highly dynamic and very accurate positioning down to the µ range
- Rotating mass moments of inertia prevent greater acceleration
- Spring effects of toothed belts or spindles are detrimental
- Backlash on reversal in spindles causes problems
- An open gear rack is not desirable
- High traveling velocities (e.g. v > 3 m/s) are requested
- Low noise generation is desired at high v_{max}
- Very good control characteristics are requested
- Long service life and reliability of the system are requested
- The operating and maintenance costs during the machine life cycle are to be kept very low
- A new and innovative machine design is requested
- Modular linear units are required
- Very short strokes are requested
- The ratio motor mass to external mass cannot be controlled with rotating motors
- Several primaries can be moved on one magnetic rail

2.3.4 Fields of application

This motor technology has its origin in the classical application of linear motors, namely mechanical engineering, but is increasingly used in almost all servo applications.

Compared to the thermally insulated and water-cooled motors that are mainly used in mechanical engineering, the applications for this type of motor have become more diverse due to the simplified infrastructure of the system (no water cooling).

Convection-cooled SL2 linear motors are ideally suited to applications in the following areas:

- Transportation and handling technology
  - e.g. two or three axis gantries
  - feeding units
  - dischargers
  - loading gantry systems
- Assembly and handling technology
- Packaging technology
- Wood processing
- Drilling
- Cutting and separation technology
- Small presses
- Special machine design

2.3.5 Properties

- Acceleration up to 80 m/s^2
- Typical traveling velocity up to 6 m/s (and higher)
- Positioning characteristics up to ± 10 µm (in reference to the measuring system and configuration of the system)
- Repeat accuracy up to ±2 increments (in reference to the measuring system and configuration of the system)
- Low noise development
- Minimum operating and maintenance costs as well as downtimes

2.4 Scope of delivery for system components

The scope of delivery for SL2 linear motors comprises:

- Primaries
- Secondaries with permanent magnets
- SL2 Advance System
  - T-slot nuts for mounting of customer loads are included
  - Electrical plug connector
  - T-slot nuts for mounting of customer loads are included
- SL2 Power System
  - Primary installed in motor cooling unit
  - Electrical plug connector
  - Forced cooling fan completely assembled and electrically wired to M12 plug connector
  - T-slot nuts for mounting of customer loads are included
- Prefabricated power and feedback cables
- Control and regulation systems such as MOVIDRIVE® and MOVIAXIS®
- Linear measuring system
- Encoder mount-on components

2.4.1 Not included in the scope of delivery:

	NOTE
	• Linear guide systems • Linear measurement systems (except for AL1H) • Cable carriers • Brake systems • Buffers/shock absorbers

2.5 Corrosion protection and storage conditions

The SL2 linear motors are treated with an anti-corrosion agent as standard.

The motor parts are protected against corrosion for five years in closed original packaging.

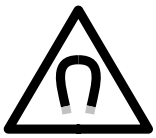
Observe the following storage conditions for SL2 linear motors:

- Store the SL2 linear motors inside.
- Keep storage area clean and dry.
- Maintain a storage temperature between –10 °C and +70 °C
- Relative humidity not to exceed 95 %
- Original packaging must be free from damages

Stored SL2 linear motors must be equipped with the following warning labels:

- Important

- Magnetic!



2.6 Coating

2.6.1 SL2-Basic

The motor parts are coated black matte (EPOXY two-component single coat paint) as standard.

2.6.2 SL2-Advance System / SL2-Power System

With the exception of the front area, all motor parts are anodized with a black coating. The front side of the motor is coated with black matte.

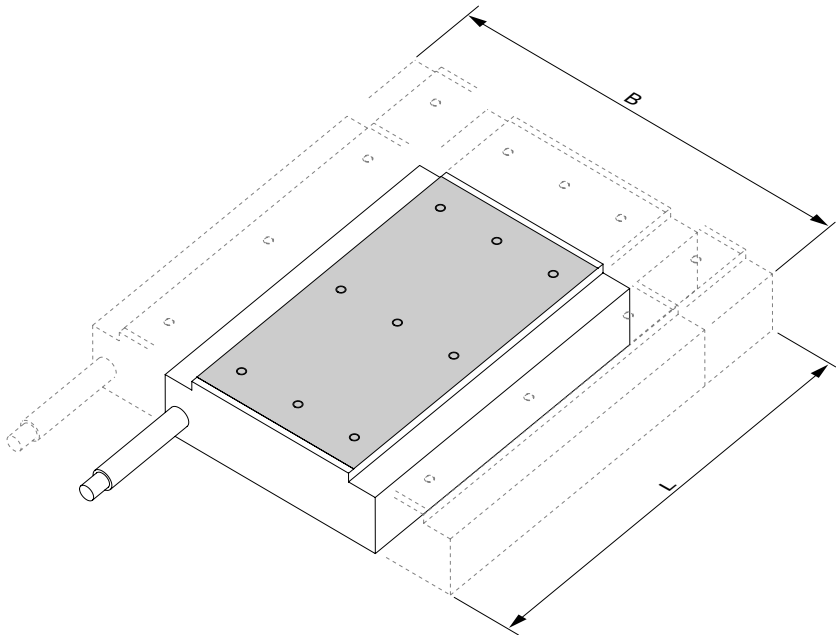
2.7 Sizes

2.7.1 Primaries

The SL2 synchronous linear motors from SEW-EURODRIVE are available in five sizes:

Primary type	SL2-Basic	SL2-Advance System	SL2-Power System
SL2-P025	X		
SL2-P050	X	X	X
SL2-P100	X	X	X
SL2-P150	X	X	X
SL2-P200	X	-	-
SL2-P250	X	-	-

X = available



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The quoted sizes (SL2-P050 to SL2-P250) refer to the active magnet width of the motor (Fig. → gray shaded area). Absolute dimensions are larger and listed in section 4.8 "Mounting dimensions."

In addition to the active motor widths, the primaries are available in different lengths to achieve a finer graduation of the rated forces.

- VS (Very Short)
- S (Short)
- M (Medium)
- ML (Medium Long)

SL2 synchronous linear motors are available in the rated power range of 125 N to 6000 N. The dynamic peak performance rating for these motors is up to 12600 N.

The motors are available in the following rated velocity classes to achieve a system-specific optimization of the motor system:

- 1 m/s
- 3 m/s
- 6 m/s

Special designs for other rated velocities are available upon request.

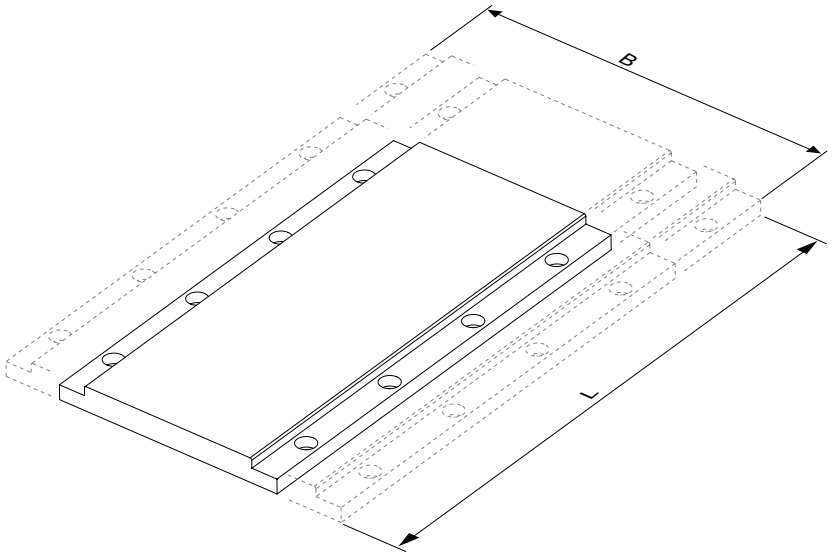
Please consult SEW-EURODRIVE.

2.7.2 Secondaries

The corresponding secondaries are available for the five motor sizes:

Secondary type	64	128	256	512
	[mm]			
SL2-S025	X	X	X	X
SL2-S050	X	X	X	X
SL2-S100	X	X	X	X
SL2-S150	X	X	X	X
SL2-S200	X	X	X	X
SL2-S250	X	X	X	X

X = available



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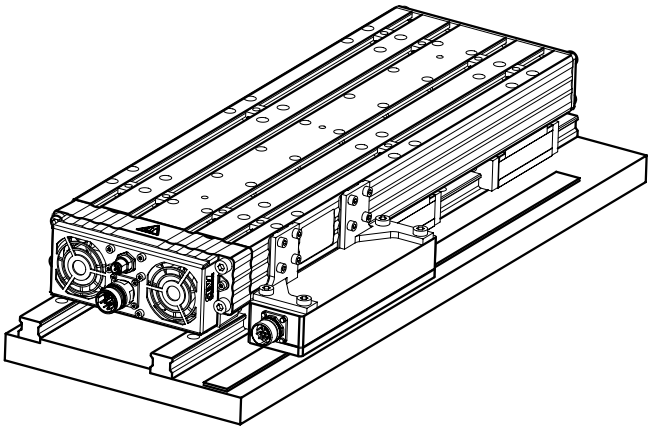
NOTE

The secondaries are lined up to cover the desired travel distance. The individual lengths always correspond to the pole pitch of the motor. This setup ensures that there is no latching at the joint between two secondaries with correct installation.

2.8 System components for SL2-Advance System and SL2-Power System

2.8.1 System description

The SL2 linear motor is installed into a motor cooling unit at the factory for product groups SL2-Advance System and SL2-Power System.



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For motor sizes

- SL2-P050,
- SL2-P100,
- SL2-P150

the motor cooling unit is available for nearly all lengths as system component.

2.8.2 Advantages of the SL2-Advance System and SL2-Power System

This subsystem offers major advantages for the design and assembly of the drive system:

- The optimum design of the subsystem offers the following advantages at the smallest volume:
  - Extremely lightweight design
  - Greatest strength
  - Best heat transfer properties
  - Optimum cooling of the motor package
- The performance data will be achieved regardless of the mounting situation / installation situation and components mounted by the customer. This ensures that project planning process can be carried out easily for the drive.
- The lightweight construction of the motor cooling unit results in very good acceleration properties for the entire system.
- A floating bearing compensates the temperature-induced expansion of the aluminum body. This setup does not result in a reduction in the rating life of the guide system due to overhung loads.
- Electrical connections are made via standardized power plugs. It is possible to use prefabricated cables from SEW-EURODRIVE.
- Optional linear measuring system AL1H with mount-on components and feedback cable.
- Simple installation of load by customer through standardized slots.
- Primary is fully installed in the motor cooling unit.
- 24 V supply for forced cooling fan at M12 plug connector.

- Retaining options for installation of measuring system.
- Minimum design effort for the operator since the position of the
  - linear guide system
  - guide carrier
  - encoder
  - EMC-compliant encoder position
  - load
  - and the stability calculation of the load carrier

  have already been prepared by SEW-EURODRIVE.
  CAD data is available for motor and options.

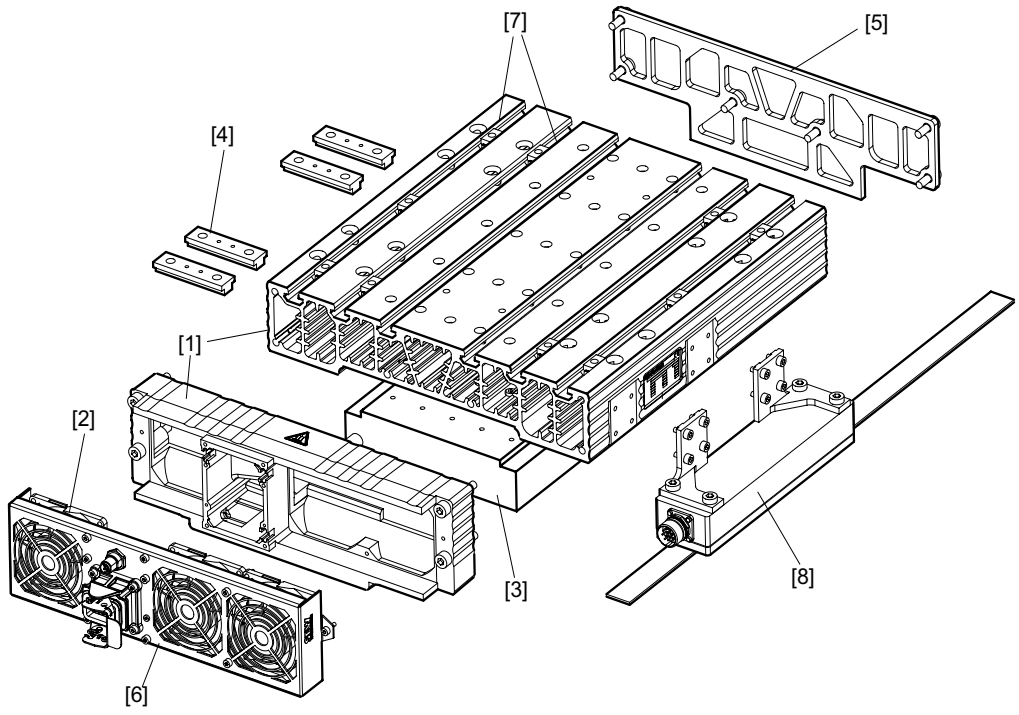
2.8.3 Advantage SL2-Power System

- In addition to the features of the SL2-Advance System, the SL2-Power System also offers a performance increase of 50 % (increase in rated feed thrust) by using forced cooling fans.

or

- Better heat dissipation, lower temperature level of the drive, which results in increased accurary on the travel distance.

2.8.4 Part drawing of the SL2-Advance System and SL2-Power System



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[1] Motor cooling unit
[2] Forced cooling fan (in SL2-Power System only)
[3] Primary
[4] Integrated floating bearing for temperature compensation
[5] End plate
[6] Front panel with power plug and fan guard
[7] Slots for installation of components by customer (T-slot nuts supplied)
[8] AL1H linear measuring system (optional)

2.8.5 Design of the subsystems

The SL2 linear motor is installed in the motor cooling unit by SEW-EURODRIVE and connected to a standardized power plug. The 24 V power supply for the fans is provided by a separate plug connector with the SL2-Power System design.

A complete package of prefabricated cables is also available.

The cooling element is designed so that the load can always be installed at the heat sink. The load can be installed into the respective slots by using commercial T-slot nuts from manufacturers of aluminum sections.

2.8.6 Applications: SL2-Advance System

The SL2-Advance System can basically be used in all fields of application for the SL2 linear motor. There are no limitations.

2.8.7 SL2 Power System

The use of the motor cooling unit with forced cooling fans is limited to enclosure IP54.

2.8.8 For use in hoists

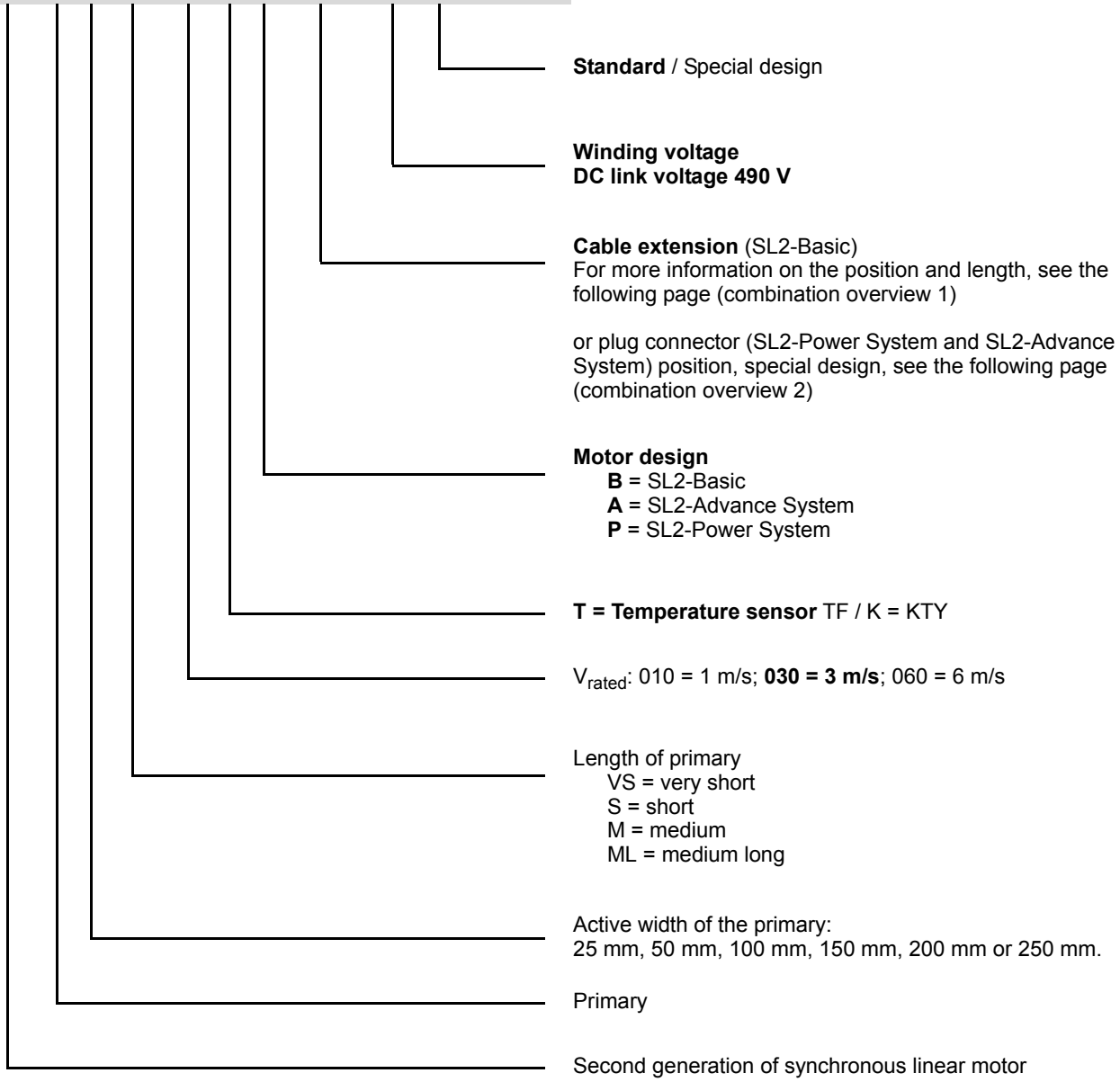
	**STOP**
	The motor system is not equipped with its own holding brake. This must be mounted separately. See chapter 5.2.
	Hoist applications require an absolute linear measuring system (e.g. AL1H). See chapter 5.5.

2.9 Type code

The following example shows the type code structure.

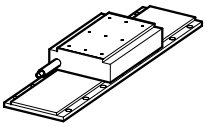
2.9.1 Primary

SL2 - P 050 VS - 030 - T - B - KVX1 - 490 - 00



	NOTE
	The standard design appears in bold.

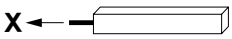
2.9.2 1. Combination overview for SL2-Basic/cable extension



SL2-P...-...-K V X 1-...

Length of cable extension in [m]
1 m = standard
4 m = optional
0 = 0.5 m cable length only for connection version[1)]

Position of cable outlet
X = standard



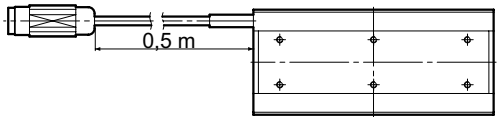
Electrical connection
V = connected

K = Cable extension
A = Connector

1) Connector version AVX= refers to a 0.5 m cable extension with prefabricated connector

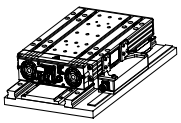
NOTE

- The SL2-Basic version with $I_{rated} \leq 26$ A is available with Intercontec round connector → type AVX0.



- SL2 primaries with a cable length of 2 m are no longer available.

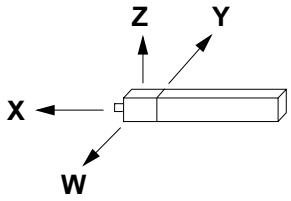
2.9.3 2. Combination overview for SL2-Advance System and SL2-Power System / connector position



SL2-P...-...-S S X S-...

Special design
S = Standard

Position of connector
X = Standard (Y, Z, W)



The following combinations of motor + connector position are not available:
- SL2-050 Power System with connector position Z[1)]
- SL2-100 Power System with connector position W[1)]
- SL2-150 Power System with connector position Z[1)]

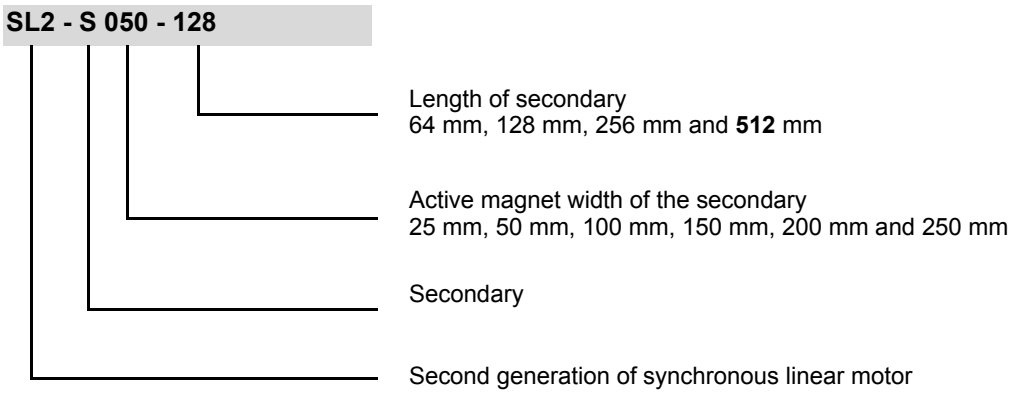
Mechanical design
S = Standard

Connector

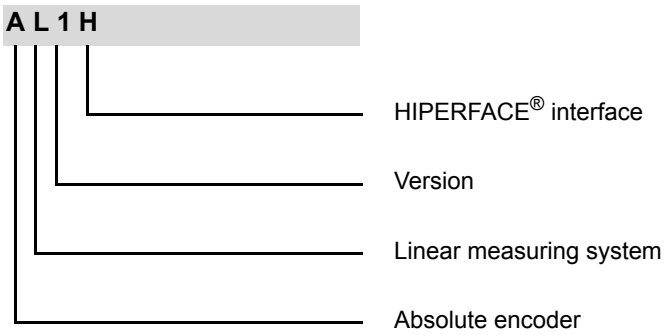
1) Collision with M12 24 V connector

	NOTE
	The standard design appears in bold.

2.9.4 Secondary



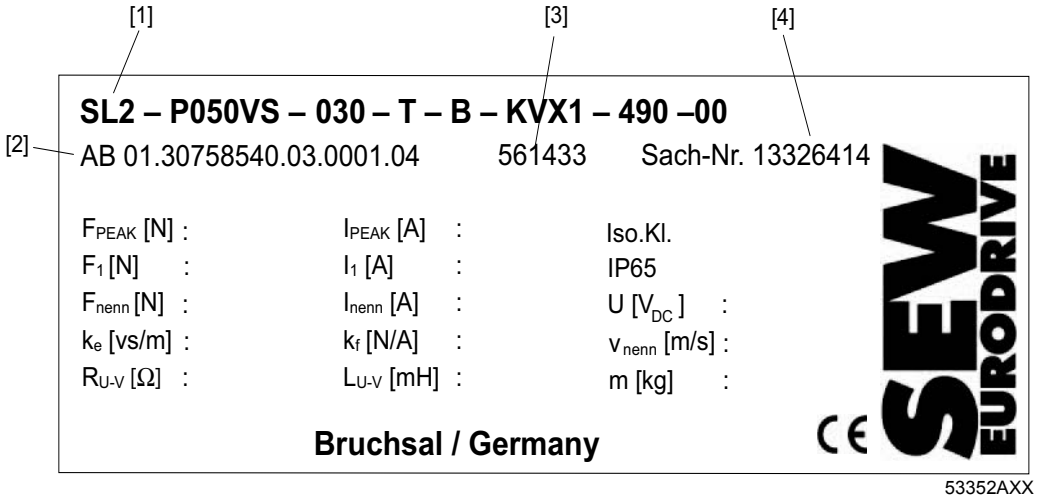
2.9.5 Linear measuring system



2.10 Nameplate

Labels are attached to the primaries and secondaries that show the technical data as follows:

2.10.1 Nameplate SL2-Basic



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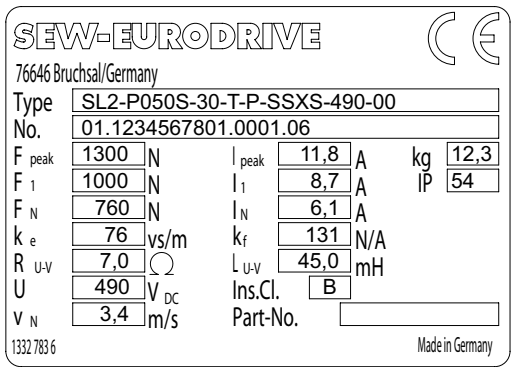
[1]	=	Type code
[2]	=	Customer order number
[3]	=	Production number
[4]	=	Part number
F_{PEAK}	=	Peak force
F_1	=	Maximum force available up to v_1
F_{nenn}	=	Permanent force
k_e	=	Voltage constant
R_{U-V}	=	Winding resistance[1)]
I_{PEAK}	=	Maximum current
I_1	=	Current at F_1
I_{nenn}	=	Rated current
k_f	=	Force factor
L_{U-V}	=	Inductance[1)]
Iso.KL.	=	Insulating material class
IP	=	Degree of protection
U	=	Voltage
v_{nenn}	=	Velocity up to which the rated force is available
m	=	Mass

1) Half the conductor value (UV value) is used for startup.

2.10.2 SL2-Advance System / SL2-Power System nameplate



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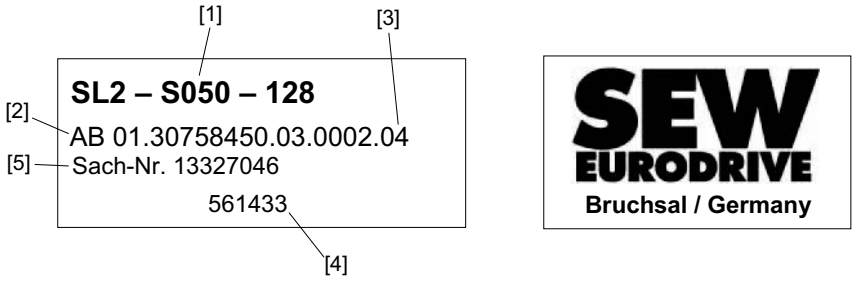
Type	=	Type code
No.	=	Customer order number
F_{PEAK}	=	Peak force
F_1	=	Maximum force available up to v_1
F_N	=	Permanent force
k_e	=	Voltage constant
R_{U-V}	=	Winding resistance[1)]
U	=	Voltage
v_N	=	Velocity up to which the rated force is available
I_{PEAK}	=	Maximum current
I_1	=	Current at F_1
I_N	=	Rated current
k_f	=	Force factor
L_{U-V}	=	Inductance[1)]
Ins.Cl.	=	Insulating material class
Part no.	=	Part number
kg	=	Mass
IP	=	Degree of protection

1) Half the conductor value (UV value) is used for startup.

2.10.3 Nameplate secondary



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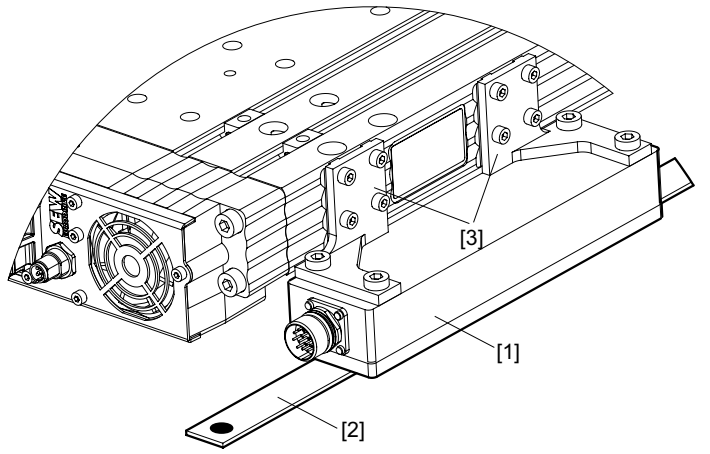
[1] = Type code
[2] = Customer order number
[3] = Date of production
[4] = Production number
[5] = Part number

2.11 AL1H absolute linear measuring system

The linear measuring system is an absolute measuring system optimized for use with MOVIDRIVE® and SL2 linear motors.

The AL1H measuring system has the same design as the LinCoder® L230-P580C2S00000 from SICK / Stegmann.



[1] Linear sensor
[2] Measuring tape
[3] Encoder mount-on components

SEW-EURODRIVE recommends the use of AL1H because in combination with MOVIDRIVE® and the SL2 linear motors, because the user benefits from the following advantages:

- Robustness, e.g. prevent ingress of dust
- Simple mounting tolerances
- Only one commutation search required during initial startup
- Only one reference travel required during initial startup (absolute encoder, up to 40 m travel distance)
- Fast acceleration to 10 g
- Fast travel velocities to 6 m/s,
- Fast assembly due to prepared encoder mount-on components for the SL2-Advance System or SL2-Power System design

These benefits ensure an optimum design-to-cost system solution.

System features in detail:

- Contactless linear measuring system → wear-free
- Magnetic sensing system
- Prefabricated cables from SEW-EURODRIVE
- Material measure is a magnetic tape
- Measuring lengths up to 40 m
- Absolute position determination, no reference run
- Position resolution in combination with MOVIDRIVE® 10 µm or 20 µm
- Reproducibility ±10 µm
- Electronic adjustment capability
- Position sampling time independent of the length
- HIPERFACE® interface

2.11.1 Order designations

	NOTE
	• For more technical data and technical information on the AL1H linear measuring system, refer to chapter 4.15. Information on preparations for assembly and assembly instructions for the AL1H linear measuring system can be found in the operating instructions.

3 Project Planning

3.1 Notes on system construction

3.1.1 Minimizing moved masses

SL2 synchronous linear motors can often be found in applications with high accelerations. The moved masses should be reduced to a minimum to keep the required acceleration forces and the motor sizes as small as possible. You have the following options:

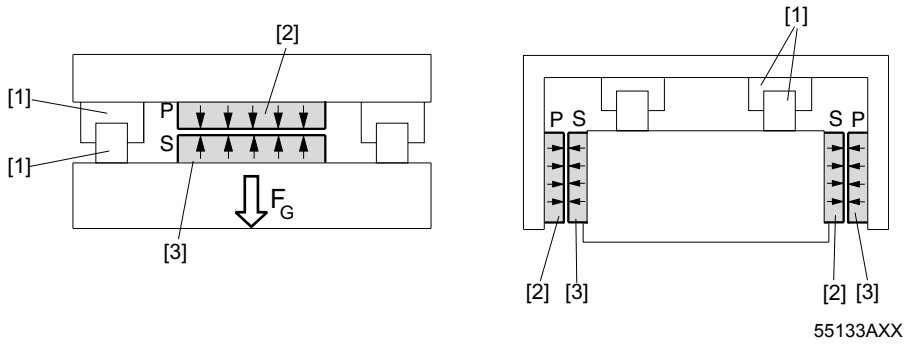
- Integrate the primary in a supporting frame for the construction
- Use aluminum alloys or composite materials
- Design the moved parts in a framework or honeycomb pattern

3.1.2 Compensate magnetic force between primary and secondary

The design will cause magnetic forces between the primary and the permanent magnets of the secondary; these forces can be up to six or eight times the rated thrust.

The magnetic force can always be compensated by:

- Using a linear guide system with high load bearing capacity
- The weight of the load when the linear motor is arranged so that the primary is suspended below the secondary;
- The arrangement of two or more linear motors with opposite magnetic force directions (see the following figure).



[1] Guide system
[2] Primary
[3] Secondary
[F_G] Weight

3.1.3 Secure final positions of travel distance

The final positions of the travel distance must be secured with hardware switches and damping elements to bring the system to a safe standstill in case of a problem. Industrial damping elements, e.g. filled with oil, or systems on an elastomer base have proven themselves as rather useful devices.

3.1.4 Note on linear measuring systems

	NOTE
	Please note the respective data supplied by the manufacturer of linear measuring systems.

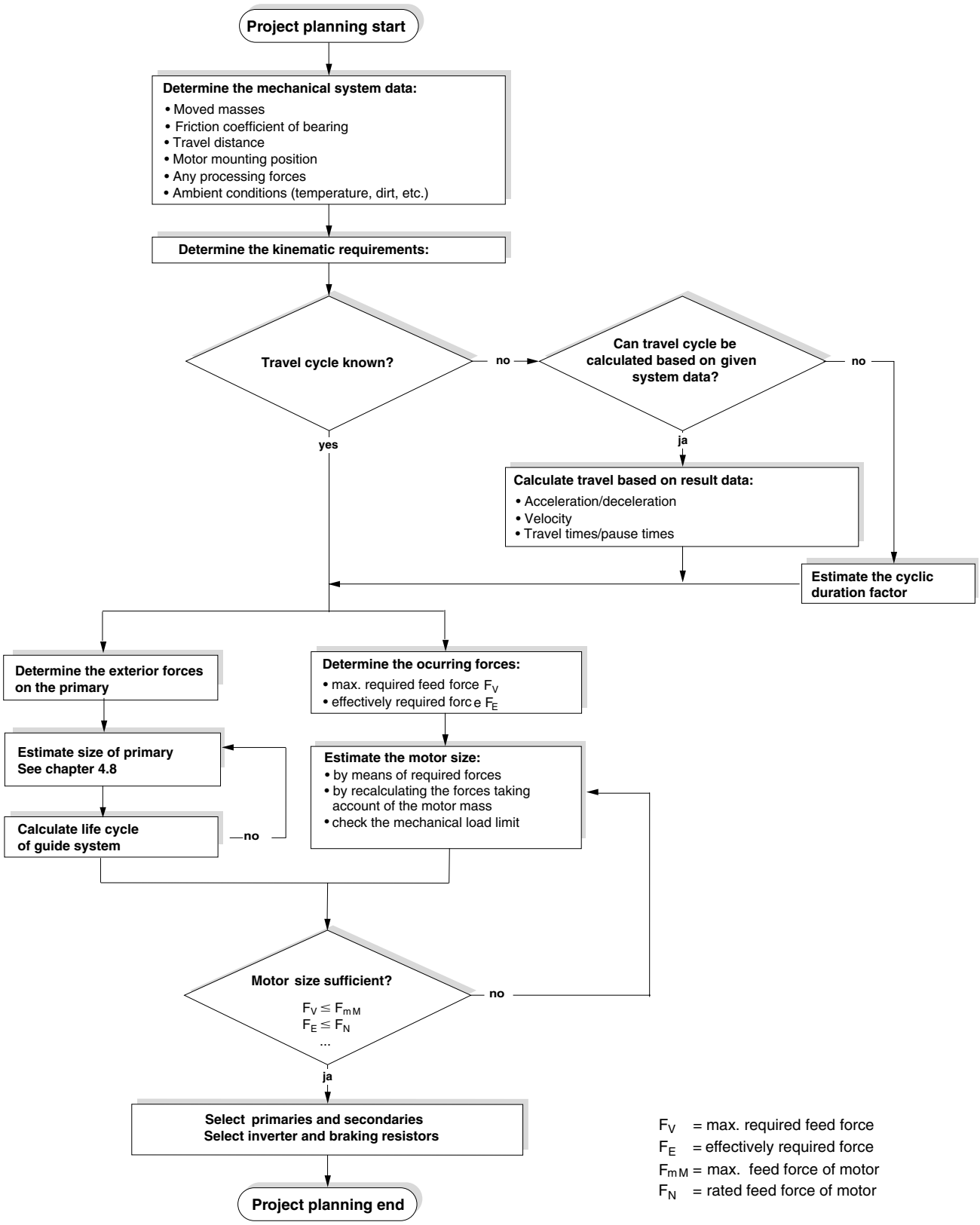
You will always have to meet the high demands made on parallel operation with the linear guide system. You also need to protect "open" linear measuring systems from mechanical stress and heavy contamination. Install the linear measuring system so that it is as torsionally rigid as possible to prevent vibration of the linear sensor at high accelerations.

	STOP
	The operating of vertical axes (hoist axes) is only with the absolute encoder system an installed standard → see chapter 5.5. **In special cases, (such as when the hoists is switched on and the motor is located at the lower stop position) incremental encoders can also be employed.**

	NOTE
	Please contact SEW-EURODRIVE for distances ≥ 20 m.

3.2 Project planning procedure

The following flow diagram illustrates the project planning procedure for an SL2 linear drive. Further information can be found in the following chapters.



F_V = max. required feed force
F_E = effectively required force
F_{mM} = max. feed force of motor
F_N = rated feed force of motor

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3.3 Calculating the travel cycle

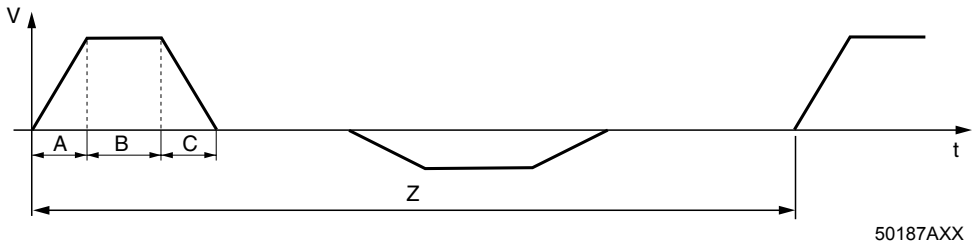
The detailed travel cycle is required to determine the effective drive unit utilization. If the exact travel cycle is not known during the project planning process for the drive, it is possible to continue the calculation with an estimated value for the thermal load (→ "Project planning with known travel cycle" see chapter 3.7).

3.3.1 Project planning with known travel cycle

Calculation of the travel cycles is possible with the basic data for travel distance, acceleration and velocity. We distinguish between trapezoid and triangular velocity curves.

3.3.2 Trapezoid velocity curve

The trapezoid velocity curve (see following figure) is the type most commonly selected. It consists of the acceleration (A), constant travel (B) and deceleration (C) phases.



The trapezoids in the illustration represent composite functions. However, it is necessary to calculate each section separately. Use the formulas listed below for the calculation.

3.3.3 Formulas for travel with constant acceleration:

(A and C-phases, see previous figure)

Required value	Unit	Known values					
		a / s	a / V	a / t	V / t	V / s	t / s
Distance s	m	-	$s = \frac{v^2}{2 \times a}$	$s = 0.5 \times a \times t^2$	$s = 0.5 \times v \times t$	-	-
Velocity v	ms^{-1}	$v = \sqrt{2 \times a \times s}$	-	$v = a \times t$	-	-	$v = \frac{2 \times s}{t}$
Acceleration a	ms^{-2}	-	-	-	$a = \frac{v}{t}$	$a = \frac{v^2}{2 \times s}$	$a = \frac{2 \times s}{t^2}$
Time t	s	$t = \sqrt{\frac{2 \times s}{a}}$	$t = \frac{v}{a}$	-	-	$t = \frac{2 \times s}{v}$	-

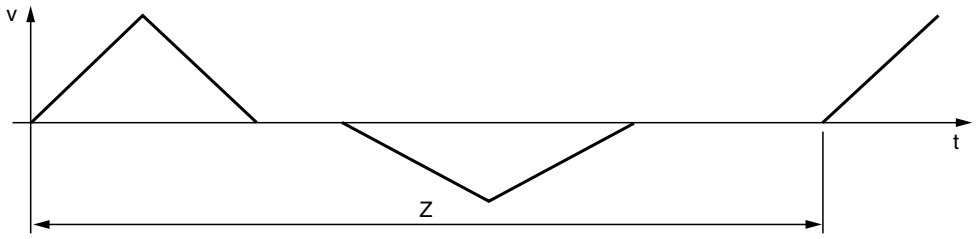
3.3.4 Formulas for uniform travel:

(B-phase, see Figure)

Required value		Known values					
		a / s	a / V	a / t	V / t	V / s	t / s
Distance s	m	-	-	-	$s = v \times t$	-	-
Velocity v	ms^{-1}	-	-	-	-	-	$v = \frac{s}{t}$
Time t	s	-	-	-	-	$t = \frac{s}{v}$	-

3.3.5 Triangular velocity curve

There is no phase with constant velocity, in contrast to the trapezoid curve. The triangle makes it possible to cover the desired travel distance in a given time period with minimum acceleration. The final velocity is higher than that of the trapezoid velocity curve. The disadvantage of this type of velocity curve is the demand on the machine caused by the sudden reversal of acceleration.



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The triangular velocity curve has slightly altered formulas that can serve as assistance for your calculations.

STOP

Please note that the values for time and distance refer to the entire triangle.

Required value	Unit	Known values		
		a / s_{tot}	a / t_{tot}	t_{tot} / s_{tot}
Velocity v	ms^{-1}	$v = \sqrt{a \times s_{tot}}$	$v = a \times \frac{t_{tot}}{2}$	$v = a \times \frac{t_{tot}}{2}$
Acceleration a	ms^{-2}	-	-	$a = \frac{4 \times s_{tot}}{t^2_{tot}}$

3.4 Calculation of drive

Please consider the following when calculating the linear drive as described in the following sections:

- The secondary is installed so that it is stationary
- The primary is installed via a linear guide system with recirculating linear ball bearing and ball chain.

STOP	**STOP**
	Please note that the forces are vectors and that you have to pay close attention to the effective direction!

3.4.1 Estimating the motor size

To calculate the motor mass and take the attractive force of the magnets into account, you will have to estimate the size of the motor that will be used with the following formula:

$F_{mM} = m_L \times [a_m + (g \times \sin \alpha)] \times 1.5$

F_{mM} = maximum thrust of the motor
m_L = load weight
a_m = maximum acceleration of the travel cycle
g = acceleration
α = incline angle of travel distance
1.5 = factor of motor size estimation in manual project planning

The motor is selected from the motor data table in section 4 using the calculated value.

The occurring forces have to be calculated to check the estimated value:

- Friction force
- Force of acceleration
- Maximum required thrust

3.4.2 Friction force

The friction force is calculated based on the friction coefficient of the installed bearing and on the static forces acting on the bearing.

$F_R = (F_G + F_D) \times \mu$

with

$F_G = (m_L + m_P) \times g \times \cos \alpha$

F_R = friction force
F_G = weight force
F_D = magnetic attraction force
m_L = load weight
m_P = weight of primary
g = gravitational acceleration
α = incline angle of travel distance
μ = coefficient of friction (typically 0.005 - 0.01)

3.4.3 Force of acceleration

$$F_A = (m_L + m_p) \times a$$

F_A = force of acceleration
m_L = load weight
m_P = weight of primary
a = acceleration

3.4.4 Maximum required thrust

The maximum required thrust F_V is calculated as follows:

- from the friction force F_R that always has to be overcome during travel;
- from the acceleration force F_A;
- possible additional force F_Z and processing force F_B.

If there are no processing forces F_B, the maximum required thrust F_V is calculated as follows:

$$F_V = F_R + F_A + F_Z$$

If the processing takes place during the acceleration process, F_V is calculated as follows:

$$F_V = F_R + F_A + F_B + F_Z$$

F_V = maximum required thrust
F_R = friction force
F_A = force of acceleration
F_B = processing force
F_Z = additional force

3.4.5 Checking the estimation

If the condition:

$$F_V \leq F_{mM}$$

is met, the estimated motor size is sufficient as far as the calculated maximum forces are concerned.

3.4.6 Effective force

It is necessary to determine the effective force requirement in the travel cycle to determine the thermal motor load. To do so, the total travel cycle must be divided into individual partial cycles at constant load. The effective force is calculated using the following formula:

$$F_E = \sqrt{\frac{\sum(F_i^2 \times t_i)}{t}}$$

F_E = effective force within the entire cycle
F_i = force present in partial cycle
t_i = associated partial cycle duration
t = total cycle time including rest periods

3.4.7 Project planning with unknown travel cycle

If the travel cycle is not known during project planning, it is possible to estimate the thermal load. The necessary input data are the forces developed during acceleration, travel, etc. and the approximate times these forces are required in reference to the entire cyclic duration factor.

$$F_E = \sqrt{\Sigma\left(F_i^2 \times \frac{ED_i}{100}\right)}$$

F_E = effective force within the entire cycle
F_i = force present in partial cycle
ED_i = cyclic duration factor of a partial cycle in relation to the total cyclic duration factor

	NOTE
	The general conditions apply to both calculation modes (known and unknown travel cycle): $F_E \leq F_N$

F_E = effective force within the entire cycle
F_N = rated thrust force of the motor

3.5 Choosing the MOVIDRIVE® or MOVIAXIS® inverter

You can determine the matching size from the assignment motors - servo inverters, see chapter 4.1

	NOTE
	For the TF evaluation of the motor in combination with MOVIDRIVE®, we recommend you use an external evaluation device for the temperature sensor. For detailed information see section 4.11. MOVIDRIVE® MDX61B or MOVIAXIS® MXA can evaluate the temperature sensor directly.

3.6 Length of secondary

The length of the secondary depends on:

- The projected travel distance
- The length of the projected primary, see chapter 4.6

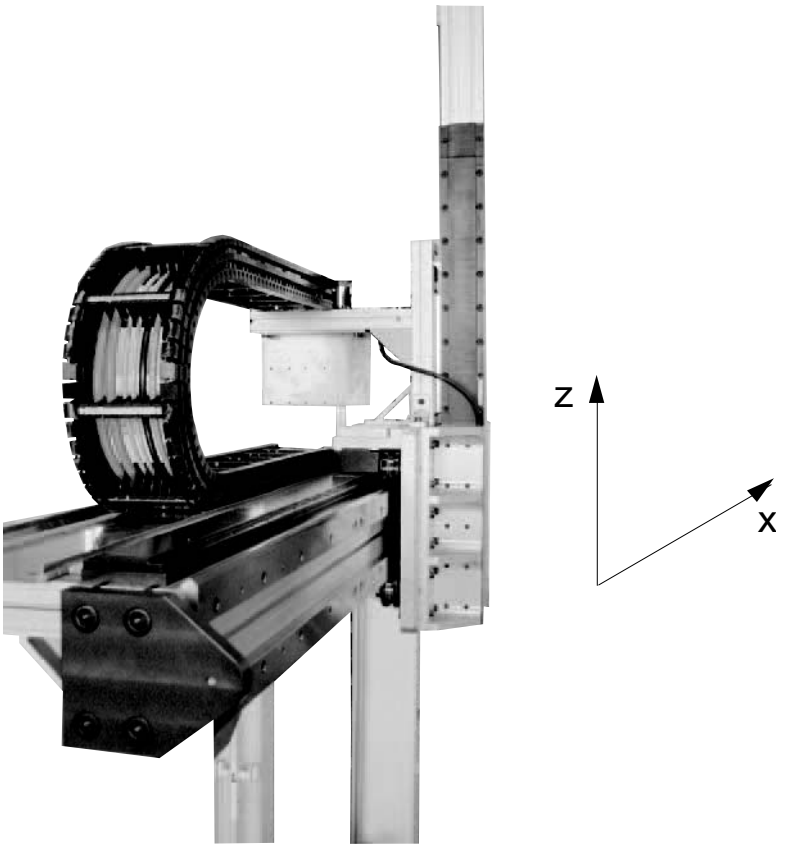
3.6.1 Length of secondary

The required length of the secondary is calculated as follows:

$s_s \geq s + L_p + (2 \times s_E)$

s_s = length of secondary
S = length of the projected travel distance
L_P = length of the projected primary
s_E = limit switch range

3.7 Project planning example: High-speed loading gantry



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A high-speed loading gantry is to be equipped with SL2 linear motors. The calculations are based on the following prerequisites:

Horizontal axis (x-axis):

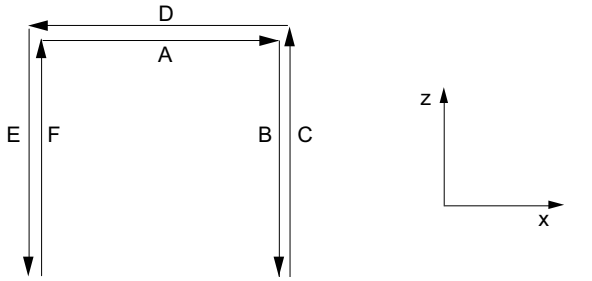
Mass	m_L	= 50 kg + weight of vertical axis
Max. velocity	v_{max}	= 6 m/s
Travel distance	s	= 2 m

Vertical axis (z-axis):

Mass	m_L	= 25 kg
Max. velocity	v_{max}	= 6 m/s
Travel distance	s	= 0.8 m

The cycle time for a product should be kept to a minimum. Therefore, triangular operation with the lowest possible thrust force is the goal for the z-axis, as long as the maximum velocity of 6 m/s is not exceeded by this design.

forward [A]	lower [B]	lift [C]	return [D]	lower [E]	lift [F]
approx. 0.5 s	approx. 0.5 s		approx. 0.5 s	approx. 0.5 s	



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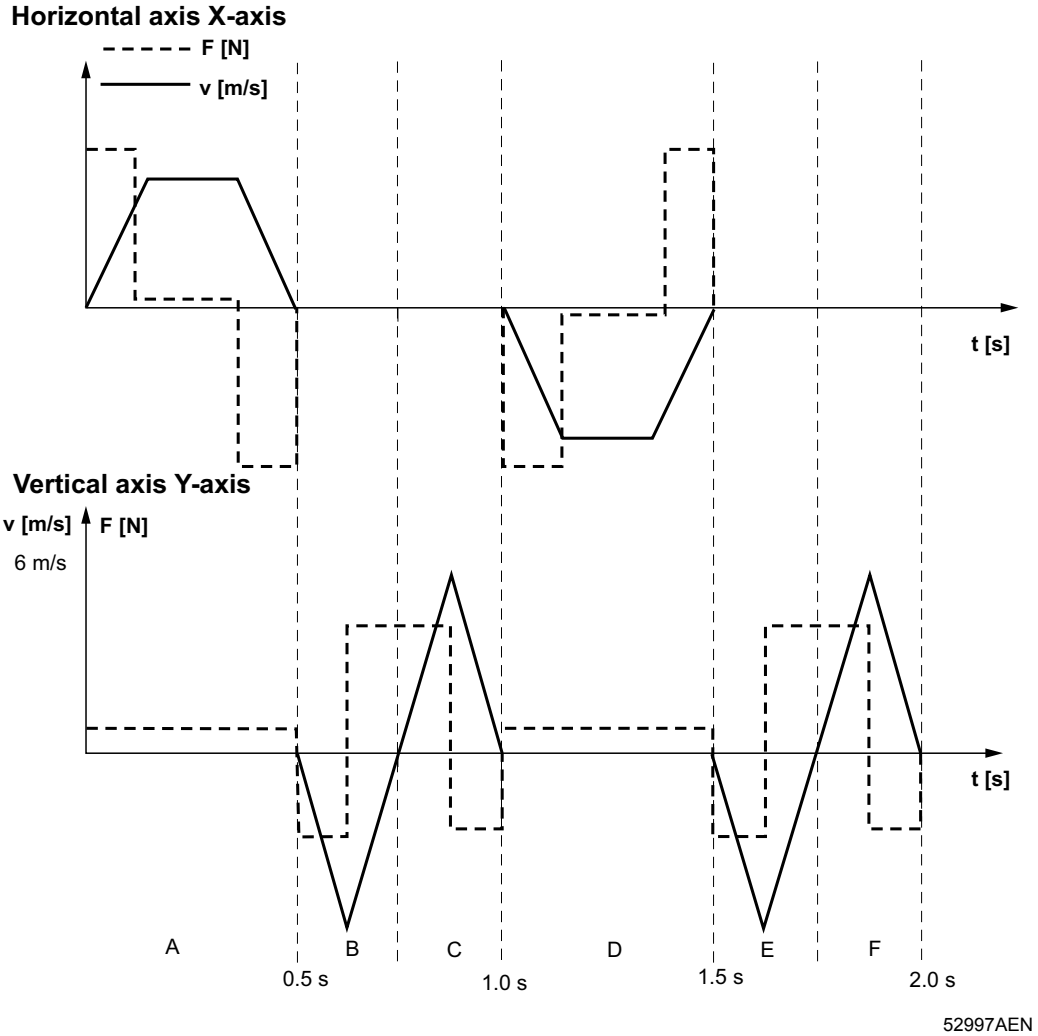
This setup results in the following travel diagrams:



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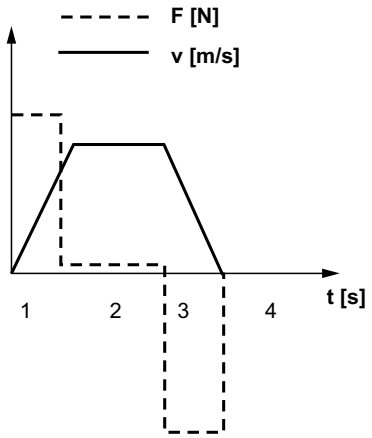
The x-axis is calculated in the first example of the following project planning process and the z-axis in the second example.

3.8 Project planning example 1A trolley (x-axis)

1st step: Determine travel cycle

(machine zero = left resting position, positive direction of travel: to the right)



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The travel diagrams show that the drive is to travel 2 m in 0.5 s. Triangular operation requires a maximum velocity v_{max} of:

$$v_{max} = \frac{2 \times s}{t} = \frac{2 \text{ x } 1 \text{ m}}{0.25 \text{ s}} = 8 \text{ m/s}$$

Since $v_{max} > v_{maxMotor}$ it leaves only trapezoidal operation for the x-axis.

Calculation of the required acceleration with estimated trapezoidal operation at 1/3 acceleration - 1/3 constant travel - 1/3 deceleration:

$$a_{max} = \frac{v_{max}}{\frac{1}{3} \text{ x } t} = \frac{6 \text{ m/s}}{0.1667 \text{ s}} = 36 \text{ m/s}^2$$

Step 2: Estimate the motor size

The total load of the hoist axis is set at 60 kg to estimate the motor size. The hoist axis is usually configured first followed by the travel axis. But since project planning of a hoist axis is based on the project planning for a travel axis, this order should be reversed and an assumed value taken for the weight of the hoist axis.

These are the results for the trolley:

m_L = 50 kg + 60 kg = 110 kg

$F_{mM} = m_L \text{ x } [a_m + (g \text{ x } \sin \alpha)] \text{ x } 1.5 \leq F_1$

F_{mM} = 110 kg x 36 m/s^2 x 1.5 = 5940 N

F_{mM}	= maximum thrust of the motor
m_L	= load weight
a_{max}	= maximum acceleration of the travel cycle
g	= acceleration
α	= incline angle of travel distance

→ From the motor table, an SL2-P-150ML-060 is selected with F_1 = 6000 N, v_1 = 6 m/s, F_D = 17000 N, m_P = 36 kg

Step 3: Calculate the forces in the individual travel sections and test the dynamic load:

$F_R = (F_G + F_D) \times \mu$

$F_R = [(m_L + m_P) \times g \times \cos(\alpha) + F_D] \times \mu$

$F_R = [(110\ kg + 36\ kg) \times 9.81\ m/s^2 + 17000\ N) \times 0.01 = 184.3\ N$

F_R = maximum friction force
F_G = weight force
F_D = magnetic attraction force
m_L = load weight
m_P = weight of primary
g = gravitational acceleration
α = incline angle of travel distance
μ = friction force

Additional process force: None

Dynamic acceleration force:

$F_A = (m_L + m_P) \times a_{max} = (110\ kg + 36\ kg) \times 36\ m/s^2 = 5256\ N$

F_A = maximum required thrust
m_L = load weight
m_P = weight of primary
a_{max} = maximum acceleration

The following values are the result for the individual travel sections according to the formulas listed in 3.3:

Section		**1**	**2**	**3**	**4**
Distance	**[m]**	0,5	1	0,5	0
Time	**[s]**	0.167	0.167	0.167	0.5
End velocity	**[m/s] ([ft/s])**	6	6	0	0
Acceleration	**[m/s²]**	36	0	- 36	0
Feed force	**[N]**	$F_A - F_R$	F_R	$-F_A + F_R$	$F_A + F_Z + F_R$
		5440.3	184.3	–5071.7	0

These calculations place all operating points within the dynamic limit force characteristic and the maximum thrust is:

$F_{vmax} \leq F1$

$F_{vmax} = F_A + F_R = 5440.3\ N$

$5440.3\ N \leq 6000\ N$

Step 4: Calculate the effective force, mean velocity and test the thermal load

The effective force and the mean velocity are calculated to determine the thermal load of the motor.

$$F_E = \sqrt{\frac{\sum(F_i^2 \times t_i)}{t}}$$

F_E = effective force within the entire cycle
F_i = force present in partial cycle
t_i = associated partial cycle duration
t = total cycle time including rest periods

$$F_E = \sqrt{\frac{(5440.3\ N)^2 \times 0.167\ s + (184.3\ N)^2 \times 0.167s - (5071.7\ N)^2 \times 0.167\ s}{1\ s}}$$

F_E = 3040.4 N

Since v_{max} is always $\leq v_1$ during the entire travel cycle, the median velocity is automatically < v_{rated}.

The condition:

$F_E \leq F_{rated}$ = 3600 N

has been met and the thermal operating point is located within the characteristics for S1 operation.

Step 5: Selecting the MDX_B inverter

Selection using the selection table in chapter 4.2. A compact servo inverter MOVIDRIVE® is to be selected.

→ When the rated velocity is 6 m/s and F_{max} = 5440 N, an MDX61B030300 is selected.

Step 6: Select the braking resistor

The maximum requested power and the average power with activated braking resistor are determined to select the braking resistor. The braking resistor is active in section 3.

Maximum power of the braking resistor at the beginning of section 3:

$P_{max} = F_{max} \times v_{max} \times \eta = 5071.7\ N \times 6\ m/s \times 0.9 = 27.4\ kW$

P_{max} = maximum power of the braking resistor
F_{max} = maximum force
v_{max} = maximum velocity
η = efficiency of the guide

Section 3:

Mean braking power:

$$P_3 = \frac{P_{max}}{2} = 13.7\ kW$$

P_3 = mean power of the braking resistor
P_{max} = maximum power of the braking resistor

With a cyclic duration factor cdf of

$$cdf = \frac{t_3}{t} = \frac{0.167\ s}{1\ s} = 17\ \%$$

→ Use the MOVIDRIVE® system manual to help you select a braking resistor BW012-050.

Step 7: Determine the secondaries for the travel distance

The required length of the secondary is calculated as follows:

$s_s \geq s + L_P + (2 \times s_e) = 2.0\ m + 0.72\ m = 2.72\ m$

The limit switch range was set to 10 mm for each end.

If the drive exceeds the limit switch, it will be decelerated by the limit switch damper. In this case, the primary must not completely cover the secondary.

The following secondaries are selected:

5 x 512 mm units SL2-S-150-512

3 x 64 mm units SL2-S-150-064

.

Step 8: Select additional components

You will need additional components to perform project planning for the entire drive

SEW-EURODRIVE supplies:

1. HIPERFACE® absolute encoder (SICK / Stegmann AL1H from SEW)
2. Motor and encoder cables approved for use with cable carriers

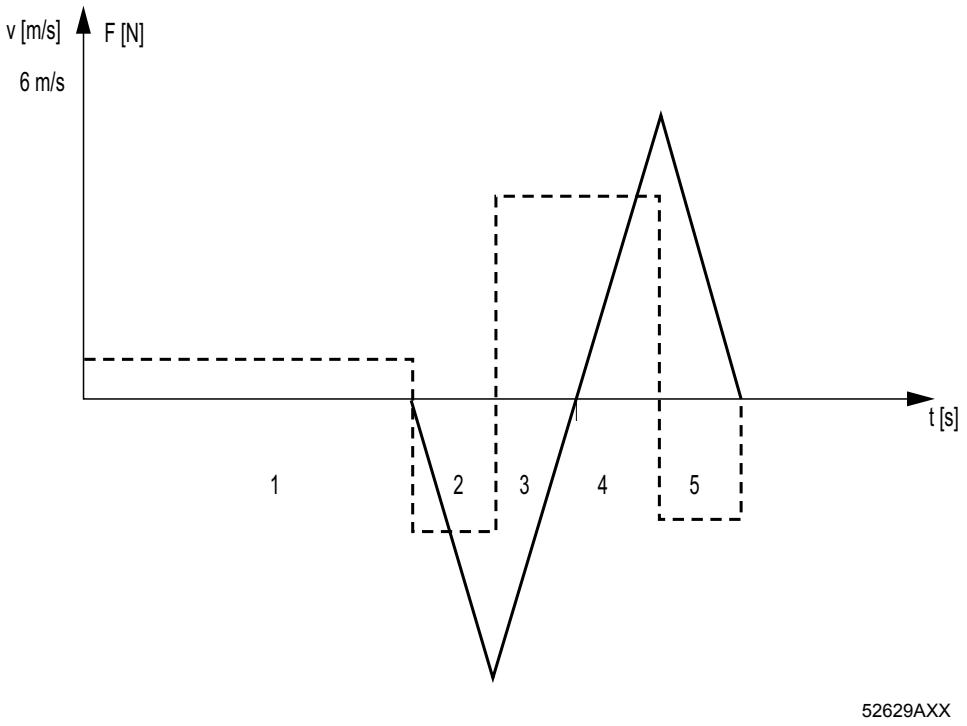
The following components are **not** included in the scope of delivery from SEW-EURODRIVE:

1. For MOVIDRIVE® MDX61B, option card DEH to evaluate the AL1H HIPERFACE® encoder
2. Linear guides
3. Cable carrier
4. Limit switch damper
5. External emergency brake, if necessary

3.9 Project planning example 1B hoist (z-axis)

1st step: Determine travel cycle

(Machine zero = upper resting position, positive direction of travel: to the top)



1, 2, 3, 4, 5 = sections of the travel cycle

Calculation of the necessary acceleration based on triangular operation:

$$a_{max} = \frac{v_{max}^2}{2 \times \frac{s}{2}} = \frac{(6\ \text{m/s})^2}{0.8\ \text{m}} = 45\ \text{m/s}^2$$

a_{max} = maximum acceleration
v_{max} = maximum velocity
s = travel distance

$$t = \frac{v_{max}}{a_{max}} = \frac{6\ \text{m/s}}{45\ \text{m/s}^2} = 0.133\ \text{m/s}$$

t = time
v_{max} = maximum velocity
a_{max} = maximum acceleration

Step 2: Estimate motor size

$F_{mN} \leq F_1$

$F_{mN} = m_L \times [a_{max} + (g \times \sin 90°)] \times 1.5$

$F_{mN} = 25\ kg \times (45\ m/s^2 + 9.81\ m/s^2) \times 1.5 = 2055\ N$

F_{mN}	= maximum motor thrust
m_L	= mass
a_{max}	= maximum acceleration
g	= acceleration

→ An SL2-P-100ML-060 with F_1 = 3000 N, v_1 = 6 m/s, F_D = 8570 N, m_P = 18.9 kg is selected from the motor table.

Step 3: Calculation of the forces / testing of dynamic load

Friction force:

$F_R = (F_G + F_D) \times m$

$F_R = [(m_L + m_P) \times g \times \cos (90°) + F_D] \times m = 8570\ N \times 0.01 = 85.7\ N$

F_R	= maximum friction force
F_G	= weight force
F_D	= magnetic attraction force
m_L	= load weight
m_P	= weight of primary
g	= gravitational acceleration
α	= incline angle of travel distance
μ	= friction force

Weight additional process force (weight + additional weight):

$F_Z = (m_L + m_P + m_Z) \times g = (25\ kg + 18.9\ kg + 5\ kg) \times 9.81\ m/s^2 = 480\ N$

F_Z	= additional process force
m_L	= load weight
m_P	= weight of primary
m_Z	= additional mass
g	= gravitational acceleration

(the holding brake of the hoist, cable carrier with cable and encoder were entered with 5 kg)

Dynamic acceleration force:

$F_A = (m_L + m_P + m_Z) \times v_{max} = (25\ kg + 18.9\ kg + 5\ kg) \times 45\ m/s^2 = 2200\ N$

F_A	= maximum required thrust
m_L	= load weight
m_P	= weight of primary
m_Z	= additional mass
a_{max}	= maximum acceleration

These values result in the following individual motion segments:

Section		1	2	3	4	5
Distance	**[m]**	0	- 0.4	- 0.4	0.4	0.4
Time	**[s]**	0.5	0.133	0.133	0.133	0.133
End velocity	**[m/s] ([ft/s])**	0	- 6.0	0	6	0
Acceleration	**[m/s^2]**	0	- 45.0	45.0	45.0	- 45.0
Feed force	**[N]**	$F_Z - F_R$	$-F_A + F_Z - F_R$	$F_A + F_Z - F_R$	$F_A + F_Z + F_R$	$-F_A + F_Z + F_R$
		394.3	-1805.7	2594.3	2765.7	-1634.3

These calculations place all operating points within the dynamic limit force characteristic and the maximum thrust is

$F_{vmax} \leq F_1$

$F_{vmax} = F_A + F_Z + F_R = 2765.7$ N

$2765.7\ N \leq 3000\ N$

Step 4: Calculation of the effective force, medium velocity and testing of the thermal loading

The effective force and the mean velocity are calculated to determine the thermal load of the motor.

$$F_E = \sqrt{\frac{\sum(F_i^2 \times t_i)}{t}}$$

F_E = effective force within the entire cycle
F_i = force present in partial cycle
t_i = associated partial cycle duration
t = total cycle time including rest periods

$$F_E = \sqrt{\frac{[(394.3N)^2 \times 0.5s + (1805.7N)^2 \times 0.133s + (2594.3N)^2 \times 0.133s + (2765.7N)^2 \times 0.133s + (1634.3N)^2 \times 0.133s]}{1\ s}}$$

$F_E = 1667$ N

Since v_{max} is always $\leq v_1$ during the entire travel cycle, the median velocity is automatically $< v_{rated}$.

The condition:

$F_E \leq F_{rated} = 1800$ N

has been met and the thermal operating point is located within the characteristics for S1 operation.

Step 5: Selecting the MDX_B inverter

Choosing an inverter from the table in chapter 4.2 of maximum forces for MOVIDRIVE®

→ Inverter according to:

$F_{vmax} \leq F_{table}$

→ with MOVIDRIVE®

2765.7 N < 3700 N

and meets the requirement.

STOP	**STOP**
	See MOVIDRIVE® system manual chapter 5.7 for testing of electrically carrying hoists.

$$I_{cont} = \frac{1}{\sqrt{2}} \times I_{rated}$$

$$I_{cont} = \frac{1}{\sqrt{2}} \times 46\ A = 32.6\ A$$

Force constants/reference point:

$$k_N = \frac{F_{rated}}{I_{rated}} = \frac{1800\ N}{23{,}3\ A} = 77.3\ N/A$$

F_{cont} = 32.5 A × 77.3 N/A = 2512.25 N

$F_{cont} > F_{vsection1}$

2512.25 N > 394.3 N

→ fulfilled.

Step 6: Select the braking resistor

The maximum requested power and the average power with activated braking resistor are determined to select the braking resistor. The braking resistor is active in sections 3 and 5.

Maximum power of the braking resistor at the beginning of section 3 of the travel cycle:

$P_{max} = F_{max} \times v_{max} \times \eta$ = 2594.3 N x 6 m/s x 0.9 = 14 kW

P_{max} = maximum power of the braking resistor
F_{max} = maximum force
v_{max} = maximum velocity
η = efficiency of the linear motor

Travel cycle section 3:

Mean braking power:

$$P_3 = \frac{P_{max}}{2} = 7 \text{ kW}$$

P_3 = mean power of the braking resistor
P_{max} = maximum power of the braking resistor

Cyclic duration factor: $t_3 = 0.133$ s

Travel cycle section 5:

Mean braking power:

$$P_5 = \frac{1}{2} \times F_{max} \times v_{max} \times \eta = 0{,}5 \times 1634{,}3 \text{ N} \times 6 \text{ m/s} \times 0{,}9 = 4{,}4 \text{ kW}$$

P_5 = mean power of the braking resistor
F_{max} = maximum force
v_{max} = maximum velocity
h = efficiency of the linear motor

Cyclic duration factor: $t_5 = 0.133$ s

Travel cycle sections 3 and 5:

Mean power:

$$P_{\varnothing} = \frac{(P_3 \times t_3) + (P_5 \times t_5)}{t_3 + t_5} = \frac{(7 \text{ kW} \times 0.133 \text{ s}) + (4.4 \text{ kW} \times 0.133 \text{ s})}{0.266 \text{ s}} = 5.7 \text{ kW}$$

P∅ = mean power of the braking resistor
P_5 = mean power of the braking resistor
t_5 = cyclic duration factor
P_3 = mean power of the braking resistor
t_3 = cyclic duration factor

with a cyclic duration factor of:

$$cdf = \frac{t_3 + t_5}{t} = \frac{0.266 \text{ s}}{1 \text{ s}} = 27 \%$$

→ The braking resistor BW018-035 is selected with the help of the MOVIDRIVE® system manual.

Step 7: Determine the secondaries for the travel distance

The required length of the secondary is calculated as follows:

$s_S \geq s + L_P + (2\ s_e) = 0.8\ m + 0.544\ m + 0.02\ m = 1.346\ m$

s_s = length of secondary
S = length of the projected travel distance
L_P = length of the projected primary
s_E = limit switch range

The limit switch range was set to 10 mm for each end.

If the drive exceeds the limit switch, it will be decelerated by the limit switch damper. In this case, the primary must not completely cover the secondary.

The following secondaries are selected:

2 x 512 mm units SL2-S-100-512

1 x 256 mm units SL2-S-100-256

1 x 128 mm units SL2-S-100-128

.

Step 8: Select additional components

You will need additional components to perform project planning for the entire drive

SEW-EURODRIVE supplies:

1. One HIPERFACE® absolute encoder (SICK / Stegmann AL1H from SEW-EURODRIVE)
2. Motor and encoder cables approved for use with cable carriers

The following components are **not** included in the scope of delivery from SEW:

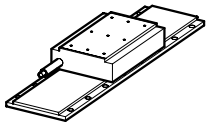
1. For MOVIDRIVE® MDX61B, option card DEH to evaluate the AL1H HIPERFACE® encoder
2. Linear guides
3. Cable carrier
4. Limit switch damper
5. External emergency brake, if necessary

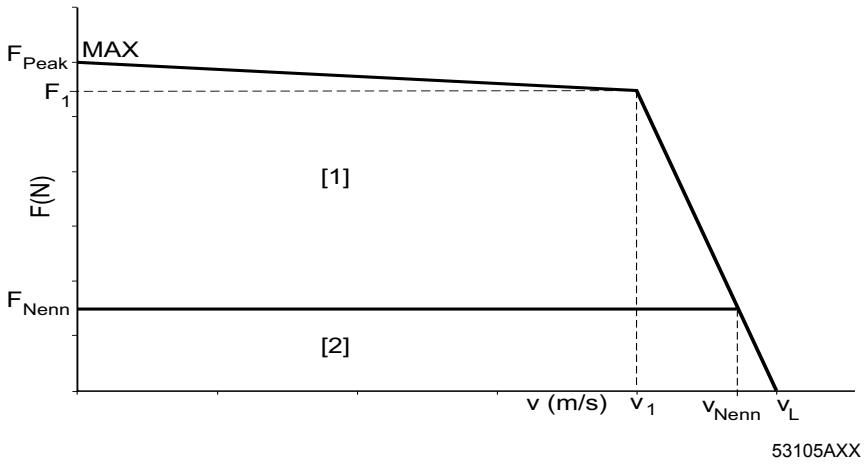
3.10 Checklist for project planning of SL2 linear motors

	NOTE
	You will find a checklist for project planning of SL2 linear motors in section 6. Make a copy to use in the process.

4 Technical Data

4.1 SL2-Basic motor data





[1] = Dynamic limit forces
[2] = Thermal limit forces
F_{rated} = Permanent force
when mounting to a horizontal aluminum cooling surface with
- **four times primary flange surface**
- **10 mm thickness**
- **up to an ambient temperature of up to 40 °C**
- **an installation altitude of up to 1000 m**

F_1 = Maximum force available up to v_1
F_{Peak} = Maximum force
v_L = Theoretical maximum traveling velocity
v_1 = Velocity up to which force F_1 is available
v_{rated} = Velocity up to which the rated force is available
I_{rated} = Rated current
I_1 = Current at F_1
I_{Peak} = Maximum current
F_D = Force through magnetic attraction
R_1 = Resistance between connection phase and star point
L_1 = Inductivity between connection phase and star point

Motor type	Force				Velocity		Current			Winding resistance	Inductance	Cable cross section[1)]
	F_{Peak} [N]	F_1 [N]	F_{rated} [N]	F_D [N]	v_1 [m/s]	v_{rated} [m/s]	I_{Peak} [A]	I_1 [A]	I_{rated} [A]	R_1 [Ω]	L_1 [mH]	[mm]
SL2-025VS	330	240	125	750	3	3.2	3.0	2.0	0.95	22.5	100	3 x 1.5
SL2-025VS	330	225	125	750	6	6.8	6.0	4.0	2.0	4.75	25.5	3 x 1.5
SL2-025S	650	470	240	1450	1.5	1.6	3.0	1.95	0.9	45.1	201	3 x 1.5
SL2-025S	650	460	240	1450	3	3.2	6.0	3.9	1.8	11.2	100.5	3 x 1.5
SL2-050VS	650	500	280	1480	3 6	3.4 8.0	6.0 13.9	4.4 10.3	2.2 5.3	7.0 1.2	43 8	3 x 1.5 3 x 1.5
SL2-050S	1300	1000	560	2880	1 3 6	1.3 3.4 6.9	4.8 11.8 24.5	3.5 8.7 17.8	1.8 4.5 9.0	24.4 3.6 0.8	130 27.5 6.0	3 x 1.5 3 x 1.5 3 x 1.5
SL2-050M	1950	1500	840	4300	1 3 6	1.1 3.3 6.4	5.9 18.0 33.0	4.4 12.8 24.6	2.2 6.5 12.6	21.0 2.4 0.6	130 16.5 4.5	3 x 1.5 3 x 1.5 3 x 1.5
SL2-050ML	2600	2000	1120	5700	1 3 6	1.1 3.4 6.9	7.8 24.0 48.0	5.8 17.8 35.5	2.9 9.1 18.2	15.2 1.6 0.4	100 11.5 3.0	3 x 1.5 3 x 1.5 3 x 2.5

Motor type	Force				Velocity		Current			Winding resistance	Inductance	Cable cross section[1]
	F_{Peak} [N]	F_1 [N]	F_{rated} [N]	F_D [N]	v_1 [m/s]	v_{rated} [m/s]	I_{Peak} [A]	I_1 [A]	I_{rated} [A]	R_1 [Ω]	L_1 [mH]	[mm]
SL2-100VS	1325	1000	600	2950	1 3 6	1.1 3.8 6.9	4.8 14.2 24.6	3.4 10.3 17.8	1.9 5.6 9.7	19.2 1.9 0.65	142.5 15.5 6.0	3 x 1.5 3 x 1.5 3 x 1.5
SL2-100S	2650	2000	1200	5760	1 3 6	1.1 3.4 6.9	8.0 25.0 49.0	5.8 17.8 35.5	3.1 9.7 20	12.5 1.3 0.3	100 11.5 3.0	3 x 1.5 3 x 1.5 3 x 2.5
SL2-100M	3970	3000	1800	8570	1 3 6	1.3 3.2 6.9	14.2 35.0 75.0	10.3 24.6 53.3	5.6 13.5 29.2	5.9 1.0 0.2	46.0 9.0 2.0	3 x 1.5 3 x 1.5 3 x 4.0
SL2-100ML	5300	4000	2400	11380	1 3 6	1.1 3.4 7.0	16.0 49.0 100.0	11.5 35.5 74.4	6.3 19.5 40.7	6.3 0.6 0.1	50.0 6.5 1.5	3 x 1.5 3 x 2.5 3 x 6.0
SL2-150VS	2000	1500	900	4420	1 3 6	1.1 3.3 6.4	6.1 18.0 35.0	4.4 12.8 24.6	1.9 7.0 13.5	16.1 1.75 0.5	127.5 16.0 4.5	3 x 1.5 3 x 1.5 3 x 1.5
SL2-150S	3900	3000	1800	8640	1 3 6	1.1 3.2 6.4	12.0 33.5 67.0	8.7 24.5 49.0	4.8 13.5 27.0	8.0 0.9 0.2	65.0 9.0 2.5	3 x 1.5 3 x 1.5 3 x 4.0
SL2-150M	5800	4500	2700	12860	1 3 6	1.1 3.4 6.4	18.0 53.0 100.0	13.1 39.0 74.5	7.2 21.5 40.7	5.4 1.1 0.1	42.5 6.0 1.5	3 x 1.5 3 x 2.5 3 x 6.0
SL2-150ML	7700	6000	3600	17000	1 3 6	1.1 3.7 6.4	24.0 76.0 132.0	17.4 56.7 98.0	9.4 31.0 53.8	4.0 0.3 0.1	32.5 3.5 1.3	3 x 1.5 3 x 4.0 3 x 6.0
SL2-200VS	2700	2000	1260	5900	1 3 6	1.1 3.4 7.6	8.1 25.0 55.0	5.7 17.8 39.2	3.3 10.2 22.5	11.2 1.2 0.2	100 11.5 2.5	3 x 1.5 3 x 1.5 3 x 2.5
SL2-200S	5200	4000	2520	11520	1 3 6	1.1 3.4 7.2	15.6 48.2 101	11.5 35.5 74.4	6.6 20.4 42.7	5.6 0.6 0.1	50.0 6.0 1.5	3 x 1.5 3 x 2.5 3 x 6.0
SL2-200M	7800	6000	3780	17150	1 3	1.1 3.4	23.4 72.0	17.2 53.3	9.9 30.1	3.7 0.4	32 3.3	3 x 1.5 3 x 4.0
SL2-200ML	10350	8000	5040	22780	1 3	1.1 3.6	30.6 100.0	22.7 74.4	13.0 42.8	2.9 0.2	25 3	3 x 1.5 3 x 6.0
SL2-250VS	3170	2400	1500	7370	1 3 6	1.2 3.5 6.6	10.0 30.0 57.0	7.3 21.8 41.2	4.1 12.4 23.5	8.4 0.9 0.2	77.5 8.0 2.3	3 x 1.5 3 x 1.5 3 x 2.5
SL2-250S	6300	4800	3000	14400	1 3 6	1.1 3.3 6.6	18.7 57.0 113.0	13.6 41.2 82.4	7.8 23.5 47.0	4.5 0.4 0.1	40 4.5 1.2	3 x 1.5 3 x 4.0 3 x 6.0
SL2-250M	9450	7200	4500	21430	1 3	1.1 3.5	30.0 90.0	21.8 65.0	12.4 37.2	2.6 0.3	13.5 2.6	3 x 1.5 3 x 6.0
SL2-250ML	12600	9600	6000	28450	1 3	1.1 3.3	37.0 113.0	27.2 82.5	15.5 47.0	2.2 0.2	20 2.2	3 x 1.5 3 x 6.0

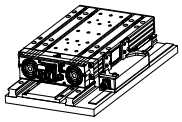
1) Cable cross section on SL2-Basic primary (for configuration of cable cross sections for the inverter. see chapter 4.11)

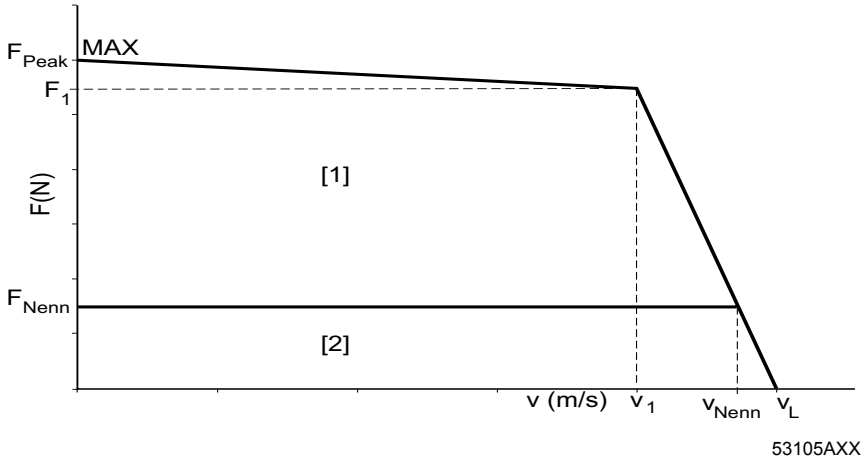
Electrical values refer to sine-shaped commutation and are indicated as effective values or refer to them.

NOTE

For inverter assignment, see section 4.4.

4.2 SL2-Advance System motor data





[1] = Dynamic limit forces
[2] = Thermal limit forces
F_{rated} = Permanent force

Rated characteristics refer to operation at
- **an ambient temperature of 40 °C**
- **an installation altitude of up to 1000 m**

F_1 = Maximum force available up to v_1
F_{Peak} = Maximum force
v_L = Theoretical maximum traveling velocity
v_1 = Velocity up to which force F_1 is available
v_{rated} = Velocity up to which the rated force is available
I_{rated} = Rated current
I_1 = Current at F_1
I_{Peak} = Maximum current
F_D = Force through magnetic attraction

Motor type	Force				v_1	Current			Cable cross section	To cable lengths	Part no. cable	Cable cross section	To cable lengths	Part no. cable
	F_{Peak}	F_1	F_{rated}	F_D		I_{Peak}	I_1	I_{rated}						
	[N]				[m/s] ([ft/s])	[A]			[mm²]	[m]		[mm²]	[m]	
SL2-050VS	650	500	280	1480	- 3 6	- 6.0 13.9	- 4.4 10.3	- 2.2 5.3	1.5 1.5	100 100	0590 631 3 0590 631 3			
SL2-050S	1300	1000	560	2880	1 3 6	4.8 11.8 24.5	3.5 8.7 17.8	1.8 4.5 9.0	1.5 1.5 1.5	100 100 57	0590 631 3 0590 631 3 0590 631 3	2.5	100	0590 483 8
SL2-050M	1950	1500	840	4300	1 3 6	5.9 18.0 33.0	4.4 12.8 24.6	2.2 6.5 12.6	1.5 1.5 2.5	100 100 71	0590 631 3 0590 631 3 0590 632 6	4.0	100	0590 484 6
SL2-050ML	2600	2000	1120	5700	1 3 6	7.8 24.0 48.0	5.8 17.8 35.5	2.9 9.1 18.2	1.5 1.5 4.0	100 57 100	0590 631 3 0590 631 3 0590 484 6	2.5	100	0590 483 8
SL2-100VS	1325	1000	600	2950	1 3 6	4.8 14.2 24.6	3.4 10.3 17.8	1.9 5.6 9.7	1.5 1.5 1.5	100 100 57	1333 116 7 1333 116 7 1333 116 7	2.5	100	0199 192 2
SL2-100S	2650	2000	1200	5760	1 3 6	8.0 25.0 49.0	5.8 17.8 35.5	3.1 9.7 20	1.5 1.5 4.0	100 57 100	1333 116 7 1333 116 7 0199 194 9	2.5	100	0199 192 2
SL2-100M	3970	3000	1800	8570	1 3 6	14.2 35.0 75.0	10.3 24.6 53.3	5.6 13.5 29.2	1.5 2.5 6.0	100 71 100	1333 116 7 1333 117 5 0199 196 5	4.0	100	0199 194 9
SL2-100ML[1)]	5300	4000	2400	11380	1 3	16.0 49.0	11.5 35.5	6.3 19.5	1.5 4.0	100 100	1333 116 7 0199 194 9			
SL2-150S	3900	3000	1800	8640	1 3 6	12.0 33.5 67.0	8.7 24.5 49.0	4.8 13.5 27.0	1.5 2.5 6.0	100 71 100	1333 116 7 1333 117 5 0199 196 5	4.0	100	0199 194 9
SL2-150M[1)]	5800	4500	2700	12860	1 3	18.0 53.0	13.1 39.0	7.2 21.5	1.5 4.0	100 82	1333 116 7 0199 194 9			
SL2-150ML	7700	6000	3600	17000	1 3	24.0 76.0	17.4 56.7	9.4 31.0	1.5 6.0	57 77	1333 116 7 0199 196 5	2.5 10.0	100 100	0199 192 2 0199 198 1

1) Not available in speed class 6 m/s

Electrical values refer to sine-shaped commutation and are indicated as effective values or refer to them.

NOTE

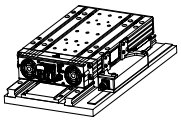
R_1, and L_1 see chapter 4.1 "SL2-Basic motor data"

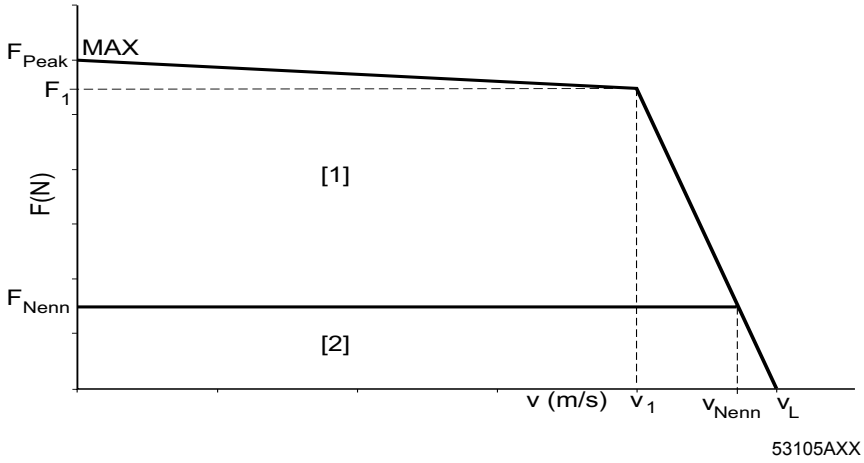
F_{peak} = identical to F_{peak} of SL2-Basic

NOTE

For inverter assignment, see chapters 4.4 and 4.5.

4.3 SL2-Power System motor data





[1] = Dynamic limit forces
[2] = Thermal limit forces
F_{rated} = Permanent force

Rated characteristics refer to operation at
- **an ambient temperature of 40 °C**
- **an installation altitude of up to 1000 m**

F_1 = Maximum force available up to V_1
F_{Peak} = Maximum force
v_L = Theoretical maximum traveling velocity
v_1 = Velocity up to which force F_1 is available
v_{rated} = Velocity up to which the rated force is available
I_{rated} = Rated current
I_1 = Current at F_1
I_{Peak} = Maximum current
F_D = Force through magnetic attraction

Motor type	Force				v_1	Current			Cable cross section	To cable lengths	Part no. cable	Cable cross section	To cable lengths	Part no. cable
	F_{Peak}	F_1	F_{rated}	F_D		I_{Peak}	I_1	I_{rated}						
	[N]				[m/s] ([ft/s])	[A]			[mm²]	[m]		[mm²]	[m]	
SL2-050VS	650	500	400	1480	- 3 6	- 6.0 13.9	- 4.4 10.3	- 3.1 7.6	1.5 1.5	100 100	0590 631 3 0590 631 3			
SL2-050S	1300	1000	760	2880	1 3 6	4.8 11.8 24.5	3.5 8.7 17.8	2.4 6.1 12.2	1.5 1.5 1.5	100 100 57	0590 631 3 0590 631 3 0590 631 3	2.5	100	0590 483 8
SL2-050M	1950	1500	980	4300	1 3 6	5.9 18.0 33.0	4.4 12.8 24.6	2.6 7.6 14.7	1.5 1.5 2.5	100 100 71	0590 631 3 0590 631 3 0590 632 6	4.0	100	0590 484 6
SL2-050ML	2600	2000	1280	5700	1 3 6	7.8 24.0 48.0	5.8 17.8 35.5	3.3 10.4 20.8	1.5 1.5 4.0	100 57 82	0590 631 3 0590 631 3 0590 484 6	2.5	100	0590 483 8
SL2-100VS	1325	1000	780	2950	1 3 6	4.8 14.2 24.6	3.4 10.3 17.8	2.5 7.3 12.6	1.5 1.5 1.5	100 100 57	1333 116 7 1333 116 7 1333 116 7	2.5	100	0199 192 2
SL2-100S	2650	2000	1570	5760	1 3 6	8.0 25.0 49.0	5.8 17.8 35.5	4.1 12.7 25.5	1.5 1.5 6.0	100 57 100	1333 116 7 1333 116 7 0199 196 5	2.5	100	0199 192 2
SL2-100M	3970	3000	2540	8570	1 3 6	14.2 35.0 75.0	10.3 24.6 53.3	7.9 19.1 41.2	1.5 4.0 10.0	57 100 100	1333 116 7 0199 194 9 0199 198 1	2.5	100	0199 199 2
SL2-100ML[1)]	5300	4000	2700	11380	1 3	16.0 49.0	11.5 35.5	7.1 21.9	1.5 4.0	100 82	1333 116 7 0199 194 9	6.0	100	0199 196 5
SL2-150S	3900	3000	2700	8640	1 3 6	12.0 33.5 67.0	8.7 24.5 49.0	7.2 20.3 40.5	1.5 4.0 10.0	100 100 100	1333 116 7 0199 194 9 0199 198 1			
SL2-150M[1)]	5800	4500	3800	12860	1 3	18.0 53.0	13.1 39.0	10.1 30.1	1.5 6.0	57 100	1333 116 7 0199 196 5	2.5	100	0199 192 2
SL2-150ML[1)]	7700	6000	5500	17000	1 3	24.0 76.0	17.4 56.7	14.4 47.4	2.5 10.0	71 100	1333 117 5 0199 198 1	2.5	100	0199 194 9

1) Not available in speed class 6 m/s.

Electrical values refer to sine-shaped commutation and are indicated as effective values or refer to them.

NOTE

R_1, and L_1 see chapter 4.1 "SL2-Basic motor data"

F_{peak} = identical to F_{peak} of SL2-Basic

NOTE

For inverter assignment, see chapters 4.4 and 4.5.

4.4 Maximum force with MOVIDRIVE® MDX61B

4.4.1 Speed class 1 m/s

The table shows the maximum force that can be reached with the connected MOVIDRIVE® MDX61B servo inverter.

NOTE

The maximum forces (F_{max}) that can be reached do not depend on SL2-Basic, SL2-Advance System, SL2-Power System.

Motor V_{rated} = 1 m/s		MOVIDRIVE® MDX61B_A...-5_3 (400/500 V unit) in SERVO operting modes (P700)											
	P [kW]	0005	0008	0011	0014	0015	0022	0030	0040	0055	0075	0110	0150
	I_{rated} [A]	2	2,4	3,1	4	4	5,5	7	9,5	12,5	16	24	32
	I_{max} [A]	4	4,8	6,2	8	6	8,25	10,5	14,25	18,75	24	36	48
	Systems	F_{max} [N]											
SL2-P025S	Basic	650											
SL2-050S	Basic Advance Power	1115	1300			1300							
SL2-050M	Basic Advance Power	1380	1620	1950	1950	1950							
SL2-050ML	Basic Advance Power	1453	1696	2120	2600	2070	2600						
SL2-100VS	Basic Advance Power	1140	1325	1325	1325	1325							
SL2-100S	Basic Advance Power	1467	1703	2118	2650	2060	2650						
SL2-100M	Basic Advance Power			1953	2412	1902	2475	3050	3970				
SL2-100ML	Basic Advance Power						3000	3710	4800	5300			
SL2-150VS	Basic	1380	1615	2000	2000	1970							
SL2-150S	Basic Advance Power		1800	2230	2785	2170	2880	3490	3900				
SL2-150M	Basic Advance Power						3100	3750	4830	5800			
SL2-150ML	Basic Advance Power							4330	5240	6330	7700		
SL2-200VS	Basic			2145	2670	2090	2700						
SL2-200S	Basic						3050	3710	4810	5200			
SL2-200M	Basic								5150	6450	7800		
SL2-200ML	Basic									6840	8390	10350	
SL2-250VS	Basic			2090	2600	2040	2670	3170					
SL2-250S	Basic							3890	5000	6300			
SL2-250M	Basic								5140	6370	7810	9450	
SL2-250ML	Basic									7020	8620	12300	12600

4.4.2 Speed class 3 m/s

The table shows the maximum force that can be reached with the connected MOVIDRIVE® MDX61B inverter.

Motor V_{rated} = 3 m/s		MOVIDRIVE® MDX61B_A...-5_3 (400/500 V unit) in SERVO operting modes (P700)															
	P [kW]	0005	0008	0011	0014	0015	0022	0030	0040	0055	0075	0110	0150	0220	0300	0370	0450
	I_{rated} [A]	2	2,4	3,1	4	4	5,5	7	9,5	12,5	16	24	32	46	60	73	89
	I_{max} [A]	4	4,8	6,2	8	6	8,25	10,5	14,25	18,75	24	36	48	69	90	109,5	133,5
	Systems	F_{max} [N]															
SL2-P025VS	Basic	330															
SL2-P025S	Basic	650															
SL2-050VS	Basic Advance Power	460	537	650	650	650											
SL2-050S	Basic Advance Power			738	926	717	955	1175	1300								
SL2-050M	Basic Advance Power							1280	1640	1950							
SL2-050ML	Basic Advance Power							1290	1650	2090	2600						
SL2-100VS	Basic Advance Power						830	1020	1325								
SL2-100S	Basic Advance Power								1680	2090	2560	2650					
SL2-100M	Basic Advance Power									2455	2950	3970					
SL2-100ML	Basic Advance Power										2950	4050	5200	5300			
SL2-150VS	Basic						1065	1280	1650	2000							
SL2-150S	Basic Advance Power									2425	2950	3900					
SL2-150M	Basic Advance Power										3070	4200	5330	5800			
SL2-150ML	Basic Advance Power											4250	5400	7080	7700		
SL2-200VS	Basic								1650	2100	2610	2700					
SL2-200S	Basic										2920	4050	5200				
SL2-200M	Basic											4340	5490	7480	7800		
SL2-200ML	Basic												5680	7510	9430	10350	
SL2-250VS	Basic								2120	2610	3170						
SL2-250S	Basic											4310	5410	6300			
SL2-250M	Basic												5670	7560	9450		
SL2-250ML	Basic													8270	10340	12260	12600

4.4.3 Speed class 6 m/s

The table shows the maximum force that can be reached with the connected *MOVIDRIVE® MDX61B inverter.*

Motor V_{rated} = 6 m/s		MOVIDRIVE® MDX61B_A...-5_3 (400/500 V unit) in SERVO operting modes (P700)															
	P [kW]	0005	0008	0011	0014	0015	0022	0030	0040	0055	0075	0110	0150	0220	0300	0370	0450
	I_{rated} [A]	2	2,4	3,1	4	4	5,5	7	9,5	12,5	16	24	32	46	60	73	89
	I_{max} [A]	4	4,8	6,2	8	6	8,25	10,5	14,25	18,75	24	36	48	69	90	109,5	133,5
	Systems	F_{max} [N]															
SL2-P025VS	Basic			330													
SL2-050VS	Basic Advance Power				400	320	415	510	650								
SL2-050S	Basic Advance Power							675	840	1040	1280	1300					
SL2-050M	Basic Advance Power									1200	1470	1950					
SL2-050ML	Basic Advance Power										1450	2025	2600				
SL2-100VS	Basic Advance Power								850	1045	1300	1325					
SL2-100S	Basic Advance Power											2025	2600	2650			
SL2-100M	Basic Advance Power											2025	2765	3700	3970		
SL2-100ML	Basic												2800	3750	4780	5300	
SL2-150VS	Basic									1220	1470	2000					
SL2-150S	Basic Advance Power											2350	2950	3900			
SL2-150M	Basic Advance Power												3150	4220	5290	5800	
SL2-150ML	Basic Advance Power														5600	6570	7700
SL2-200VS	Basic											1860	2390	2700			
SL2-200S	Basic													3760	4710	5200	
SL2-250VS	Basic											2150	2730	3170			
SL2-250S	Basic													4150	5180	6130	6300

4.5 Maximum force with MOVIAXIS®

4.5.1 Speed class 1 m/s

The table shows the maximum force that can be reached with the connected MOVIAXIS® multi-axis servo inverter.

NOTE

The maximum forces (F_{max}) that can be reached do not depend on SL2-Basic, SL2-Advance System, SL2-Power System.

Motor V_{rated} = 1 m/s		MOVIAXIS® MX									
		Size 1			Size 2		BG3		BG4	BG5	BG6
	I_{rated} [A]	2	4	8	12	16	24	32	48	64	100
	I_{max} [A]	5	10	20	30	40	60	80	120	160	250
	Systems	F_{max} [N]									
SL2-P025S	Basic	285	650								
SL2-050S	Basic Advance Power	1300									
SL2-050M	Basic Advance Power	1705	1950								
SL2-050ML	Basic Advance Power	1798	2600								
SL2-100VS	Basic Advance Power	1367	1082	1325							
SL2-100S	Basic Advance Power	1817	2650								
SL2-100M	Basic Advance Power		2979	3970							
SL2-100ML	Basic Advance Power		3583	5300							
SL2-150VS	Basic	1694	2000								
SL2-150S	Basic Advance Power		3399	3900							
SL2-150M	Basic Advance Power		3579	5800							
SL2-150ML	Basic Advance Power			6919	7700						
SL2-200VS	Basic	1805	2700								
SL2-200S	Basic		3610	5200							
SL2-200M	Basic			6955	7800						
SL2-200ML	Basic			7319	10350						
SL2-250VS	Basic	1768	3170								
SL2-250S	Basic		3701	6300							
SL2-250M	Basic			6813	9450						
SL2-250ML	Basic				10645	12600					

4.5.2 Speed class 3 m/s

The table shows the maximum force that can be reached with the connected MOVIAXIS® MX multi-axis servo inverter.

Motor V_{rated} = 3 m/s		MOVIAXIS® MX									
		BG1			BG2		BG3		BG4	BG5	BG6
	I_{rated} [A]	2	4	8	12	16	24	32	48	64	100
	I_{max} [A]	5	10	20	30	40	60	80	120	160	250
	Systems	F_{max} [N]									
SL2-P025VS	Basic	225.4	330								
SL2-P025S	Basic	650									
SL2-050VS	Basic Advance Power	568	650								
SL2-050S	Basic Advance Power		1116	1300							
SL2-050M	Basic Advance Power		1220	1950							
SL2-050ML	Basic Advance Power			2211	2600						
SL2-100VS	Basic Advance Power		993	1325							
SL2-100S	Basic Advance Power			2246	2650						
SL2-100M	Basic Advance Power			2528	3587	3970					
SL2-100ML	Basic Advance Power				3485	4473	5300				
SL2-150VS	Basic		1223	2000							
SL2-150S	Basic Advance Power			2528	3587	3900					
SL2-150M	Basic Advance Power				3594	4630	5800				
SL2-150ML	Basic Advance Power					4467	6387	7700			
SL2-200VS	Basic			2260	2700						
SL2-200S	Basic				3516	4521	5200				
SL2-200M	Basic					4816	6877	7800			
SL2-200ML	Basic						6737	8678	10350		
SL2-250VS	Basic			2271	3170						
SL2-250S	Basic				3686	4762	6300				
SL2-250M	Basic						6813	8727	9450		
SL2-250ML	Basic						7373	9524	12600		

4.5.3 Speed class 6 m/s

The table shows the maximum force that can be reached with the connected MOVIAXIS® MX multi-axis servo inverter.

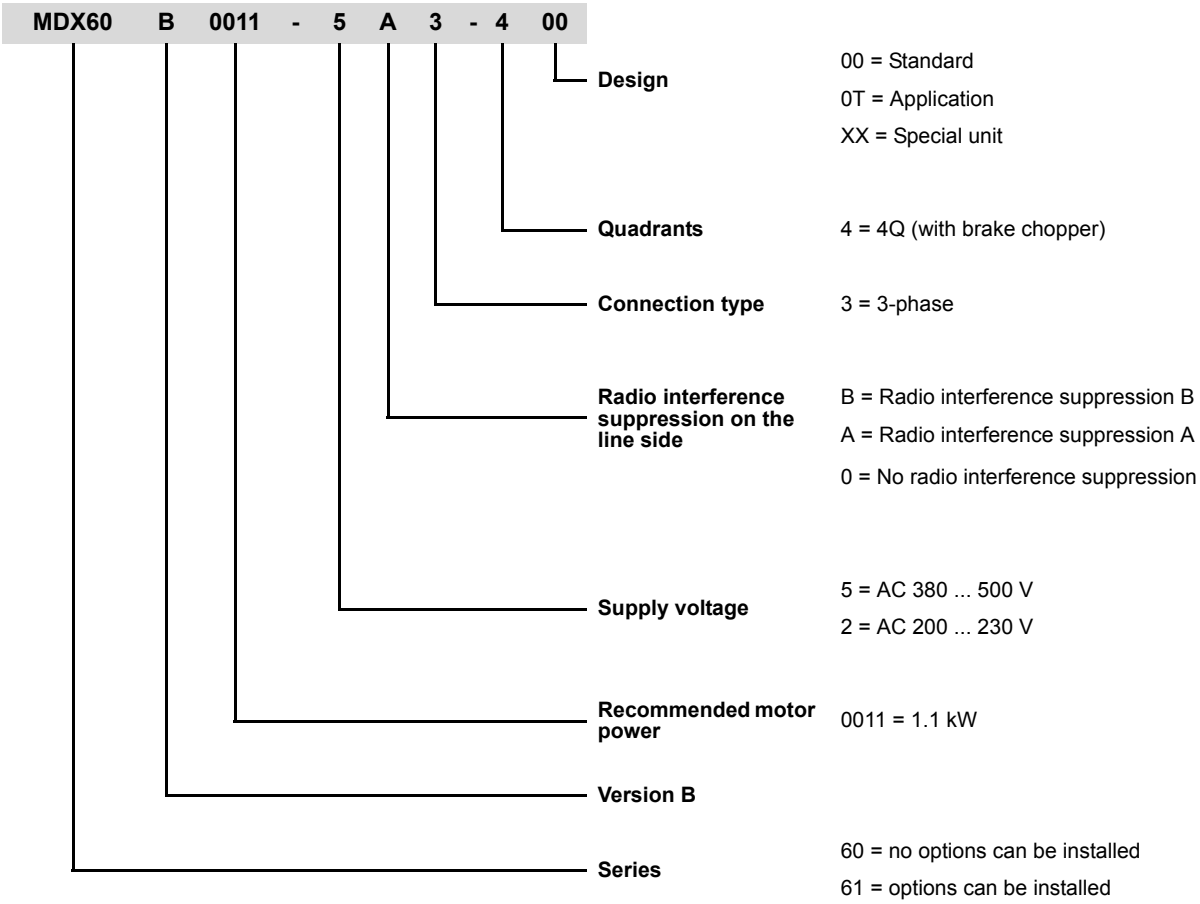
Motor V_{rated} = 6 m/s		MOVIAXIS® MX									
		BG1			BG2		BG3		BG4	BG5	BG6
	I_{rated} [A]	2	4	8	12	16	24	32	48	64	100
	I_{max} [A]	5	10	20	30	40	60	80	120	160	250
	Systems	F_{max} [N]									
SL2-P025VS	Basic	274	330								
SL2-050VS	Basic Advance Power		486	650							
SL2-050S	Basic Advance Power			1116	1300						
SL2-050M	Basic Advance Power			1254	1771	1950					
SL2-050ML	Basic Advance Power				1728	2211	2600				
SL2-100VS	Basic Advance Power			1123	1325						
SL2-100S	Basic Advance Power				1742	2237	2650				
SL2-100M	Basic Advance Power					2357	3360	3970			
SL2-100ML	Basic						3355	4314	5300		
SL2-150VS	Basic			1264	1793	2000					
SL2-150S	Basic Advance Power					2528	3587	3900			
SL2-150M	Basic Advance Power						3775	4854	5800		
SL2-150ML	Basic Advance Power							5072	7195	7700	
SL2-200VS	Basic				1610	2077	2700				
SL2-200S	Basic						3376	4348	5200		
SL2-250VS	Basic				1843	2381	3170				
SL2-250S	Basic						3686	4762	6300		

4.6 Unit designation for MOVIDRIVE® MDX61B

SL2 linear motors can be operated together with MOVIDRIVE® MDX61B servo inverters from SEW-EURODRIVE.

	NOTE
	It is mandatory that you make sure that the guide carriage is free to move as regards the secondary.

Example



	NOTE
	• Always use the HIPERFACE® encoder card type DEH option to connect the AL1H motor encoder. • For more information, refer to the MOVIDRIVE® B system manual. • The linear motors were integrated into the standard firmware with 18 (the application version of MOVIDRIVE® must be selected). This means special design 08 is not required any longer.

4.7 Unit designation for MOVIAXIS® basic units

Example:

MX A 80 A -004 5 0 3 - 00

00 = Standard design
XX = Special design

3 = 3-phase connection type

50 = U = AC 380 - 500 V connection voltage

Versions:

004 = For axis modules the rated current, such as 004 = 4 A
050 = For DC link discharge modules the dissipatable energy quantity, such as 050 = 5000 Ws
010 = For supply modules the rated power, such as 010 = 10 kW
050 = For capacitor, buffer and damping modules the capacity, such as 050 = 5,000 µF
060 = For 24 V switched-mode power supply the power, such as 060 = 600 W

Version

80 = Standard design
81 = Type with one safety relay in the axis module
82 = Type with two safety relays in the axis module

Unit type:

A = Axis module
B = Buffer module
C = Capacitor module
D = Damping modules
M = Master module
P = Supply module with brake chopper
R = Supply module with regeneration
S = 24 V switched-mode power supply module
Z = DC link discharge module

MOVIAXIS®

Unit designation for the axis module:

MXA80A-004-503-00	=	Axis module with 4 A rated current

Unit designation for the buffer module component

MXB80A-050-503-00	=	Buffer module

Unit designation for the capacitor module component

MXC80A-050-503-00	=	Capacitor module

Unit designation for the master module component:

MXM80A-000-000-00	=	Master module

Unit designation for the supply module:

MXP80A-010-503-00	=	10 kW supply module
MXR80A-025-503-00	=	25 kW supply module with regeneration (in preparation)

Unit designation for the 24 V switched-mode power supply module component

MXS80A-060-503-00	=	24 V switched-mode power supply module

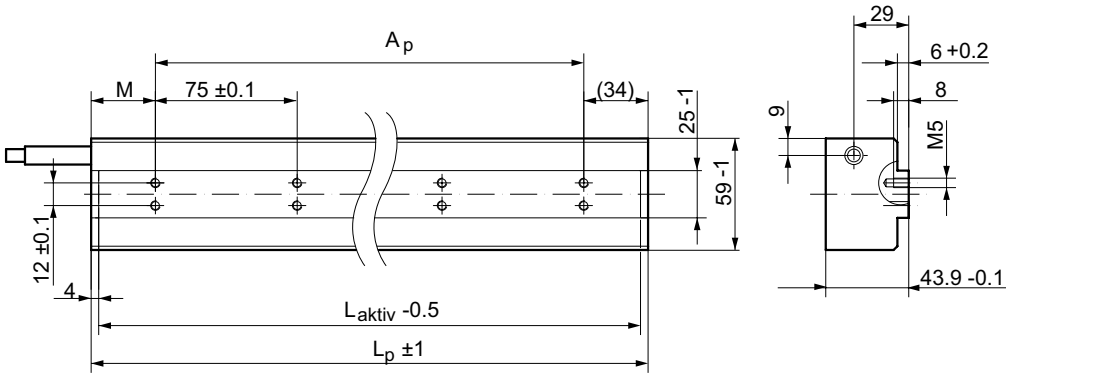
Unit designation DC link discharge module component:

MXZ80A-050-503-00	=	DC link discharge module with a dissipatable energy quantity of 5000 Ws

4.8 Mounting dimensions / weights

	NOTE
	CAD data is available from SEW-EURODRIVE for all sizes on request. • 2D-DXF, DWG and TIF • 3D-IGES, STEP

4.8.1 SL2-Basic primary size 025



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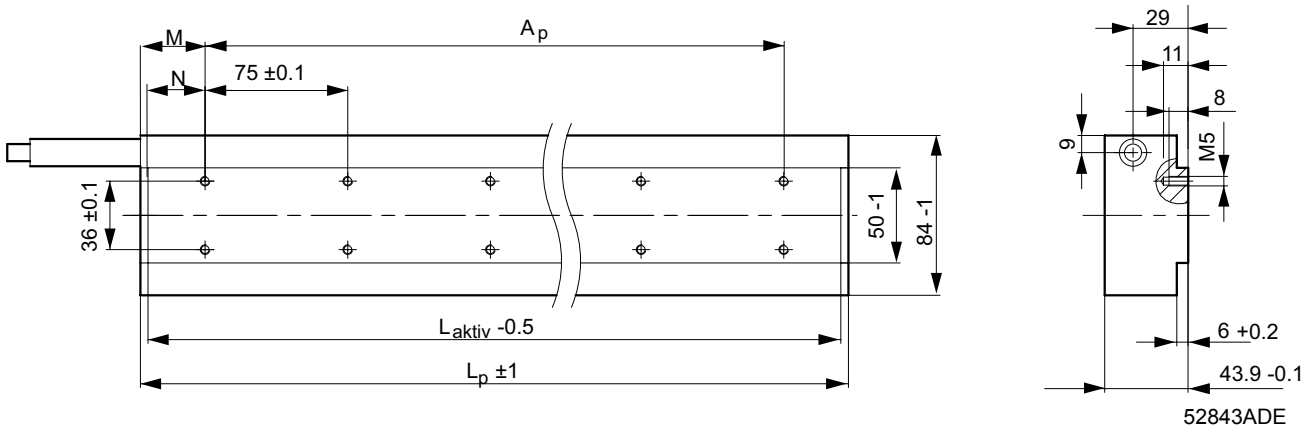
Motor type	L_P [mm]	L_{active} [mm]	M [mm]	A_p [mm]	m 1) [kg]
SL2-P025VS	192	184,2	21	2 x 75 (= 150)	2.5
SL2-P025S	368	360	34	4 x 75 (= 300)	4.1

1) Weight without cable

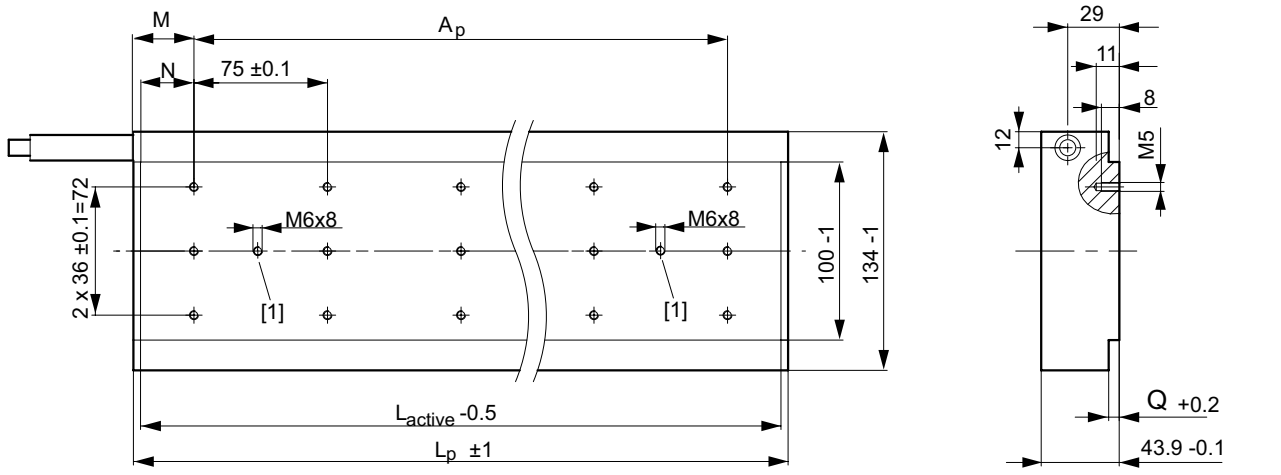
4.8.2 SL2-Basic primary size 050



Motor type	L_P [mm]	L_{active} [mm]	M [mm]	N [mm]	A_p [mm]	m[1] [kg]
SL2-P050VS	192	184.2	21.1	17.1	2 x 75 (= 150)	3.6
SL2-P050S	368	360	34	30	4 x 75 (= 300)	6.9
SL2-P050M	544	535.8	46.9	42.9	6 x 75 (= 450)	10.4
SL2-P050ML	720	711.6	22.3	18.3	9 x 75 (= 675)	13.9

1) Weight without cable

4.8.3 SL2-Basic primary size 100



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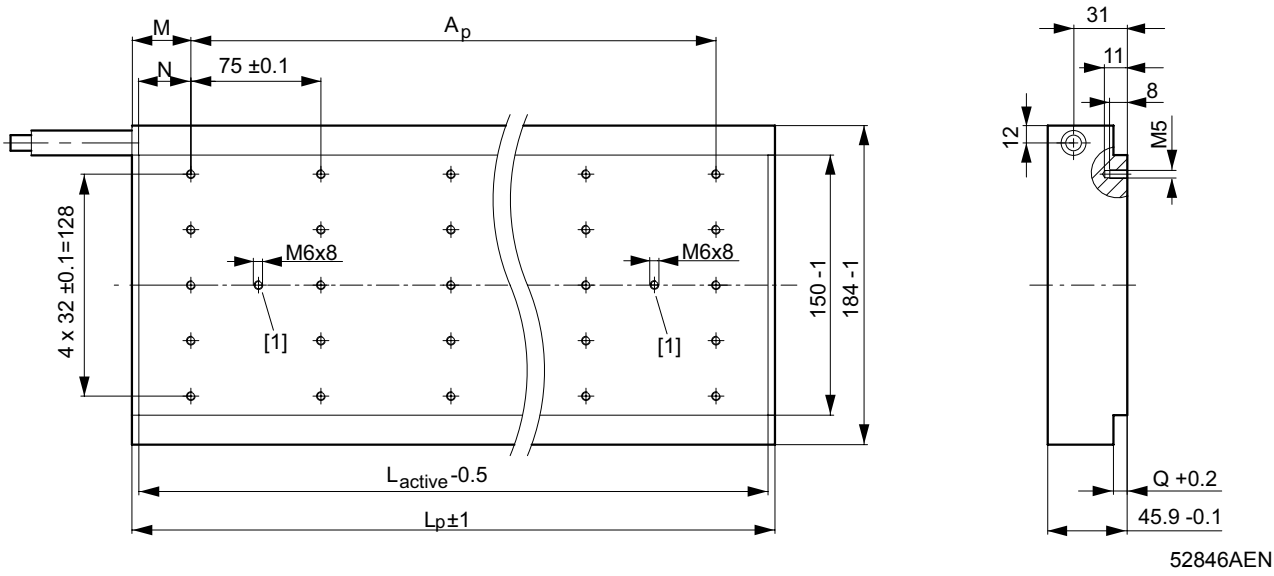
[1] Power transmission thread

Motor type	L_P [mm]	L_{active} [mm]	M [mm]	N [mm]	A_p [mm]	Q [mm]	m[1)] [kg]
SL2-P100VS	192	184.2	21.1	17.1	2 x 75 (= 150)	6	6.5
SL2-P100S	368	360	34	30	4 x 75 (= 300)	6	12.5
SL2-P100M	544	535.8	46.9	42.9	6 x 75 (= 450)	6	18.9
SL2-P100ML	720	711.6	22.3	18.3	9 x 75 (= 675)	6	25
SL2-P100ML-060	724	711.6	26.3	18.3	9 x 75 (= 675)	1	25.2

1) Weight without cable

4.8.4 SL2-Basic primary size 150

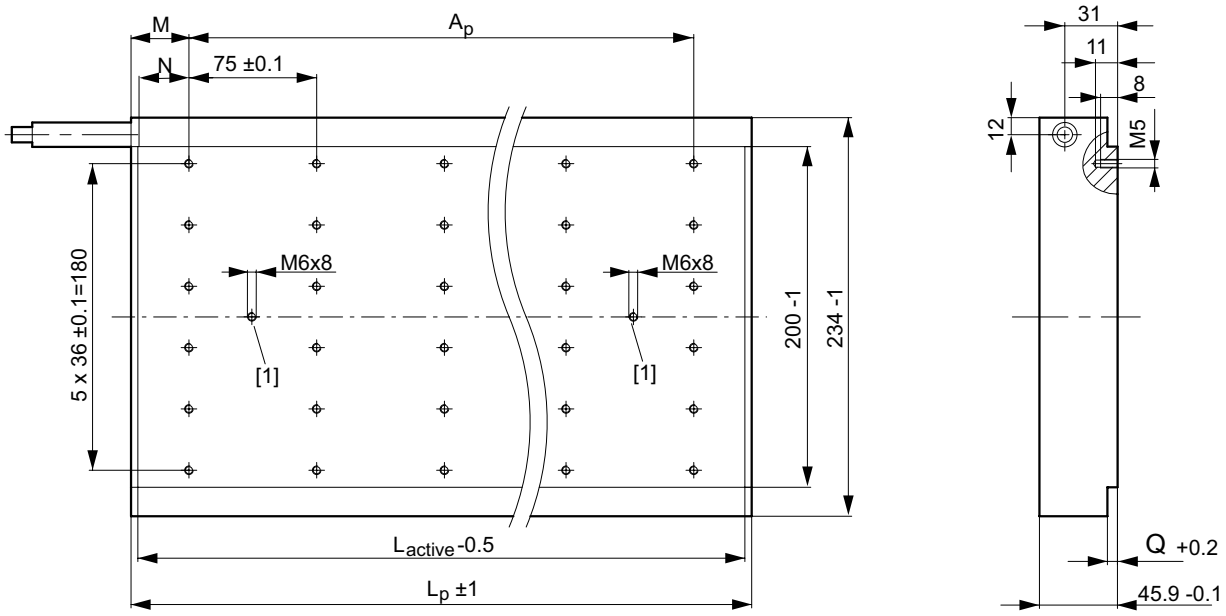


[1] Power transmission thread

Motor type	L_P [mm]	L_{active} [mm]	M [mm]	N [mm]	A_p [mm]	Q [mm]	m[1)] [kg]
SL2-P150VS	192	184.2	21.1	17.1	2 x 75 (= 150)	6	9.5
SL2-P150S	368	360	34	30	4 x 75 (= 300)	6	18
SL2-P150M-010-030	544	535.8	46.9	42.9	6 x 75 (= 450)	6	27
SL2-P150M-060	548	535.8	50.9	42.9	6 x 75 (= 450)	1	27.3
SL2-P150ML-010-030	720	711.6	22.3	18.3	9 x 75 (= 675)	6	36
SL2-P150ML-060	724	711.6	26.3	18.3	9 x 75 (= 675)	1	36.2

1) Weight without cable

4.8.5 SL2-Basic primary size 200



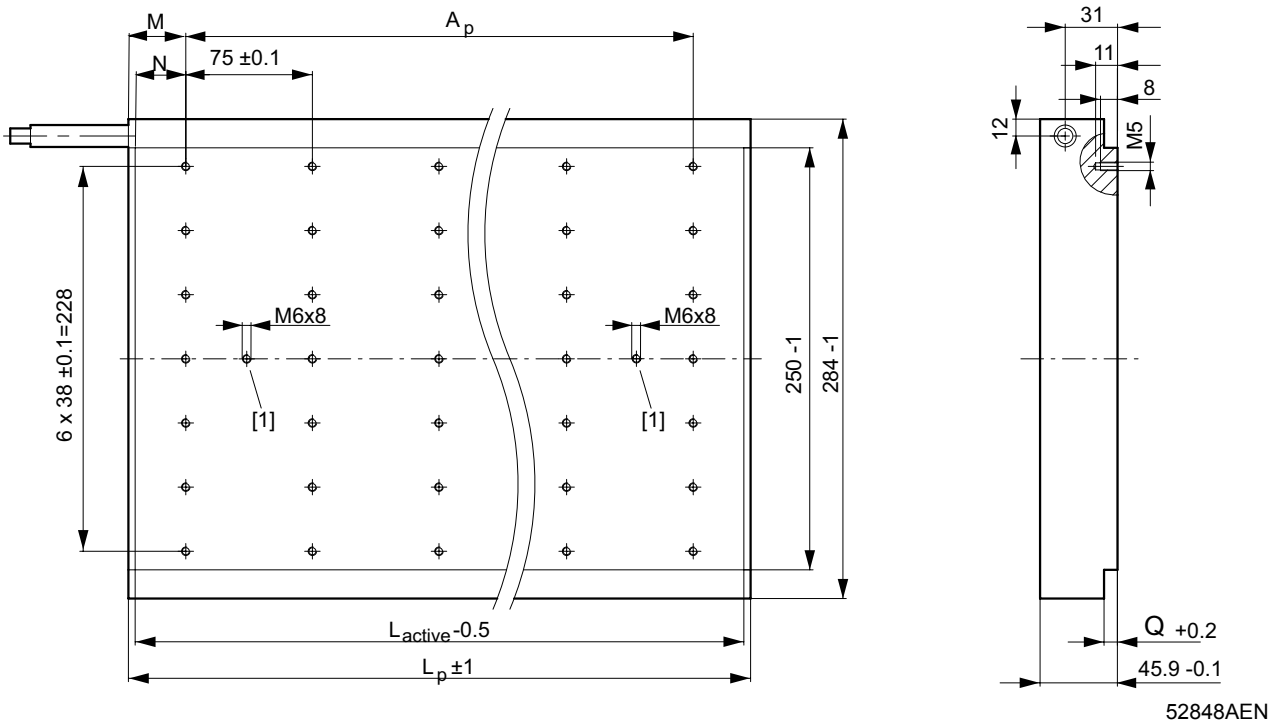
52847AEN

[1] Power transmission thread

Motor type	L_P [mm]	L_{active} [mm]	M [mm]	N [mm]	A_p [mm]	Q [mm]	m 1) [kg]
SL2-P200VS	192	184.2	21.1	17.1	2 x 75 (= 150)	6	12
SL2-P200S	368	360	34	30	4 x 75 (= 300)	6	23.5
SL2-P200S-060	372	360	38	30	4 x 75 (= 300)	1	23.6
SL2-P200M	544	535.8	46.9	42.9	6 x 75 (= 450)	6	35
SL2-P200ML	720	711.6	22.3	18.3	9 x 75 (= 675)	6	47
SL2-P200ML-030	724	711.6	26.3	18.3	9 x 75 (= 675)	1	47.2

1) Weight without cable

4.8.6 SL2-Basic primary size 250

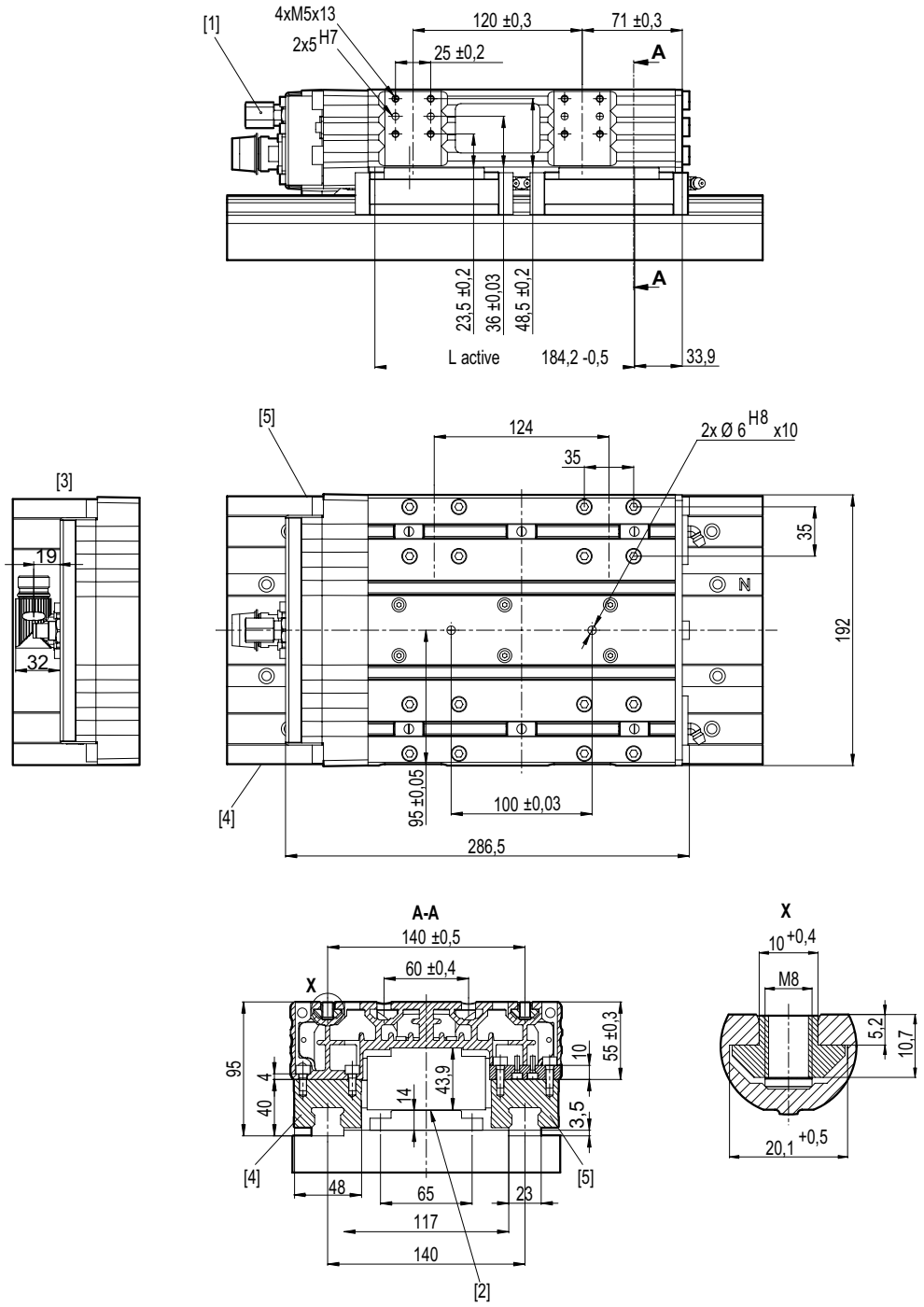


[1] Power transmission thread

Motor type	L_P [mm]	L_{active} [mm]	M [mm]	N [mm]	A_p [mm]	Q [mm]	m 1) [kg]
SL2-P250VS	192	184.2	21	17.1	2 x 75 (= 150)	6	15
SL2-P250S	368	360	34	30	4 x 75 (= 300)	6	29
SL2-P250S-060	372	360	38	30	4 x 75 (= 300)	1	29.1
SL2-P250M	544	535.8	47	42.9	6 x 75 (= 450)	6	43
SL2-P250M-030	548	535.8	50.9	42.9	6 x 75 (= 450)	1	43.2
SL2-P250ML	720	711.6	22.5	18.3	9 x 75 (= 675)	6	58
SL2-P250ML-030	724	711.6	26.3	18.,3	9 x 75 (= 675)	1	58.2

1) Weight without cable

4.8.7 SL2-Advance System / SL2-Power System size: SL2-P050VS

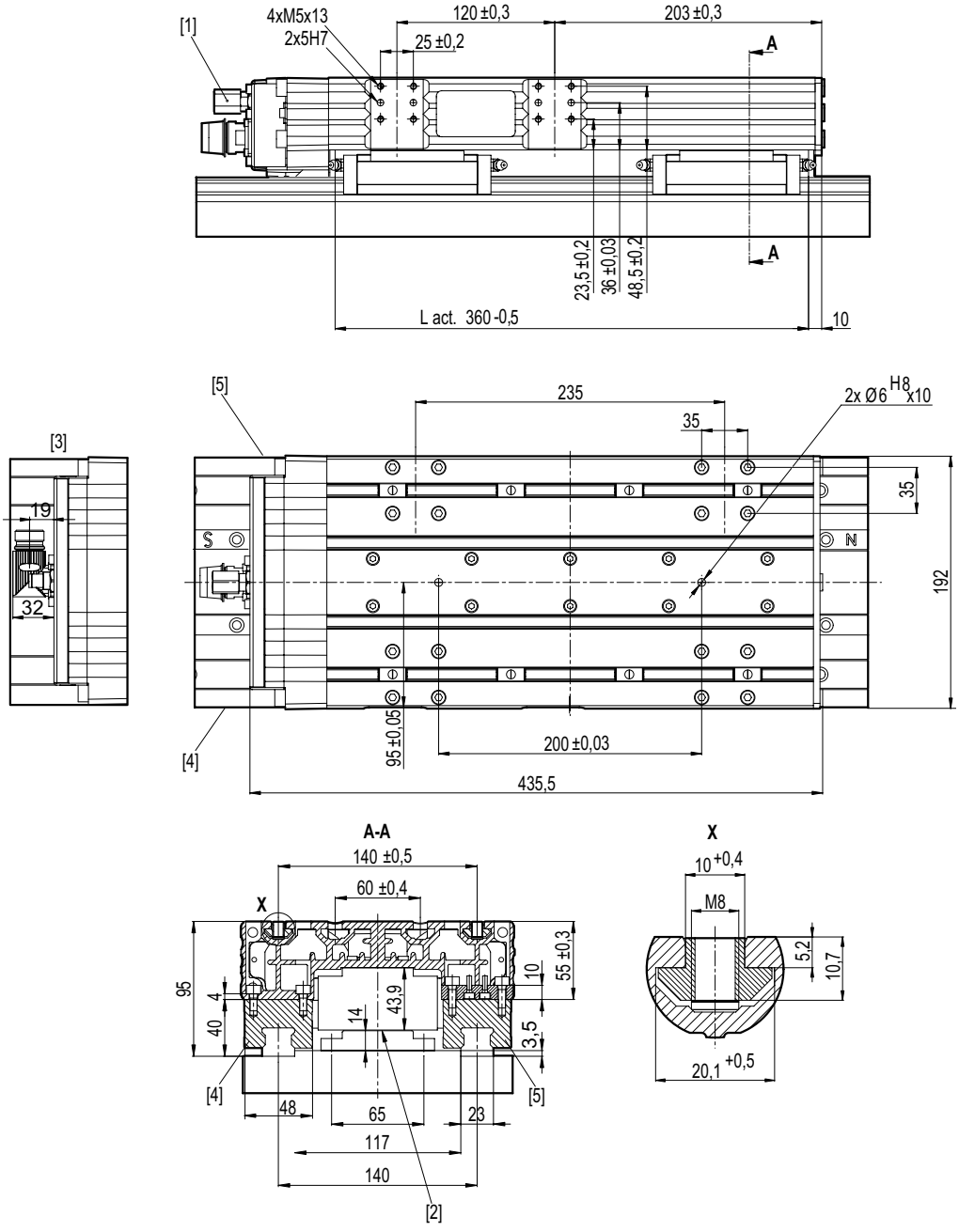


54996AEN

[1] M12 connector with SL2-Power System design only
[2] Visible air gap = 1.0 mm
[3] Design with right-angle connector
[4] Fixed bearing end
[5] Floating bearing end

Weights	
SL2 Advance System	7.0 kg
SL2 Power System	7.2 kg

SL2-Advance System / SL2-Power System size: SL2-P050S

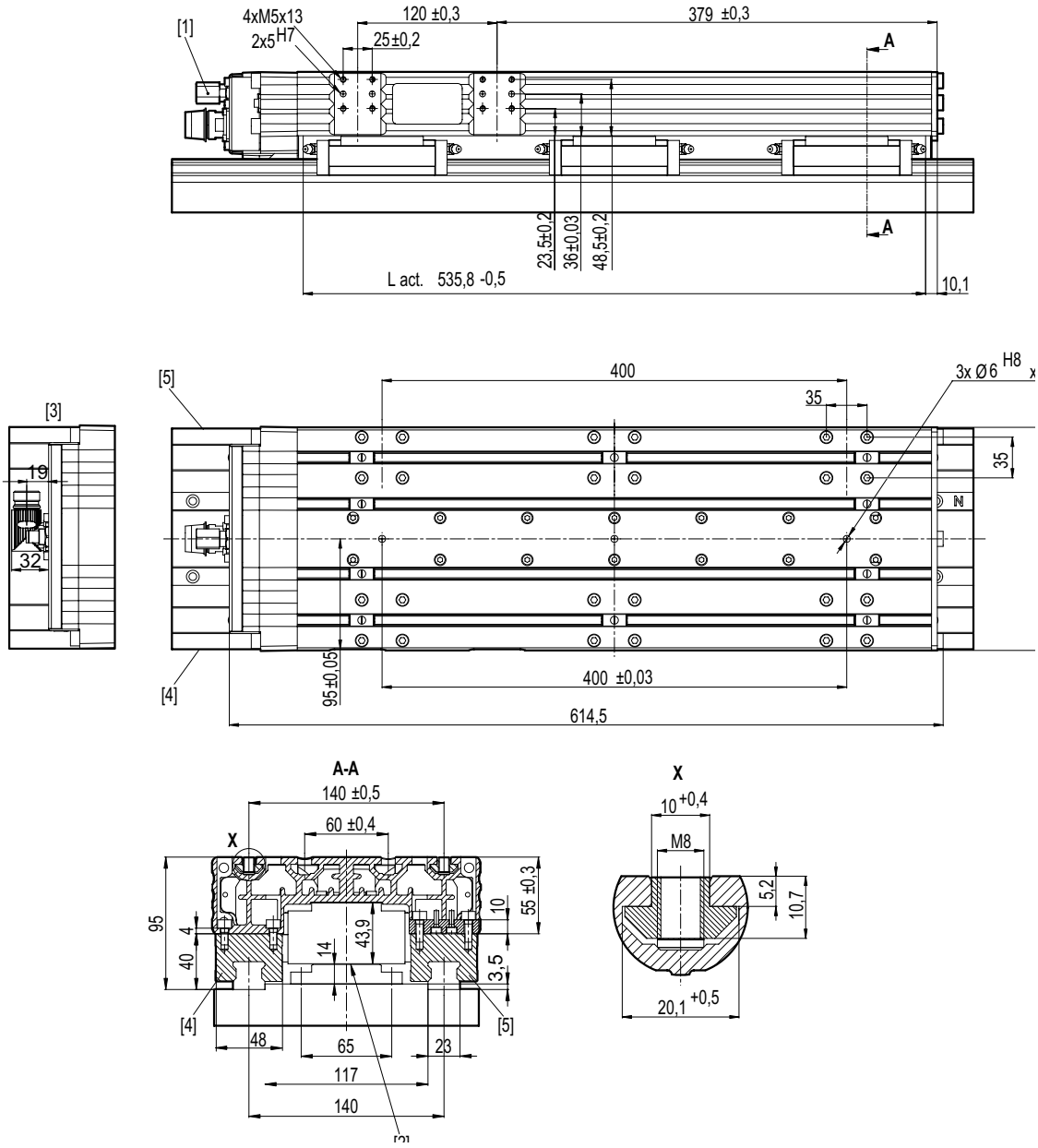


54997AEN

[1] M12 connector with SL2-Power System design only
[2] Visible air gap = 1.0 mm
[3] Design with right-angle connector
[4] Fixed bearing end
[5] Floating bearing end

Weights	
SL2 Advance System	12.1 kg
SL2 Power System	12.3 kg

4.8.8 SL2-Advance System / SL2-Power System size: SL2-P050M

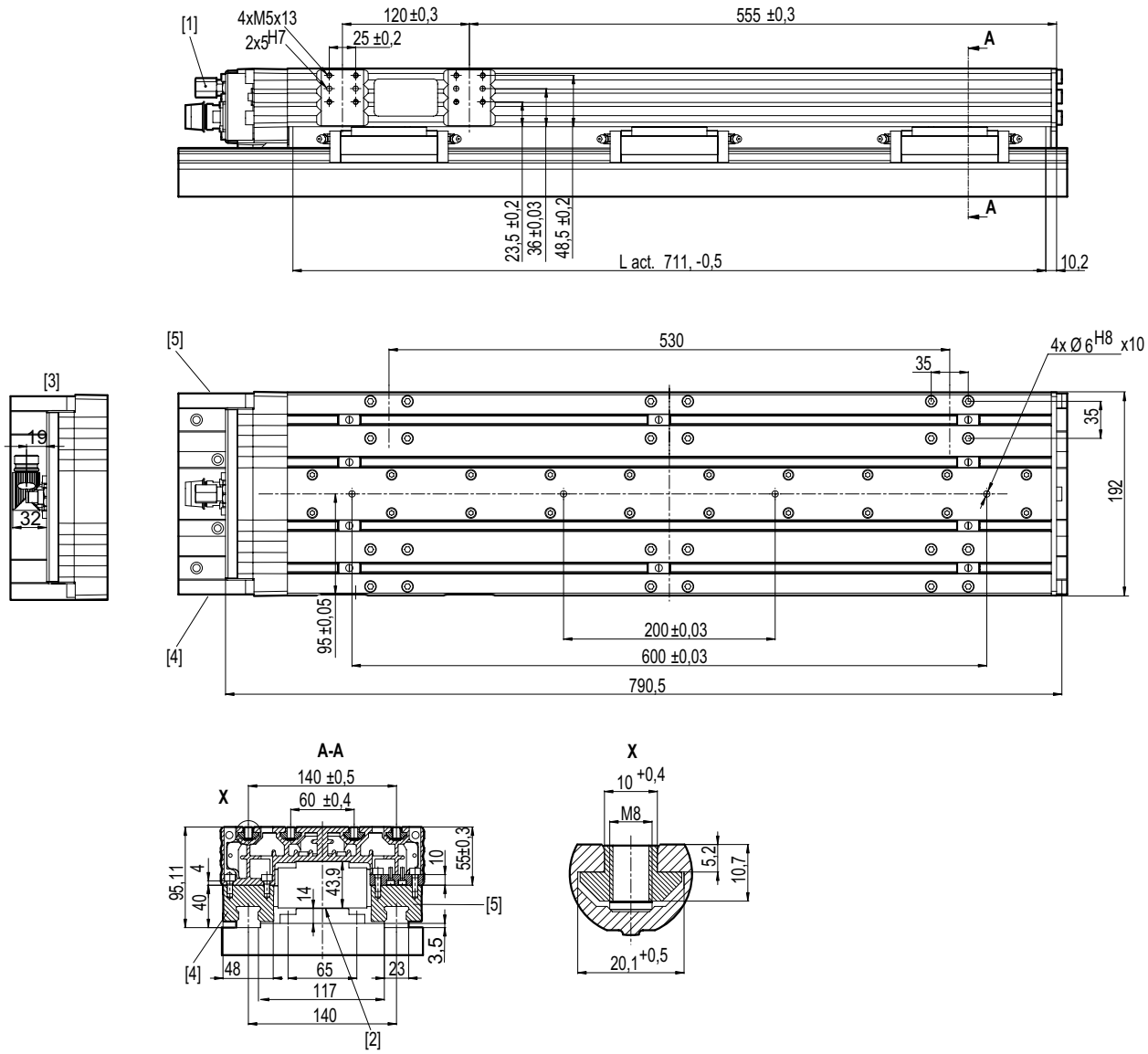


54998AEN

[1] M12 connector with SL2-Power System design only
[2] Visible air gap = 1.0 mm
[3] Design with right-angle connector
[4] Fixed bearing end
[5] Floating bearing end

Weights	
SL2 Advance System	17.6 kg
SL2 Power System	17.8 kg

4.8.9 SL2-Advance System / SL2-Power System size: SL2-P050ML

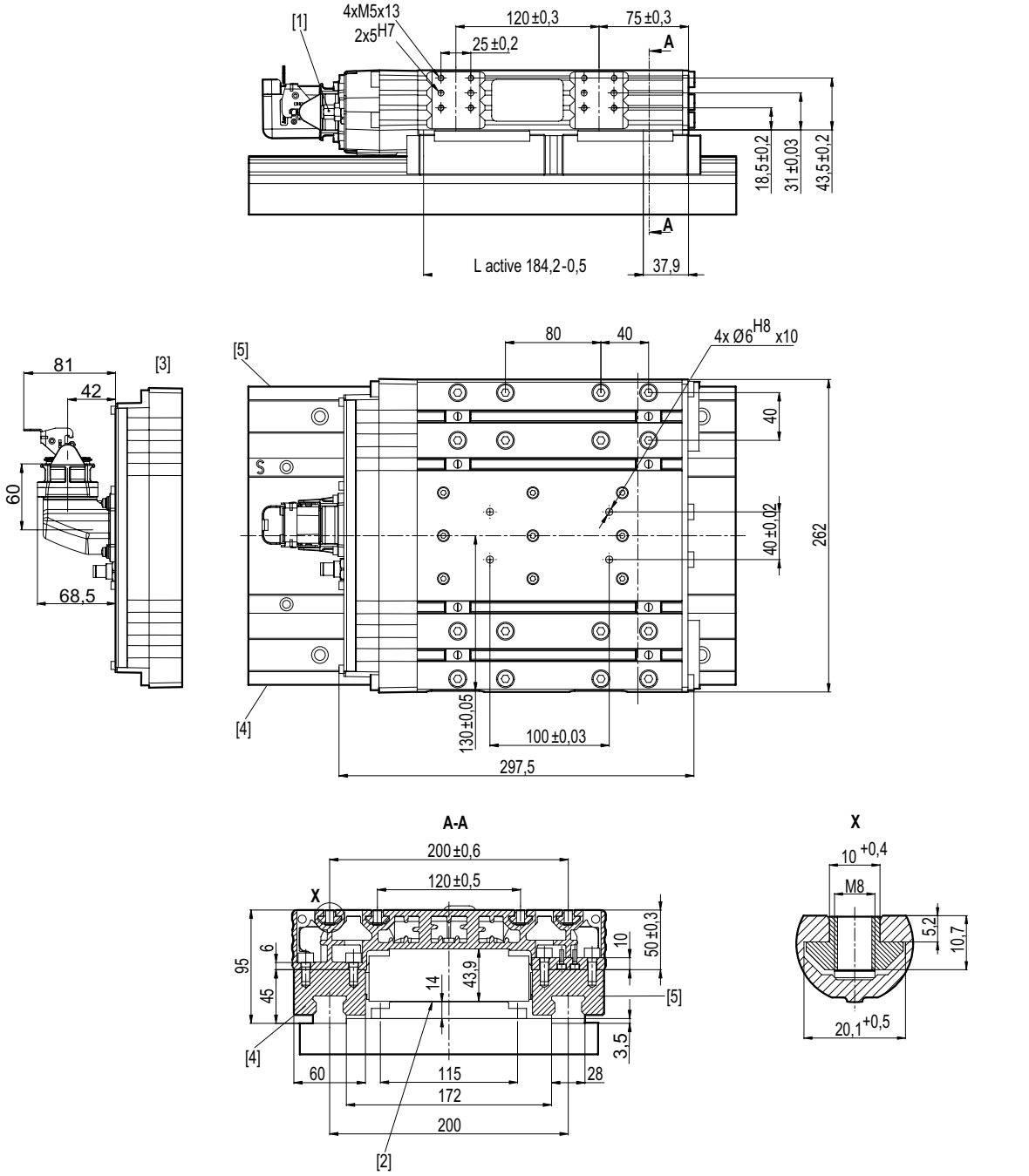


54999AEN

[1] M12 connector with SL2-Power System design only
[2] Visible air gap = 1.0 mm
[3] Design with right-angle connector
[4] Fixed bearing end
[5] Floating bearing end

Weights	
SL2 Advance System	23.0 kg
SL2 Power System	23.2 kg

4.8.10 SL2-Advance System / SL2-Power System size: SL2-P100VS

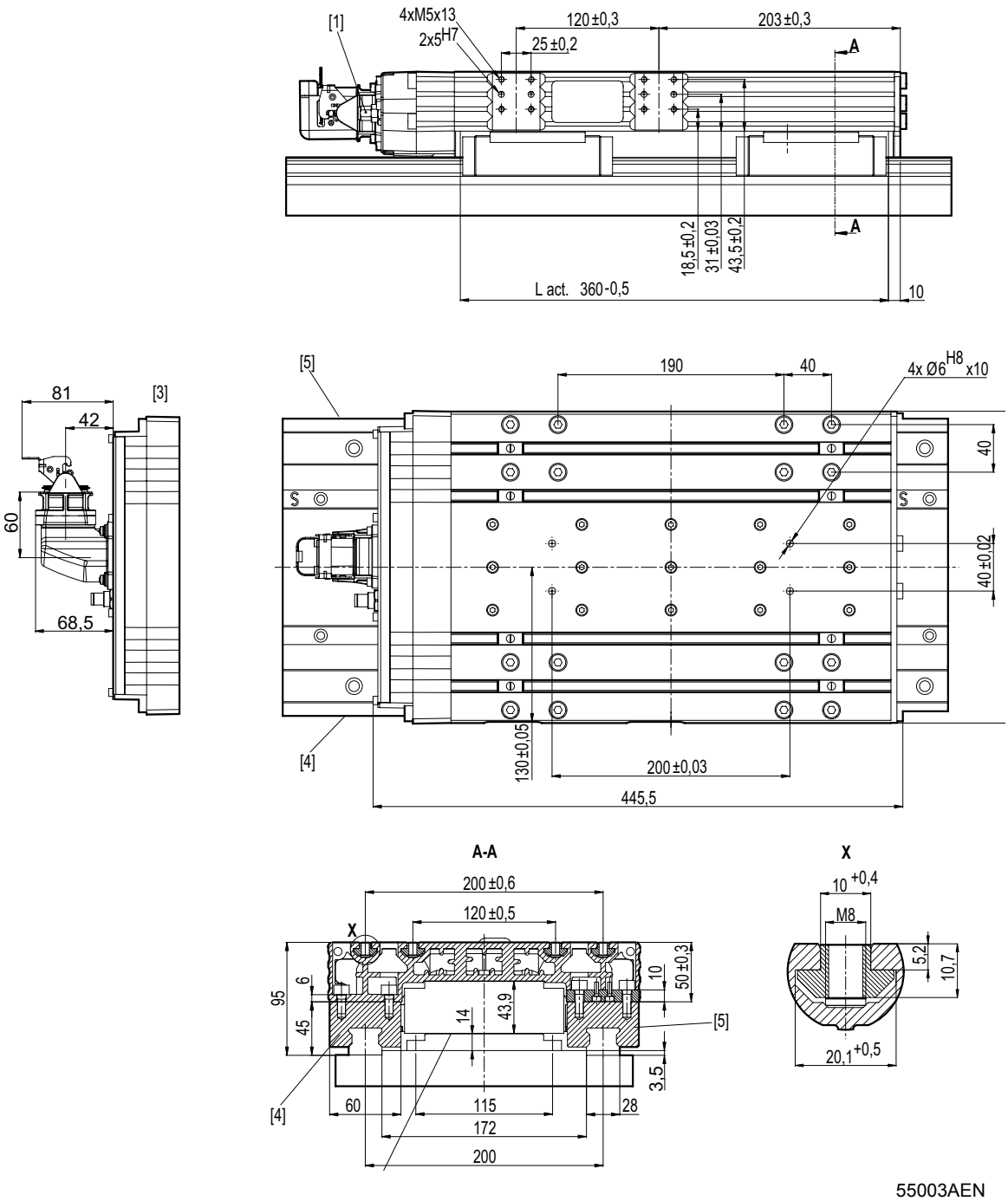


55002AEN

[1] M12 connector with SL2-Power System design only
[2] Visible air gap = 1.0 mm
[3] Design with right-angle connector
[4] Fixed bearing end
[5] Floating bearing end

Weights	
SL2 Advance System	11.3 kg
SL2 Power System	11.5 kg

4.8.11 SL2-Advance System / SL2-Power System size: SL2-P100S

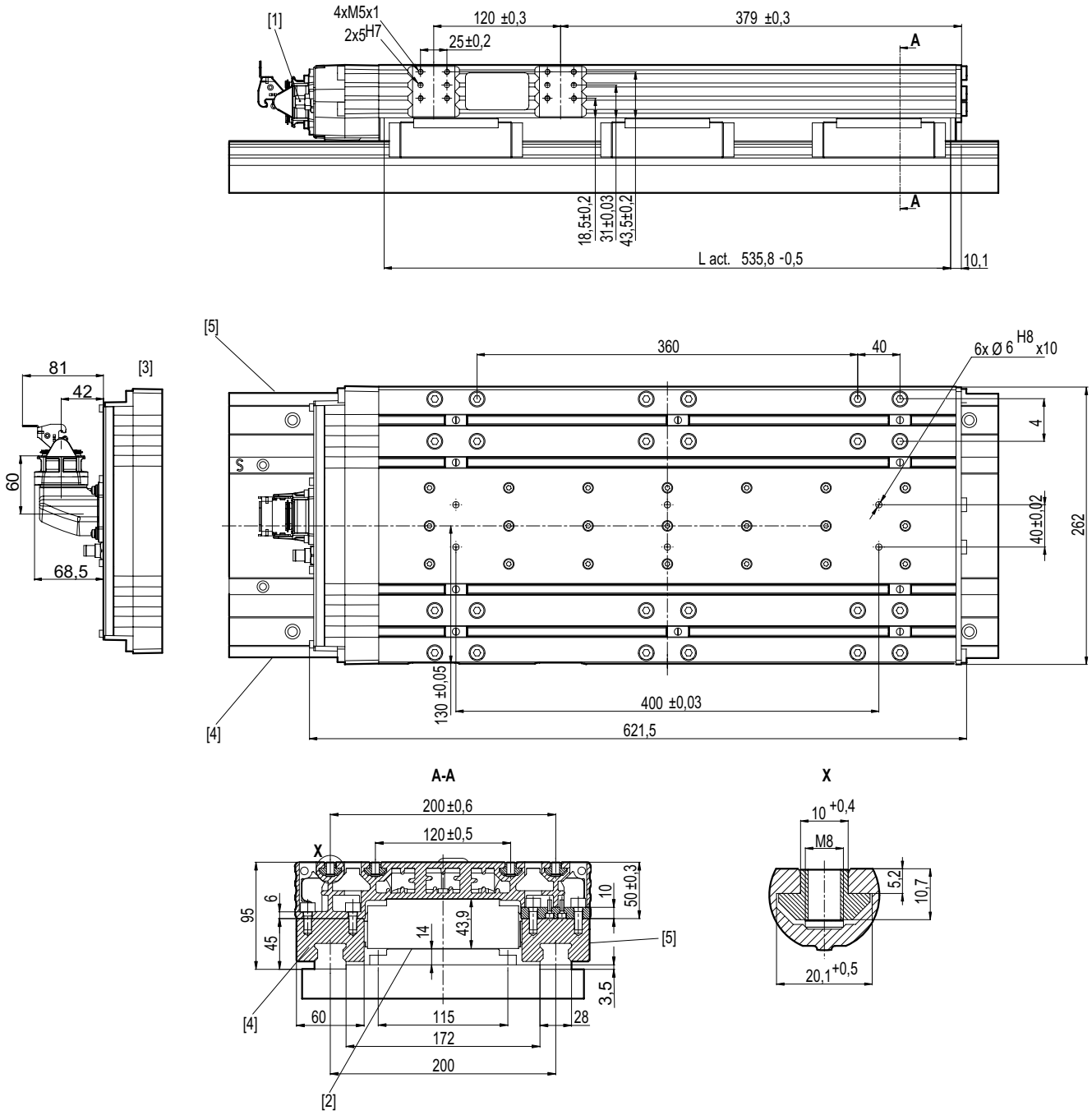


55003AEN

[1] M12 connector with SL2-Power System design only
[2] Visible air gap = 1.0 mm
[3] Design with right-angle connector
[4] Fixed bearing end
[5] Floating bearing end

Weights	
SL2 Advance System	19.4 kg
SL2 Power System	19.6 kg

4.8.12 SL2-Advance System / SL2-Power System size: SL2-P100M

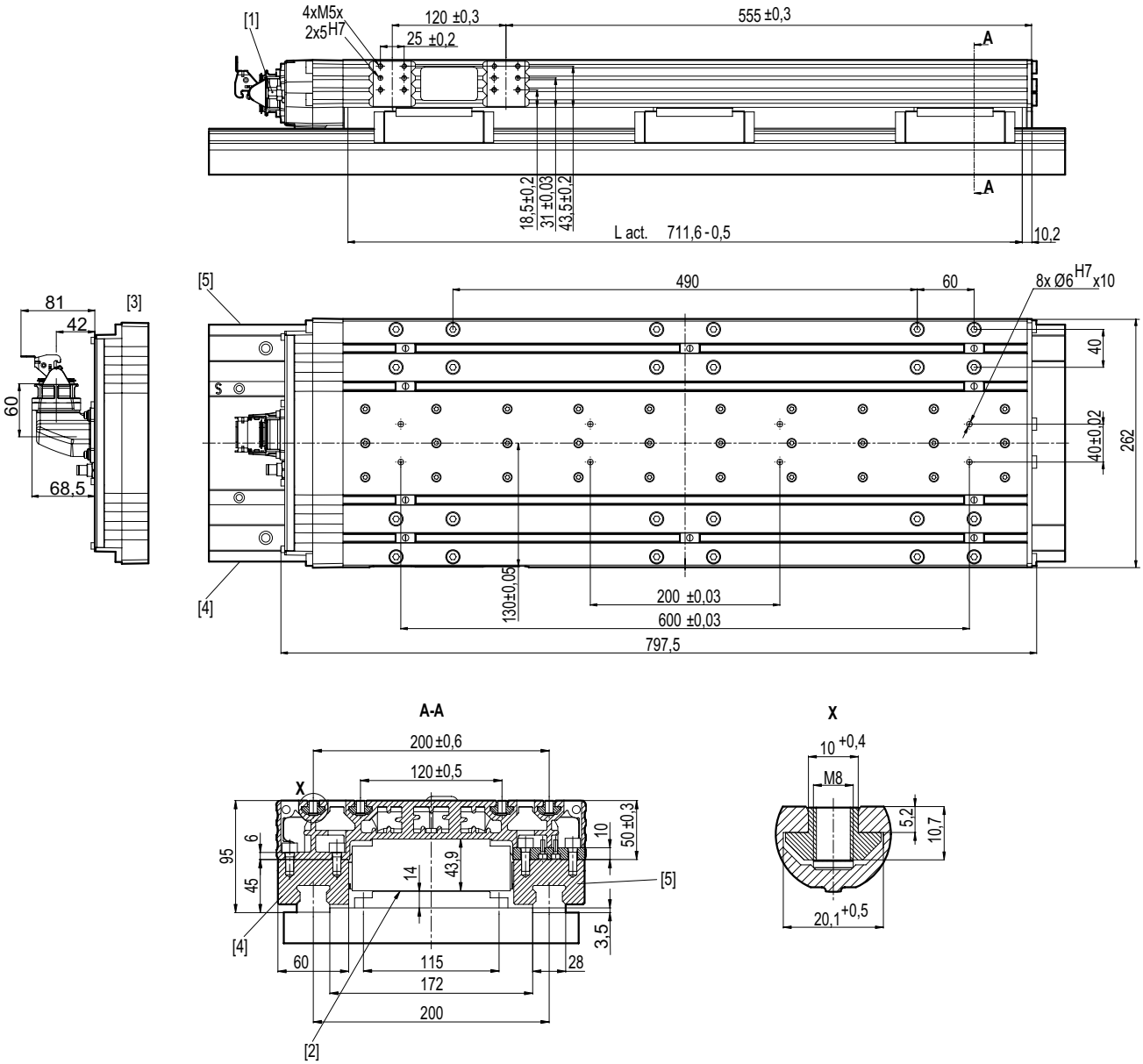


55004AEN

[1] M12 connector with SL2-Power System design only
[2] Visible air gap = 1.0 mm
[3] Design with right-angle connector
[4] Fixed bearing end
[5] Floating bearing end

Weights	
SL2 Advance System	28.4 kg
SL2 Power System	28.6 kg

4.8.13 SL2-Advance System / SL2-Power System size: SL2-P100ML

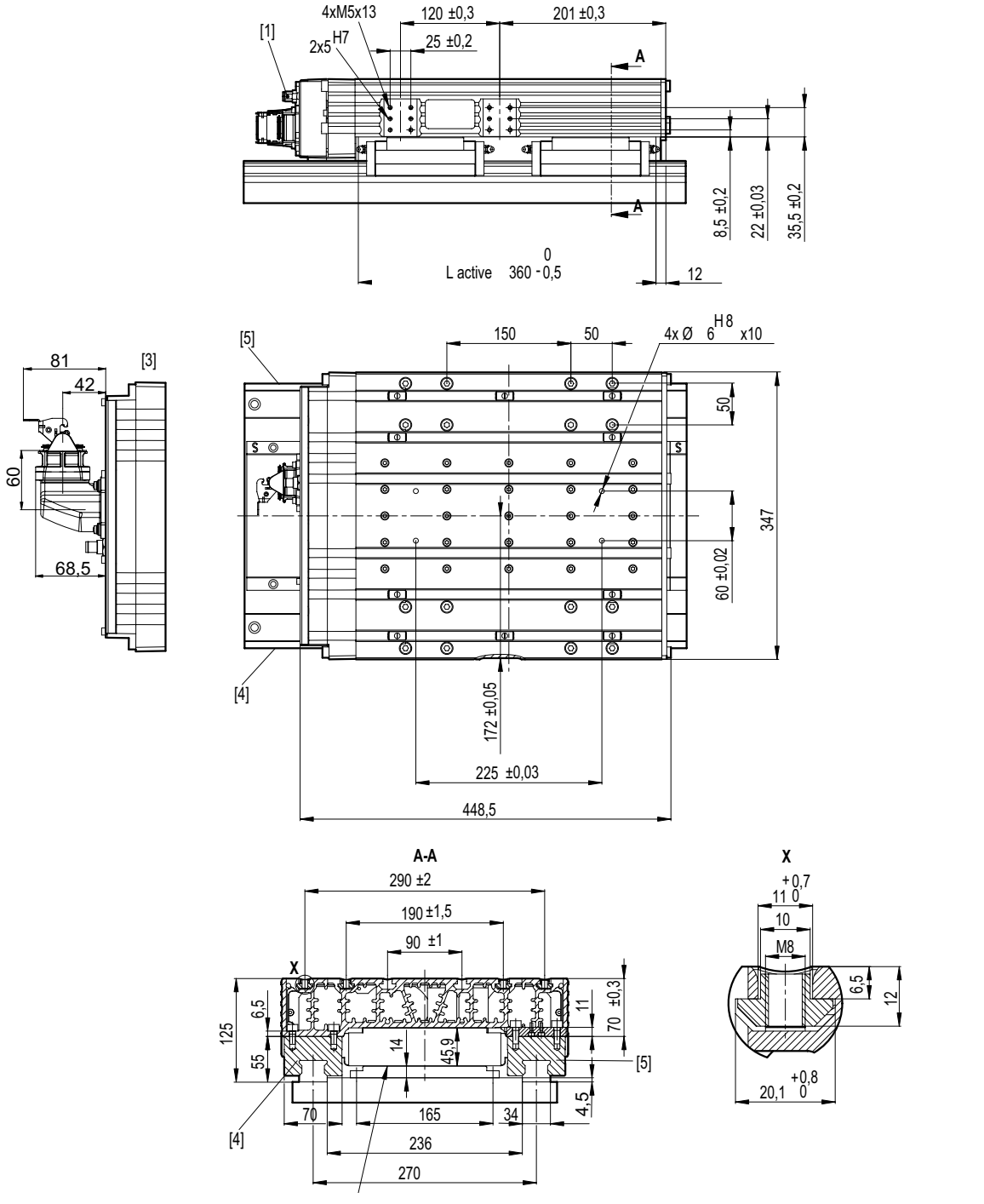


55001AEN

[1] M12 connector with SL2-Power System design only
[2] Visible air gap = 1.0 mm
[3] Design with right-angle connector
[4] Fixed bearing end
[5] Floating bearing end

Weights	
SL2 Advance System	37.0 kg
SL2 Power System	37.2 kg

4.8.14 SL2-Advance System / SL2-Power System size: SL2-P150S

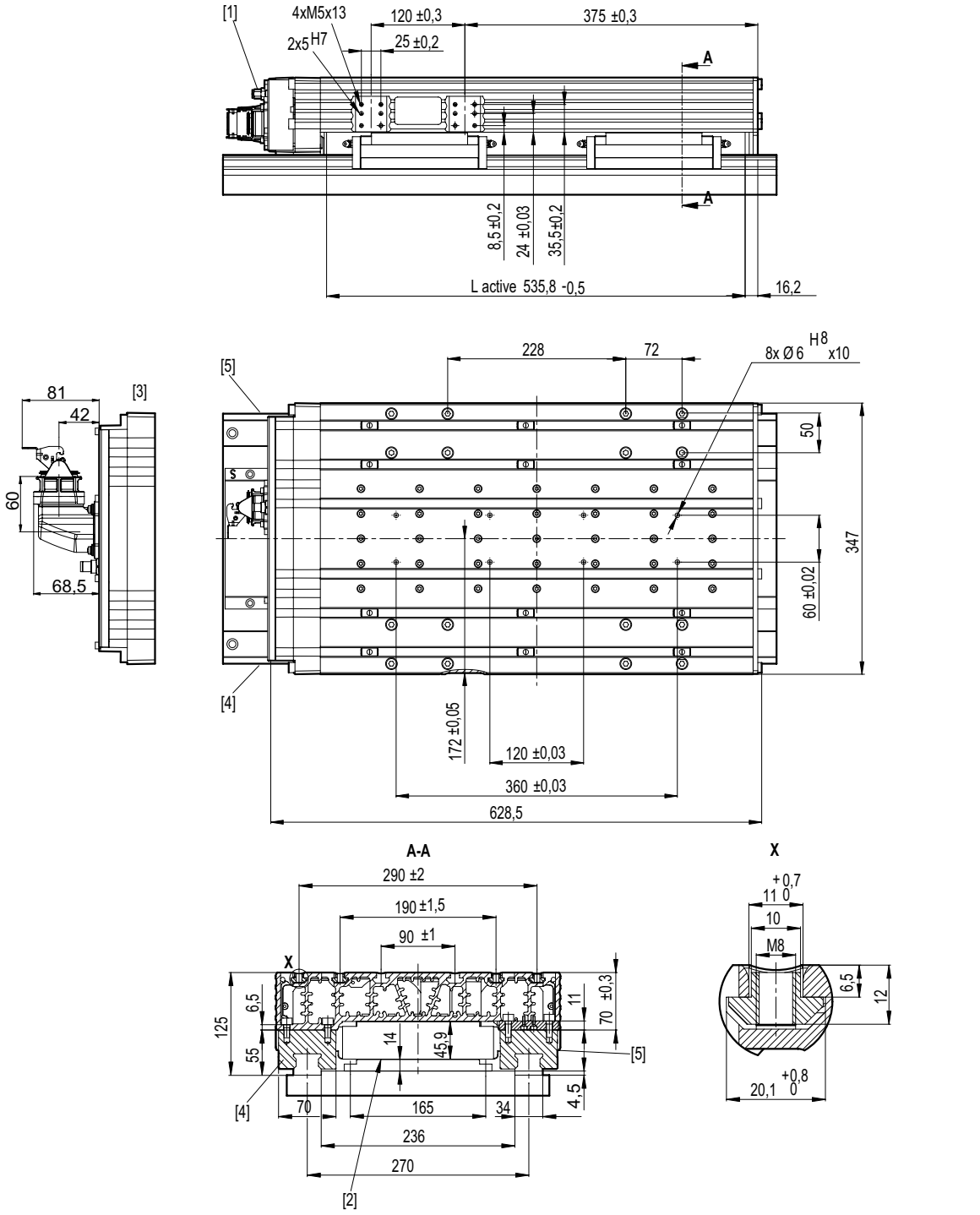


55005AEN

[1] M12 connector with SL2-Power System design only
[2] Visible air gap = 1.0 mm
[3] Design with right-angle connector
[4] Fixed bearing end
[5] Floating bearing end

Weights	
SL2 Advance System	29.4 kg
SL2 Power System	29.9 kg

4.8.15 SL2-Advance System / SL2-Power System size: SL2-P150M

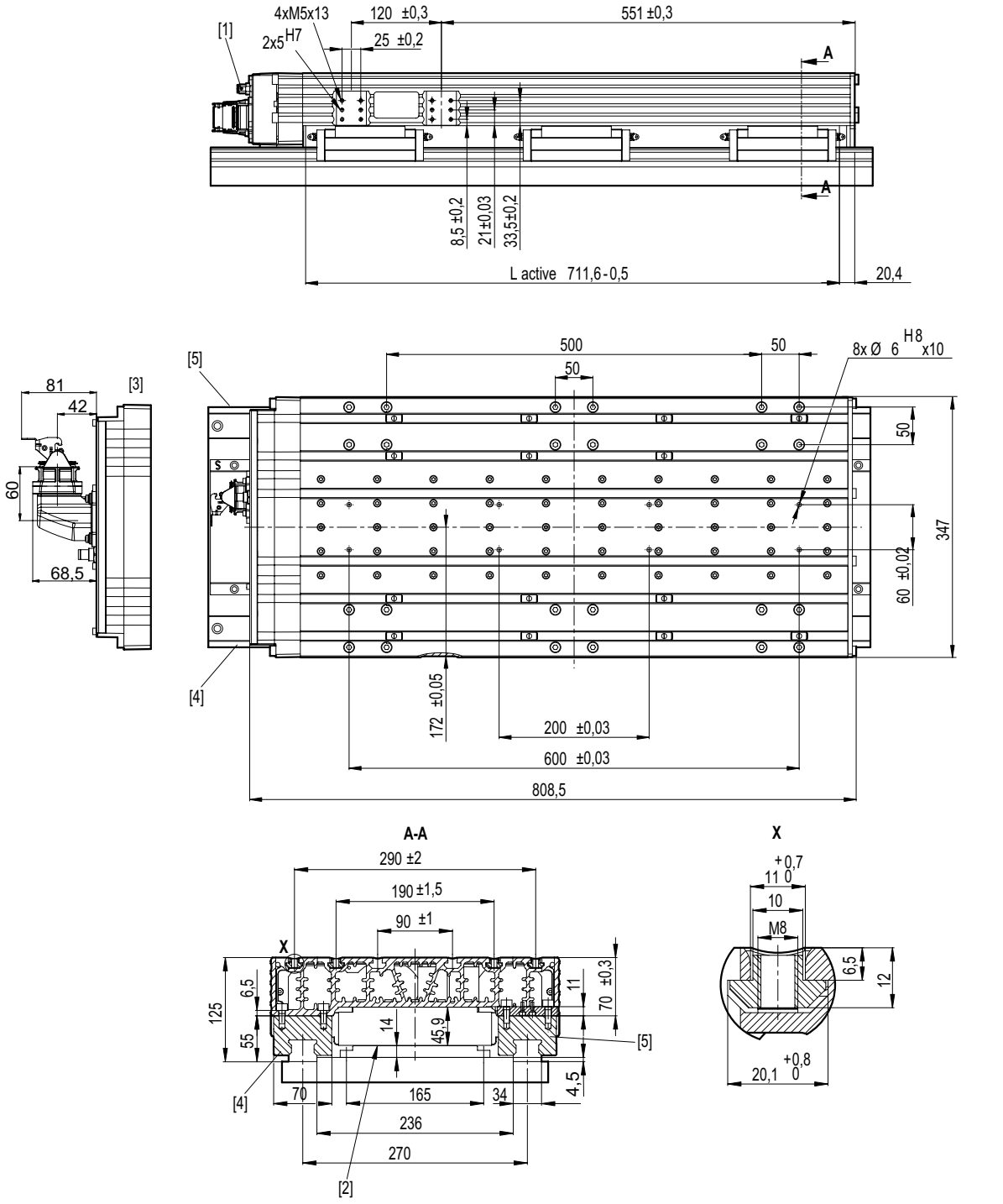


55006AEN

[1] M12 connector with SL2-Power System design only
[2] Visible air gap = 1.0 mm
[3] Design with right-angle connector
[4] Fixed bearing end
[5] Floating bearing end

Weights	
SL2 Advance System	42.6 kg
SL2 Power System	43.1 kg

4.8.16 SL2-Advance System / SL2-Power System size: SL2-P150ML



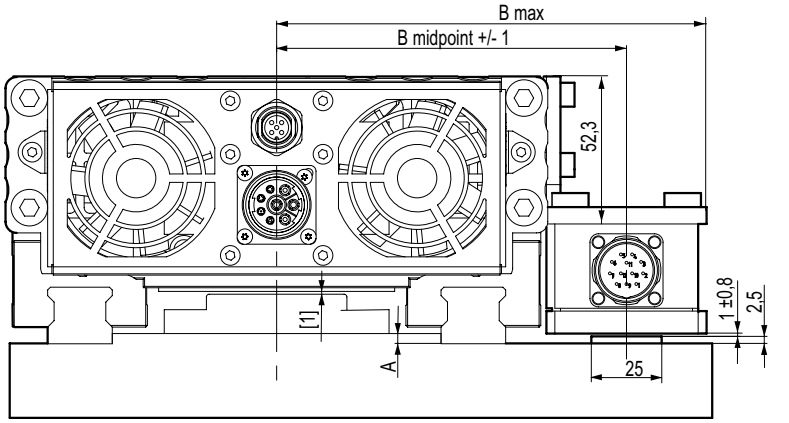
55007AEN

[1] M12 connector with SL2-Power System design only
[2] Visible air gap = 1.0 mm
[3] Design with right-angle connector
[4] Fixed bearing end
[5] Floating bearing end

Weights	
SL2 Advance System	56.0 kg
SL2 Power System	56.6 kg

4.8.17 Mounting dimensions of the AL1H encoder

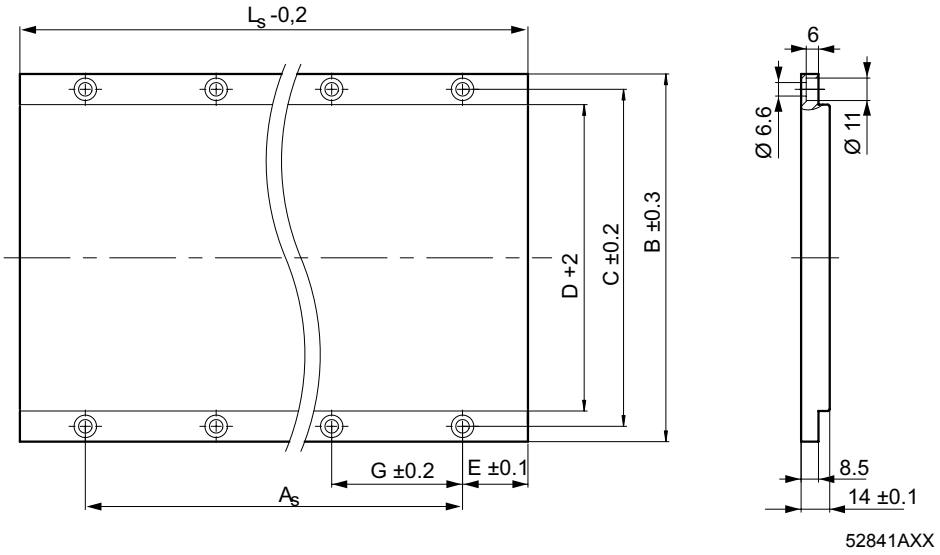
For mounting on SL2-Advance System / SL2-Power System with encoder mounting part no. 13328301.



[1] 1 mm visible air gap

Motor type	A	B midpoint	B max
SL2-050	3.5	124,5	153
SL2-100	3.5	159,5	188
SL2-150	4.5	201,5	230

4.8.18 Secondaries sizes 025 - 150



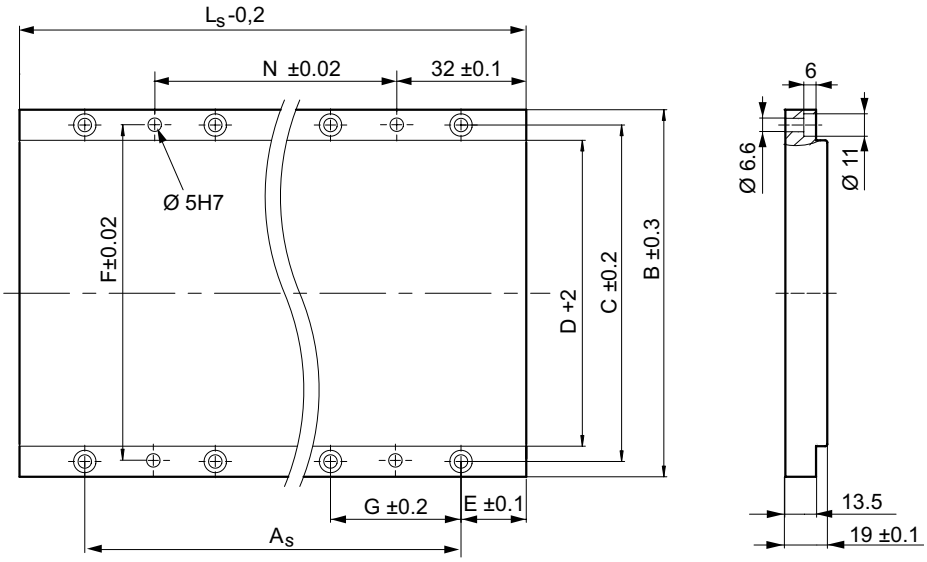
Motor type	B [mm]	C [mm]	D [mm]	E [mm]	G [mm]	L_s [mm]	m [kg]
SL2-S025-64	55	40	25	32	-	64	0.29
SL2-S025-128					64	128	0.57
SL2-S025-256					3x64	256	1.14
SL2-S025-512					7x64	512	2.27
SL2-S-050-64	80	65	50		-	64	0.47
SL2-S-050-128					1 x 64 (= 64)	128	0.96
SL2-S-050-256					3 x 64 (= 192)	256	1.89
SL2-S-050-512					7 x 64 (= 448)	512	3.8
SL2-S-100-64	130	115	100		-	64	0.8
SL2-S-100-128					1 x 64 (= 64)	128	1.6
SL2-S-100-256					3 x 64 (= 192)	256	3.2
SL2-S-100-512					7 x 64 (= 448)	512	6.4
SL2-S-150-64	180	165	150		-	64	1.31
SL2-S-150-128					1 x 64 (= 64)	128	2.62
SL2-S-150-256					3 x 64 (= 192)	256	5.25
SL2-S-150-512					7 x 64 (= 448)	512	10.5

NOTE

CAD data is available from SEW-EURODRIVE for all sizes on request.

- 2D-DXF, DWG and TIF
- 3D-IGES, STEP

4.8.19 Secondaries size 200 - 250



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Motor type	B [mm]	C [mm]	D [mm]	E [mm]	F[1] [mm]	G [mm]	L_s [mm]	N[1] [mm]	m [kg]
SL2-S-200-64	230	215	200	16	-	1 x 32 (= 32)	64	-	2.3
SL2-S-200-128						3 x 32 (= 96)	128		4.5
SL2-S-200-256						7 x 32 (= 224)	256		9.1
SL2-S-200-512						15 x 32 (= 480)	512		18.2
SL2-S-250-64	285	270	250		270	1 x 32 (= 32)	64	centered	2.8
SL2-S-250-128						3 x 32 (= 96)	128	64	5.6
SL2-S-250-256						7 x 32 (= 224)	256	192	11.3
SL2-S-250-512						15 x 32 (= 480)	512	448	22.6

1) The secondary components of the SL2-250 building size must be secured at the substructure with pins ∅ 5m6 to prevent shifting. For the SL2-200 size, no pin holes are required.

NOTE

CAD data is available from SEW-EURODRIVE for all sizes on request.

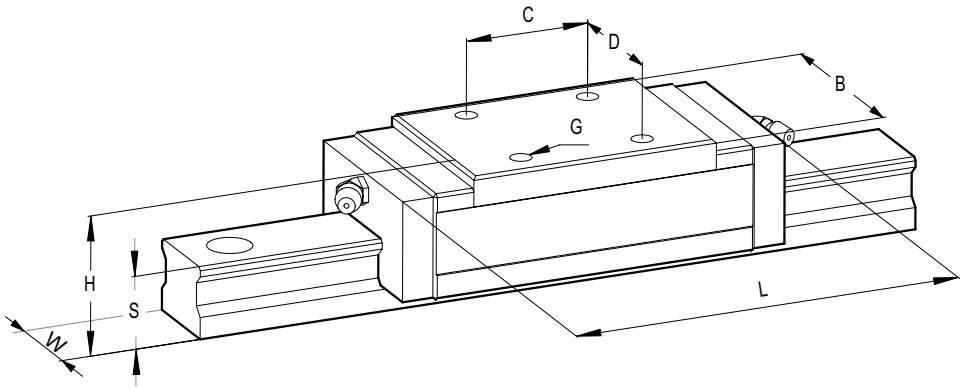
- 2D-DXF, DWG and TIF
- 3D-IGES, STEP

4.9 Technical data for linear guide systems

The following guide systems can be installed on the SL2-Advance System and the SL2-Power System primaries.

STOP	**STOP** It is mandatory that you make sure that the primary/guide carriage can move freely in relation to the secondary.

4.9.1 SL2 - P050VS/S/M/ML Advance/Power



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Guide systems (standard mounting) to DIN 645-1 version 3M

$L_{max.}$ [1]	B	C	D	H	W	$S_{max.}$	G
			[mm]				
SL2-P050VS = 94 SL2-P050S = 133 SL2-P050M = 144 SL2-P050ML = 190	48	35	35	40	23	24	M6x8

1) The max. length is dependent on the size

Manufacturer	Size
THK	HSR 25 R (standard) SHS 25 R (with ball chain)
INA	KUVE 25 B H KUVE 25 B KT H (with Quadspacer)
NSK	LAH 25 ANZ
Schneeberger	BMC 25
HIWIN	HGH25CA

4.9.2 SL2 - P100VS/S/M Advance/Power

Guide systems (standard mounting) to DIN 645-1 version 3M

$L_{max.}$ [1)]	B	C	D	H	W	$S_{max.}$	G
[mm]							
SL2-P100VS = 94 SL2-P100S = 140 SL2-P100M = 140	60	40	40	45	28	25	M8x10

1) The max. length is dependent on the size

Manufacturer	Size
THK	HSR30R SHS 30R (with ball chain)
INA	KUVE 30 B H KUVE 30 B KT H (with Quadspacer)

4.9.3 SL2 - P100ML Advance/Power

Guide systems (standard mounting, long guide carriages) to DIN 645-1 version 3L

$L_{max.}$	B	C	D	H	W	$S_{max.}$	G
[mm]							
170	60	60	40	45	28	25	M8x10

Manufacturer	Size
THK	HSR30LR SHS 30LR (with ball chain)
INA	KUVE 30 B HL KUVE 30 B KT HL (with Quadspacer)

4.9.4 SL2 - P150S/ML Advance/Power

Guide systems (standard mounting) to DIN 645-1 version 3M

$L_{max.}$	B	C	D	H	W	$S_{max.}$	G
[mm]							
170	70	50	50	55	34	29.8	M8x10

Manufacturer	Size
THK	HSR 35R SHS 35R (with ball chain)
INA	KUVE 35 B H KUVE 35 B KT H (with Quadspacer)
NSK	LAH 35 ANZ
Schneeberger	BMC 35
HIWIN	HGH35CA

4.9.5 SL2 - P150M Advance/Power

Guide systems (standard mounting) to DIN 645-1 version 3L

$L_{max.}$	B	C	D	H	W	$S_{max.}$	G
[mm]							
250	70	72	50	55	34	29.8	M8x10

Manufacturer	Size
THK	HSR 35LR SHS 35LR (with ball chain)
INA	KUVE 35 B HL KUVE 35 B KT HL (with Quadspacer)
NSK	LAH 35 BNZ
Schneeberger	BMD 35
HIWIN	HGH35HA

4.10 Mechanical load capacity of the SL2-Advance and SL2 -Power System

The permitted mechanical load capacity of the entire linear drive system is dependent on the size, position and type of the forces caused by the loads mounted by customers and the permitted loads from:

- Guide system
- Retaining screws for guide carriages on the cooling unit
- Cooling unit housing
- Loads mounted via slots/T-slot nuts

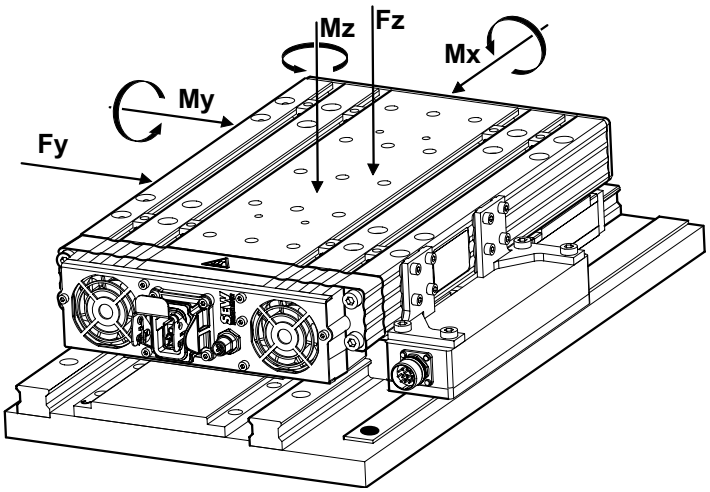
However, to help with the selection, the permitted loads have been reduced to simple applications and clear calculation models. Depending on the individual application, greater loads may occur. Please contact SEW-EURODRIVE if you have any questions on this topic.

Check the following forces for each point listed for every application.

4.10.1 Guide systems

Project planning for linear guide systems is carried out in agreement with the manufacturers of the guide system.

4.10.2 Housing of the motor cooling unit



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[Mx] = permitted load torque on the X axis
[My] = permitted load torque on the Y axis
[Mz] = permitted load torque on the Z axis
[Fy] = permitted force in Y direction
[Fz] = permitted force in Z direction

The table (see below) shows the permitted static loads for the housing, based on the load bearing capacity of the housing and the retaining screws of the guide carriage. The magnetic attraction forces between the primary and secondary are also taken into account.

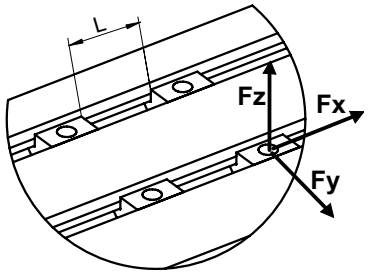
The values in the following table apply to both directions for the total forces and torque ratings.

STOP

The housing is only allowed to be subjected to one load value. If several forces/torques act on the housing at the same time, SEW-EURODRIVE can calculate the exact load bearing capacity of the motor cooling unit.

Motor type	Mx [Nm]	Fy [N]	My [Nm]	Fz [N]	Mz [Nm]
SL2-050VS	1500	1600	2500	12000	150
SL2-050S	1700	1800	4500	14000	220
SL2-050M	2500	2800	10000	20000	550
SL2-050ML	2800	3000	16000	20000	800
SL2-100VS	3400	3100	3200	12000	200
SL2-100S	3800	3400	8000	14000	400
SL2-100M	5500	5300	20000	20000	1000
SL2-100ML	5800	5700	32000	20000	1500
SL2-150S	5300	4000	10000	19000	400
SL2-150M	6000	4600	20000	26000	700
SL2-150ML	8500	6500	45000	32000	1800

4.10.3 Slots/T-slot nuts for mounting customer loads



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The design of the slot system is based on the modular profile system from Bosch/ Rexroth so that components from this modular system or similar modular systems can be used.

Permitted static load for the slot:

In direction	Fz	12000 N	(plastic deformation starts)
In direction	Fx	1000 N	
In direction	Fy	1000 N	

NOTE

The rule of thumb is 1000 N (≈ 100 kg) per T-slot nut in every direction

As long as the minimum distance (L) between the T-slot nuts is observed, the T-slot nuts can be distributed as required within the customer mounting surface.

Motor type	Number of T-slot nuts enclosed	Min. distance (L) between the T-slot nuts [mm]
SL2-050VS	6	70
SL2-050S	8	80
SL2-050M	10	90
SL2-050ML	10	90
SL2-100VS	8	70
SL2-100S	8	80
SL2-100M	10	90
SL2-100ML	10	90
SL2-150S	10	80
SL2-150M	12	90
SL2-150ML	14	90

To make it easier for customers to install/remove loads, each cooling unit comes equipped with pin holes for positioning. Additionally, the T-slot nuts are secured to ensure that they do not shift.

Any other loads acting on the screw connection of the T-slot nuts must be determined in accordance with the standard calculation procedures used in mechanical engineering (VDI 2230). The customer loads and design of the mount-on components are included in the calculation.

Generally, the permitted load of the primary is limited by the screw itself.

4.11 Derating

4.11.1 Influence of the ambient temperature on linear motors

	Ambient temperature [°C]				
	0...40	45	50	55	60
Rated thrust	1.0 x F_N	0.96 x F_N	0.92 x F_N	0.87 x F_N	0.82 x F_N

4.11.2 Influence of the installation altitude on linear motors

	Installation altitude [m]						
	Up to 1000	1500	2000	2500	3000	3500	4500
Rated thrust	1.0 x F_N	0.97 x F_N	0.94 x F_N	0.9 x F_N	0.86 x F_N	0.82 x F_N	0.77 x F_N

4.11.3 Influence of increasing the mechanical air gap S in linear motors

NOTE

- SEW-EURODRIVE recommends that customers set an air gap of 1 mm for the SL2-Basic, SL2-Advance System und SL2-Power System motors (smaller air gaps are only possible if the customer's surrounding structure is very stable).
- The following feasible thrust forces require that air gap tolerances of ±0.05 mm are observed.

	Mechanical air gap [d_{mech} [1)]] [mm]				
Σ	0.5	0.6	0.7	0.8	0.9
Maximum force F_1	1.0 x F_1	0.995 x F_1	0.99 x F_1	0.983 x F_1	0.975 x F_1
Magnetic attraction force F_D	1.0 x F_D	0.99 x F_D	0.98 x F_D	0.967 x F_D	0.95 x F_D

1) visible air gap between primary and secondary in installed state of motor, referred to as SIGMA Σ.

	Mechanical air gap [d_{mech} [1)]] [mm]					
Σ	SEW-EURODRIVE recommendation 1.0	1.1	1.2	1.3	1.4	1.5
Maximum force F_1	**0.965 x F_1**	0.955 x F_1	0.94 x F_1	0.93 x F_1	0.915 x F_1	0.90 x F_1
Magnetic attraction force F_D	**0.93 x F_D**	0.90 x F_D	0.865 x F_D	0.83 x F_D	0.78 x F_D	0.73 x F_D

1) visible air gap between primary and secondary in installed state of motor, referred to as SIGMA Σ.

4.12 General information on the electrical connection

4.12.1 Circuit breakers and protection devices

Permanent-field SL2 linear motors must be protected against overloads and short circuits.

Install the motors with sufficient space for air to cool them.

The surface temperature may exceed 65 °C during operation. Provide preventive measures against inadvertent contact.

The motors are available with temperature detection (TF or KTY) to protect the motor winding against overheating. The standard design of motor windings is thermal classification B.

The motors are equipped with **TF temperature sensor** as standard (thermal classification B).

TF temperature sensors meet DIN 44081 or DIN 44082. These motors are also available with **temperature sensor KTY** on request.

STOP	**STOP** If you use a KTY temperature sensor, it is essential that you contact SEW-EURODRIVE.

The TF signal can be evaluated directly in the inverter when using MOVIDRIVE® B. When using the MOVIDRIVE®*compact* MCH, refer to the notes on the TF evaluation unit on page 98.

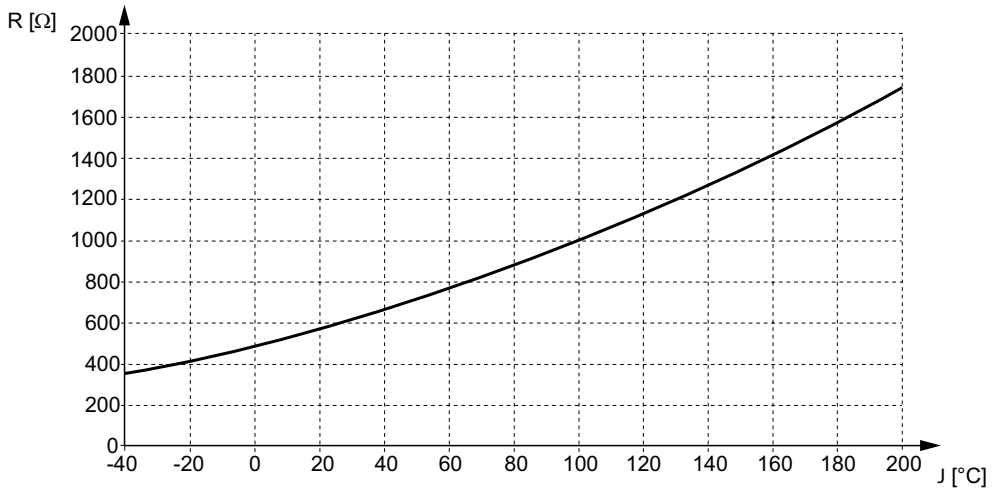
Temperature sensors will respond at the maximum permitted winding temperature. Integrate the contacts of the temperature monitoring device into the monitoring circuit.

Temperature measurement with KTY temperature sensors in MOVIDRIVE® B is in preparation.

4.12.2 KTY temperature sensor

- It is essential to observe the correct connection of the KTY to ensure correct evaluation of the temperature sensor.
- Avoid currents > 4 mA in the circuit of the KTY since high self-heating of the temperature sensor can damage its insulation and the motor winding.

The characteristic curve in the following figure shows the resistance curve with a measuring current of 2 mA.



4.13 Electrical connection

4.13.1 SL2-Basic electrical connection

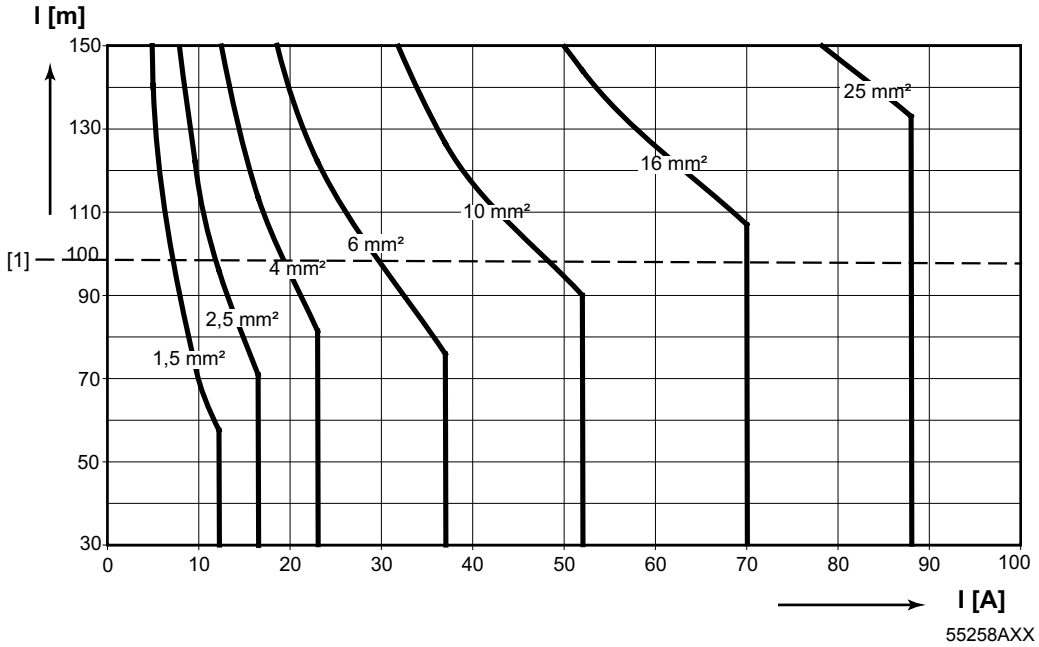
STOP

The current carrying capacity only applies to the SL2-Basic design with standard cable length 1 m.

Cable extension type	1	2	3	4	5
Outer diameter [mm]	9,6	10,8	13	17,5	20,5
Cores	4 x 1.5 + 1 x (2 x 0.5)	4 x 2.5 + 1 x (2 x 0.5)	4 x 4.0 + 1 x (2 x 0.5)	4 x 6.0 + 1 x (3 x 1.5)	4 x 10 + 1 x (3 x 1.5)
Load A at ambient temperature 30 °C [A]	18	26	34	44	61
Load A at ambient temperature 40 °C [A]	16	23	30	40	55
Load A at ambient temperature 60 °C [A]	12	17	24	31	43
Color of power cores	Black	Black	Black	Black	Black
Identification phase U	1	1	1	U/L1	U/L1
Identification phase V	2	2	2	V/L2	V/L2
Identification phase W	3	3	3	W/L3	W/L3
Color protective earth	Yellow - green	Yellow - green	Yellow - green	Yellow - green	Yellow - green
Color thermistor core (TF1)	White	White	White	Black	Black
Color thermistor core (TF2)	Brown	Brown	Brown	Black	Black
Thermistor identification (TF1) PTC140	-	-	-	1	1
Thermistor identification (TF2) PTC140	-	-	-	2	2
Thermistor identification KTY-84 Anode	White	White	White	1	1
Thermistor identification KTY-84 Kathode	Brown	Brown	Brown	2	2
Minimum bending radius fixed routing [mm]	20	22	26	53	62
Minimum bending radius at constant motion [mm]	96	110	130	175	205

4.13.2 Project planning for cable cross-section of the power cable

Cable dimensioning according to EN 60402



[1] Max. permitted cable length to SEW specification = 100 m

The diagram (see figure above) is the basis for chapters 4.2 and 4.3.

Hybrid cables with cross sections of 1.5 mm^2 to 10 mm^2 can be ordered from SEW-EURODRIVE.

Cable load through current I in [A] according to EN 60204-1 table 5, ambient temperature 40 °C

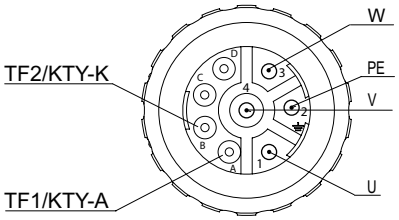
Cable cross section [mm^2]	Three-core sheathed cable in pipe or cable [A]	Three-core sheathed cable on top of one another on wall [A]	Three-core sheathed cable next to one another [A]
1,5	12,2	15,2	16,1
2,5	16,5	21,0	22
4	23	28,0	30
6	29	36,0	37
10	40	50,0	52
16	53	66,0	70
25	67	84,0	88
35	83	104,0	114

These data are merely recommended values and are **no substitute for detailed project planning** of the supply cables depending on the actual application, taking the applicable regulations into account!

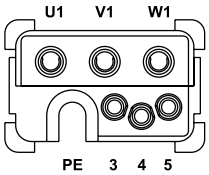
4.13.3 Pin assignment of the power connection for the SL2-Advance System and SL2 -Power System

The following pin assignments are described as viewed onto the motor.

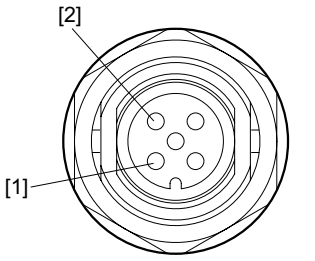
Size SL2-P050 and design AVX0

Contact	Assigned	Plug connectors
1	U	**BEGA 089** 
4	V	
3	W	
2	PE	
A	TF1/KTY-A	
B	TF2/KTY-K	
C	n.c.	
D	n.c.	

Size SL2-P100, SL2-P150

Contact	Assigned	Plug connectors
U1	U1	**C148U connector with socket contacts**
V1	V1	
W1	W1	
PE	Green / yellow	
3	n.c.	
4	(TF1)/KTY-A	
5	(TF2)/KTY-K	

4.13.4 Pin assignment for the power supply to the fan in the SL2-Power System



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[1] +24 V
[2] Grounding

4.13.5 Safety notes

EMC measures

SEW-EURODRIVE SL2 synchronous linear motors are designed for use as components for installation in machinery and systems. The designer of the machine or system is responsible for complying with the EMC Directive 89/336/EEC. For more detailed information on this subject, refer to the SEW publications:

"Drive Engineering Practical Implementation Volume 7, Project Planning for Drives" and "Drive Engineering Practical Implementation Volume 9, EMC in Drive Engineering".

Encoder connection

Observe the following instructions when connecting an encoder:

- Use a shielded cable with twisted pair conductors only.
- Connect the shield to the PE potential on both ends over a large surface area.
- Route signal cables separately from power cables or brake cables (min. distance 200 mm).

TF evaluation

STOP	**STOP**
	Risk of unwanted axis movements due to interference from parasitic signals (EMC) via the motor cable. When an older MOVIDRIVE® *compact* MCH servo inverter is used, SEW-EURODRIVE strongly recommends that you use an external TF evaluation unit (e.g. EMT6-K from Möller or 3RN1011 from Siemens).

STOP	**STOP**
	If you use a KTY temperature sensor (KTY84...140), it is essential that you contact SEW-EURODRIVE.

4.14 Prefabricated cables for SL2-Advance System / SL2 -Power System

	NOTE
	The cables have low capacitive properties for operation on inverters (see page 93 and subsequent pages). Standard cables with smaller outer diameters are also available.

4.14.1 Prefabricated power cables

For the motor designs

- SL2 Advance System
- SL2 Power System

SEW-EURODRIVE offers prefabricated power and feedback cables from 1 m to 100 m for straightforward and reliable connection.

The opposite cable end is fitted with cable lugs (for power cables) or conductor end sleeves. The shielding is connected to the mating connector.

Prefabricated power cables are used to connect the:

- Motor power
- Motor protection (**TF** or KTY)

4.14.2 Prefabricated feedback cable

SEW-EURODRIVE offers a feedback cable for the AL1H linear measuring system. The cable is fitted with plug connectors for connection to the encoder and the servo controller.

The cables are only available as cable carrier cables. Cables from the company Nexan are used.

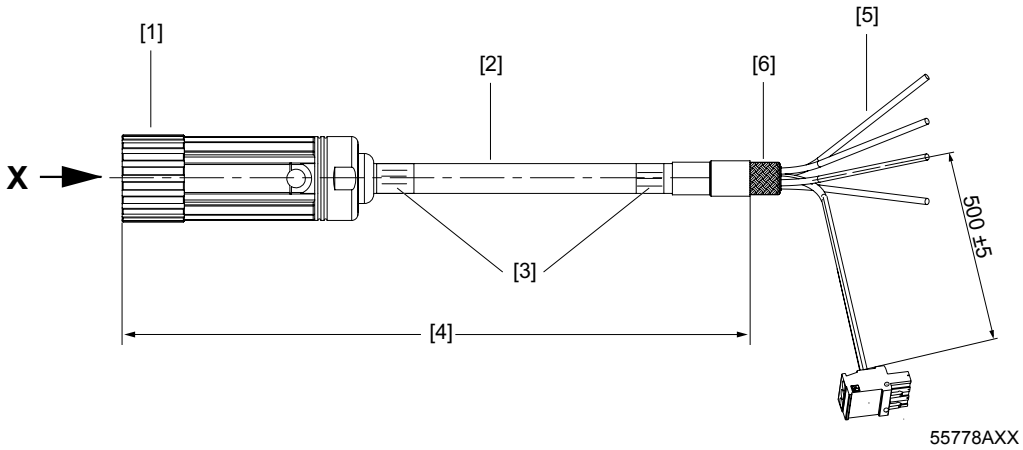
4.14.3 SL2 unit designation

Power cables of the SL2-P050... motors correspond to the brakemotor cables of the CM71 motor series with an SB71-74 round plug connector.

The power cables for the motor sizes SL2-P100 and SL2-P150 correspond to the brake motor cables of the CM motor series with SB51-59 plug connectors.

	NOTE
	Observe the data given in the specification in chapters 4.14 and 4.13.

4.14.4 Structure of power cables for SL2-050 motors and AVX0 design



[1] Connector: Intercontec BSTA 078
[2] SEW-EURODRIVE logo printed on cable
[3] Nameplate
[4] Line length ≤ 10 m: +200 mm tolerance
Line length ≥ 10 m: +2 % tolerance
Permitted cable length according to the technical documents
[5] Prefabricated cable end for inverter
Required loose parts are supplied with the cable
[6] Shielding 20 mm, pulled back approximately + 5 mm

Prefabricated cables for motor side

The power cables on the motor side consist of an 8-pin plug connector and socket contacts.

The shield is connected in the connector housing according to EMC requirements. All plug connectors seal the plug on the cable end with a lamellar seal and ensure cable relief according to EN 61884.

Prefabricated cables for inverter end

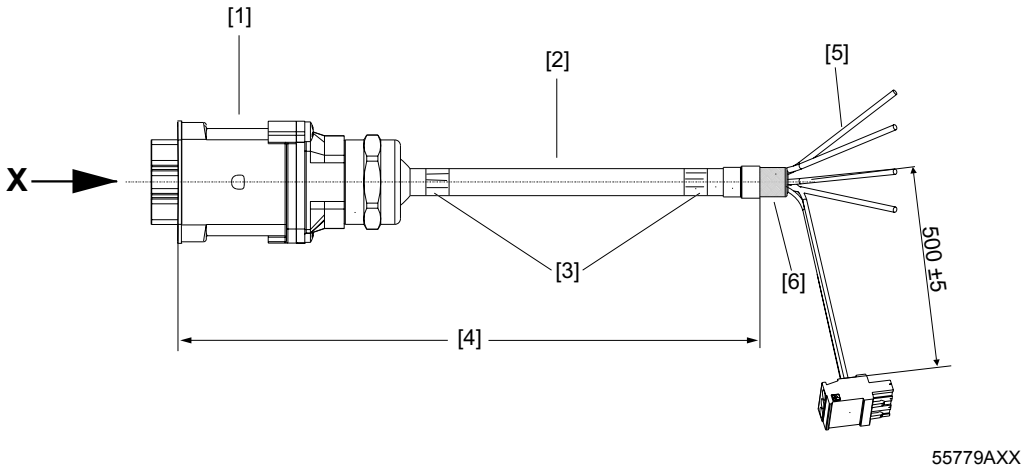
The individual cable cores of the power cables are exposed and the shield is prepared for connection in the control cabinet. The cable for the inverter end has yet to be assembled. The loose parts required are supplied with the cable in a separate bag.

Loose parts

The following loose parts are supplied in accordance with the core cross sections for connection to the power terminals on the inverter:

Bag no.	Content
1	4 x conductor end sleeves 1.5 mm^2 , insulated 4 x M6 U-shaped cable lugs 1.5 mm^2
2	4 x conductor end sleeves 2.5 mm^2 , insulated 4 x M6 U-shaped cable lugs 2.5 mm^2
3	4 x conductor end sleeves 4 mm^2 , insulated 4 x M6 U-shaped cable lugs 4 mm^2 4 x M10 U-shaped cable lugs 4 mm^2

4.14.5 Structure of power cables for SL2-100 and SL2-150 motors



[1] Connector: Amphenol
[2] SEW-EURODRIVE logo printed on cable
[3] Nameplate
[4] Line length ≤ 10 m: +200 mm tolerance
Line length ≥ 10 m: +2 % tolerance
Permitted cable length according to the technical documents
[5] Prefabricated cable end for inverter
Required loose parts are supplied with the cable
[6] Shielding 20 mm, pulled back approximately + 5 mm

Prefabricated cables for motor side

The power cables on the motor end have a 6-pin EMC Amphenol plug connector and socket contacts.

The shield is connected in the connector housing according to EMC requirements. All plug connectors seal the plug on the cable end with a lamellar seal and ensure cable relief according to EN 61884.

Prefabricated cables for inverter end

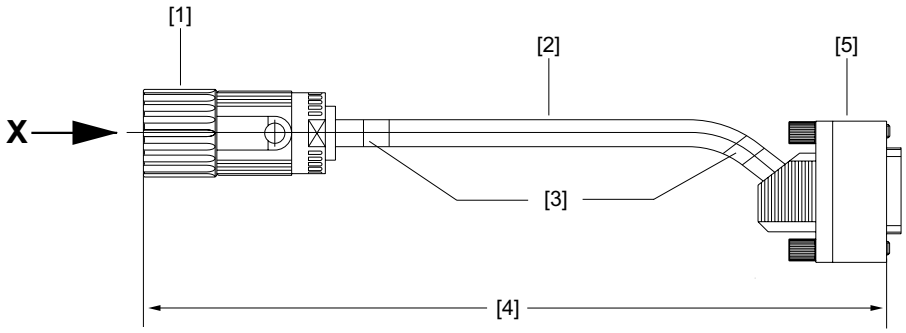
The individual cable cores of the power cables are exposed and the shield is prepared for connection in the control cabinet. The cable for the inverter end has yet to be assembled. The loose parts required are supplied with the cable in a separate bag.

Loose parts

The following loose parts are supplied in accordance with the core cross sections for connection to the power terminals on the inverter:

Bag no.	Content
1	4 x conductor end sleeves 1.5 mm^2 , insulated 4 x M6 U-shaped cable lugs 1.5 mm^2
2	4 x conductor end sleeves 2.5 mm^2 , insulated 4 x M6 U-shaped cable lugs 2.5 mm^2
3	4 x conductor end sleeves 4 mm^2 , insulated 4 x M6 U-shaped cable lugs 4 mm^2 4 x M10 U-shaped cable lugs 4 mm^2
4	4 x M6 U-shaped cable lugs 6 mm^2 4 x M10 U-shaped cable lugs 6 mm^2
5	4 x M6 U-shaped cable lugs 10 mm^2 4 x M10 ring-type cable lugs 10 mm^2

4.14.6 Structure of the AL1H feedback cable for MOVIDRIVE® B



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[1] Connector: Intercontec ASTA
[2] Printed on connector: SEW-EURODRIVE
[3] Nameplate
[4] Line length ≤ 10 m: +200 mm tolerance
Line length ≥ 10 m: +2 % tolerance
Permitted cable length according to the technical documents
[5] Sub D plug

A 12-pin EMC signal plug connector with socket contacts from Intercontec is used to connect the encoder system. The shield is connected in the connector housing according to EMC requirements. All plug connectors seal the plug on the cable end with a lamellar seal.

Prefabricated cables for inverter end

A commercial sub-D EMC connector with pin contacts is used on the inverter end. A 15-pin connector matching the inverter is used.

Hybrid cable

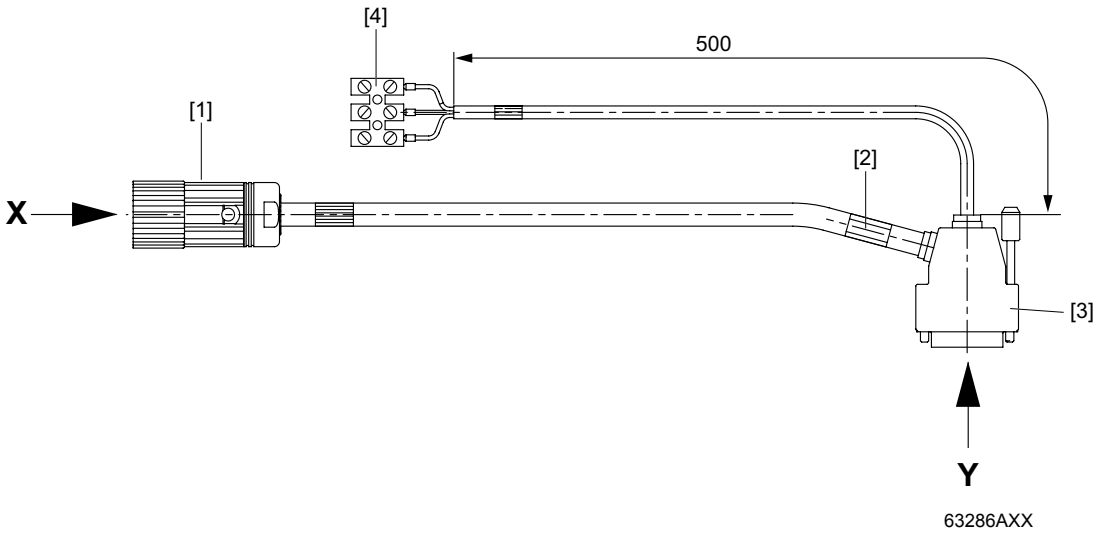
The outer cable sheath on the motor and inverter end bears a nameplate with part number and logo of the prefabricated cable manufacturer. The ordered length and permitted tolerance are interrelated as follows:

- Line length ≤ 10 m: 200 mm tolerance
- Line length ≥ 10 m: +2 % tolerance

	NOTE
	Refer to the system manual of the inverter for determining the maximum cable length.

Make sure that an EMC-compliant environment is maintained during project planning.

4.14.7 Structure of the AL1H feedback cable for MOVIAXIS®



[1] Connector: Intercontec ASTA
[2] Nameplate
[3] Sub D plug
[4] Screw terminal

A 12-pin EMC signal plug connector with socket contacts from Intercontec is used to connect the encoder system. The shield is connected in the connector housing according to EMC requirements. All plug connectors seal the plug on the cable end with a lamellar seal.

Prefabricated cables for inverter end

A sub-D EMC connector with pin contacts is used on the inverter end. A 15-pin connector matching the inverter is used.

With MOVIAXIS®, the temperature sensor of the linear motor can additionally by connected via screw terminals and be evaluated via the encoder input.

Hybrid cable

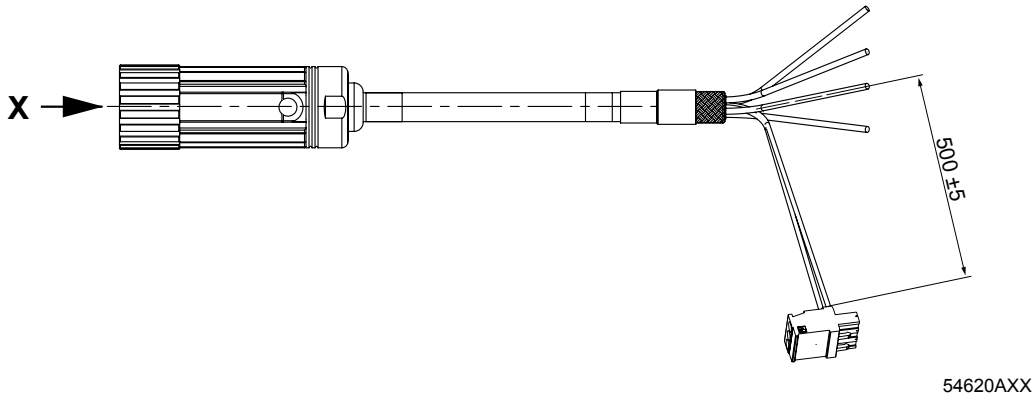
The outer cable sheath on the motor and inverter end bears a nameplate with part number and logo of the prefabricated cable manufacturer. The ordered length and permitted tolerance are interrelated as follows:

- Line length ≤ 10 m: 200 mm tolerance
- Line length ≥ 10 m: +2 % tolerance

	NOTE
	Refer to the system manual of the inverter for determining the maximum cable length.

Make sure that an EMC-compliant environment is maintained during project planning.

4.14.8 Pin assignment for SL2-050 power cables



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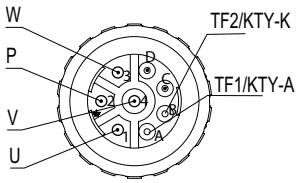
The customer assembles the cable with a Phoenix plug connector. The connector can be cut off because it is not required for the TF connection.

Plug connectors	Contact	Core identification	Assigned	Contact type	Extra
BSTA 078  **View X**	1	Black with white lettering U, V, W	U		Bag of loose parts
	4		V		
	3		W		
	2	Green/yellow	PE		
	A	Black 1	TF1/KTY-A	Cut off Phoenix connector	
	B	Black 2	TF2/KTY-K		
	C	Black 3	n.c.	Ground in control cabinet	
	D	–	n.c.		

Plug connector type	Number of cores and line cross section	Part no.	Installation type	LC[1)]
SB71 / SB81	**4 x 1.5 mm² (AWG 16) 3 x 1 mm² (AWG 17)**	0590 631 8	Cable carrier installation	X
SB72 / SB82	**4 x 2.5 mm² (AWG 14) 3 x 1 mm² (AWG 12)**	0590 632 6	Cable carrier installation	X
SB74 / SB84	**4 x 4 mm² (AWG 12) 3 x 1 mm² (AWG 17)**	0590 484 6	Cable carrier installation	

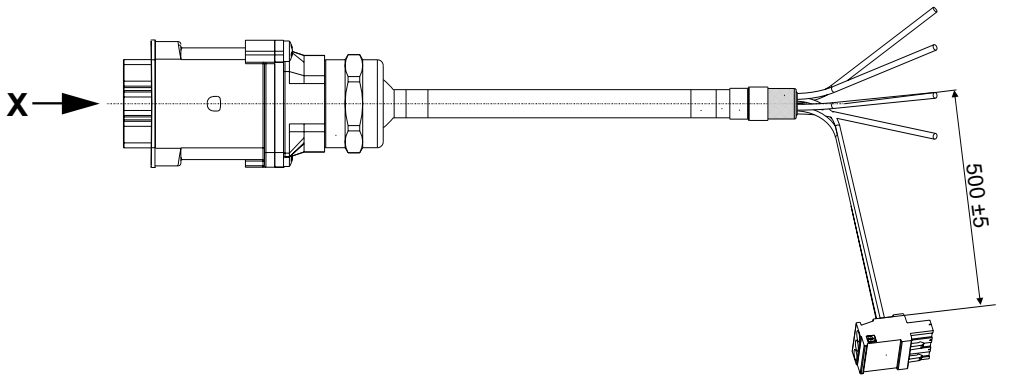
1) Cable with low capacitance characteristics (LC = low capacity).

Alternative plug connector at customer end

Plug connectors for power supply with socket contacts (complete).

Type	Number of cores and line cross section	Part no.
SB71 / SB81	**4 x 1.5 mm² (AWG 16) 3 x 1 mm² (AWG 17)**	0198 919 7
SB72 / SB82	**4 x 2.5 mm² (AWG 14) 3 x 1 mm² (AWG 12)**	0198 919 7
SB74 / SB84	**4 x 4 mm² (AWG 12) 3 x 1 mm² (AWG 17)**	0199 163 9

4.14.9 Pin assignment for SL-100 and SL2-150 power cables



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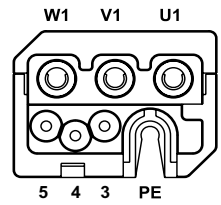
The cable is fitted with a Phoenix plug connector at the control cabinet end. The connector can be cut off because it is not required for the TF connection.

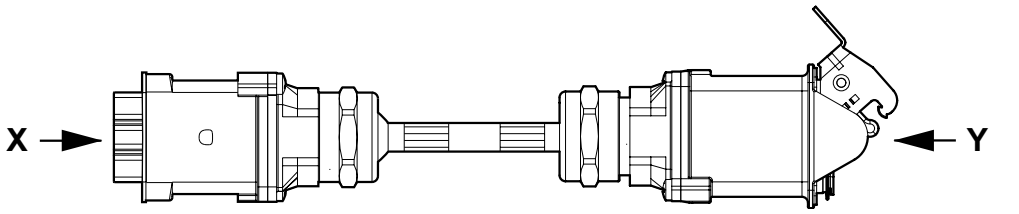
Plug connectors	Contact	Core identification	Assigned	Contact type	Extra
C148U connector with socket contacts	U1	Black with white lettering U, V, W	U	Cut-off, length ca. 250 mm	Bag of loose parts
	V1		V		
	W1		W		
 **View X**	PE	Green/yellow	(protective earth)		
	3	Black 1	n.c.	Ground in control cabinet	
	4	Black 2	TF1/KTY-A	Cut off Phoenix connector	
	5	Black 3	TF2/KTY-K		

Power cable type

Plug connector type, complete	Number of cores and line cross section	Part number	Installation type	LC[1)]
SB51 / SB61	**4 x 1.5 mm² (AWG 16) + 3 x 1.0 mm² (AWG 17)**	1333 116 7	Cable carrier installation	X
SB52 / SB62	**4 x 2.5 mm² (AWG 12) + 3 x 1.0 mm² (AWG 17)**	1333 117 5		X
SB54 / SB64	**4 x 4 mm² (AWG 10) + 3 x 1.0 mm² (AWG 17)**	199 194 9		
SB56 / SB66	**4 x 6 mm² (AWG 10) + 3 x 1.5 mm² (AWG 16)**	199 196 5		
SB59 / SB69	**4 x 10 mm² (AWG 10) + 3 x 1.5 mm² (AWG 17)**	199 198 1		

1) Cable with low capacitance characteristics (LC = low capacity).

4.14.10 Pin assignment for SL-100 and SL2-150 power extension cables



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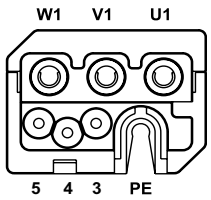
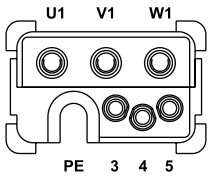
Pin assignment for extension cables

Plug connectors	Contact	Core identification	Contact	Plug connectors
C148U adapter with pin contacts	U1	Black with white lettering U, V, W	U1	**C148U connector with socket contacts**
	V1		V1	
	W1		W1	
	PE	Green/yellow	PE	
	n.c.	Black 1	n.c.	
	4 TF1/KTY-A	Black 2	4 TF1/KTY-A	
	5 TF1/KTY-K	Black 3	5 TF1/KTY-K	



View Y



View X

The extension cable has the same pin assignment as all other contacts.

Power extension cable types

Plug connector type, complete	Number of cores and line cross section	Part number	Installation type	LC[1)]
SK51 / SK61	**4 x 1.5 mm² (AWG 16) + 3 x 1.0 mm² (AWG 17)**	1333 120 5	Cable carrier installation	X
SK52 / SK62	**4 x 2.5 mm² (AWG 12) + 3 x 1.0 mm² (AWG 117)**	1333 121 3		X
SK54 / SK64	**4 x 4 mm² (AWG 10) + 3 x 1.0 mm² (AWG 17)**	0199 204 X		
SK56 / SK66	**4 x 6 mm² (AWG 10) + 3 x 1.5 mm² (AWG 16)**	0199 206 6		
SK59 / SK69	**4 x 10 mm² (AWG 10) + 3 x 1.5 mm² (AWG 17)**	0199 208 2		

1) Cable with low capacitance characteristics (LC = low capacity).

Alternative plug connector at customer end

Plug connectors for power supply with socket contacts (complete).

Type	Cross sections	Part no.
SB51 / SB61	**4 x 1.5 mm² (AWG 16) + 3 x 1.0 mm² (AWG 17)**	199 142 6
SB52 / SB62	**4 x 2.5 mm² (AWG 12) + 3 x 1.0 mm² (AWG 17)**	199 143 4
SB54 / SB64	**4 x 4 mm² (AWG 10) + 3 x 1.0 mm² (AWG 17)**	199 144 2
SB56 / SB66	**4 x 6 mm² (AWG 10) + 3 x 1.5 mm² (AWG 16)**	199 145 0
SB59 / SB69	**4 x 10 mm² (AWG 10) + 3 x 1.5 mm² (AWG 17)**	199 146 9

4.14.11 Cable for AL1H encoder MOVIDRIVE®

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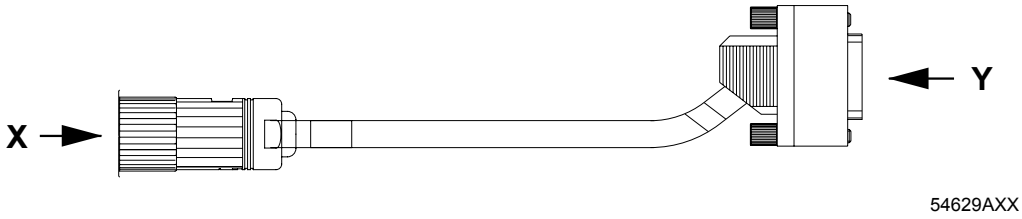
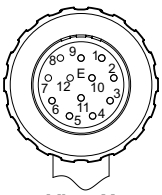
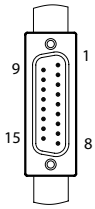


Type	Installation	Part number
SL2	Cable carrier installation (MOVIDRIVE® B)	0595 151 8

Cable pin assignment for feedback cables

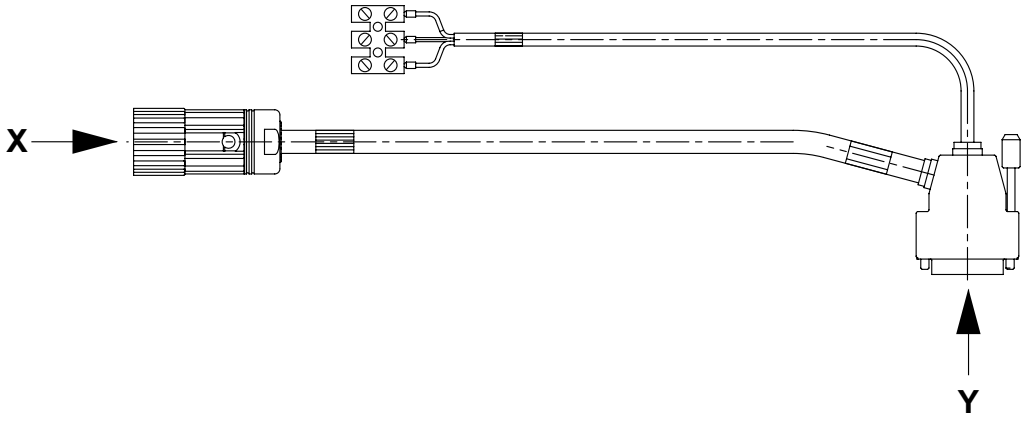
Encoder end					Connection MOVIDRIVE® MDX..B	
Plug connectors	Contact no.	Description	Cable core color	Description	Contact no.	Plug connectors
ASTA021FR 198 921 9 12-pin with socket contacts  View X	1	S3 (cosine -)	Blue (BU)	S3 (cosine -)	9	Sub-D 15-pin  MOVIDRIVE® B View Y
	2	Data (+)	Black (BK)	Data (+)	4	
	3	Unassigned		Unassigned	3	
	4	Unassigned		Unassigned	5	
	5	S2 (sine +)	Yellow (YE)	S2 (sine +)	2	
	6	S4 (sine -)	Green (GN)	S4 (sine -)	10	
	7	Data (-)	Violet (VT)	Data (-)	12	
	8	S1 (cosine +)	Red (RD)	S1 (cosine +)	1	
	9	Unassigned		Unassigned	6	
	10	GND	Grey/pink (GY-PK) / pink (PK)	GND	8	
	11	Unassigned		Unassigned	7	
	12	U_S	Red/blue (RD-BU) / gray (GY)	U_S	15	
		Unassigned	Unassigned	Unassigned	11	
		Unassigned	Unassigned	Unassigned	13	
		Unassigned	Unassigned	Unassigned	14	

Alternative plug connector at customer end

Type	Cross sections	Part no.
ALH1	**6 x 2 x 0.25 mm²**	01986732

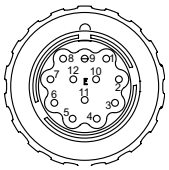
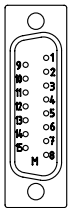
4.14.12 Cable for AL1H encoder MOVIAXIS®

Using the following cable, also the temperature switch of the linear motor can be connected to the encoder input. If doing so is required, the previously described MOVIDRIVE® cable can be used

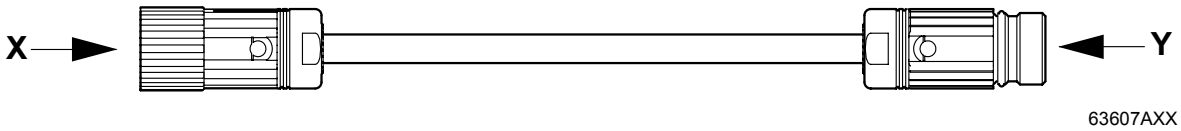


Type	Installation	Part number
SL2	Cable carrier installation	1333 224 4

Cable pin assignment for feedback cables

Encoder end					Connection MOVIDRIVE® MDX..B	
Plug connectors	Contact no.	Description	Cable core color	Description	Contact no.	Plug connectors
ASTA021FR 198 921 9 12-pin with socket contacts  View X	1	S3 (cosine -)	Blue (BU)	S3 (cosine -)	9	Sub-D 15-pin  View Y
	2	Data (+)	Black (BK)	Data (+)	4	
	3	Unassigned		Unassigned	3	
	4	Unassigned		Unassigned	5	
	5	S2 (sine +)	Yellow (YE)	S2 (sine +)	2	
	6	S4 (sine -)	Green (GN)	S4 (sine -)	10	
	7	Data (-)	Violet (VT)	Data (-)	12	
	8	S1 (cosine +)	Red (RD)	S1 (cosine +)	1	
	9	Unassigned		Unassigned	6	
	10	GND	Grey/pink (GY-PK) / pink (PK)	GND	8	
	11	Unassigned		Unassigned	7	
	12	U_s	Red/blue (RD-BU) / gray (GY)	U_s	15	
		Unassigned	Unassigned	Unassigned	11	
		Unassigned	Unassigned	Unassigned	13	
		Unassigned				
1 2 3	1	TF/TH/KTY+	BN	TF/TH/KTY+	14	
	2	TF/TH/KTY-	WH	TF/TH/KTY-	6	
	3	Shield		PE		

4.14.13 Extension cable for AL1H encoders



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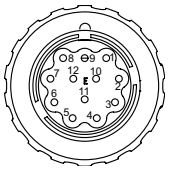
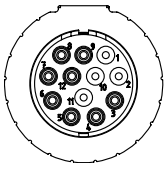
Type	Installation	Part number
SL2	Cable carrier installation	1333 387 9

Cable pin assignment for feedback cables

Encoder end					Connection MOVIDRIVE® MDX..B	
Plug connectors	**Contact no.**	**Description**	**Cable core color**	**Description**	**Contact no.**	**Plug connectors**
ASTA021FR **198 921 9** **12-pin with socket contacts**	1	S3 (cosine -)	Blue (BU)	S3 (cosine -)	1	**AKUA020 MR** **12-pole**
	2	Data (+)	Black (BK)	Data (+)	2	
	3	Unassigned		Unassigned	3	
	4	Unassigned		Unassigned	4	
	5	S2 (sine +)	Yellow (YE)	S2 (sine +)	5	
	6	S4 (sine -)	Green (GN)	S4 (sine -)	6	
	7	Data (-)	Violet (VT)	Data (-)	7	
	8	S1 (cosine +)	Red (RD)	S1 (cosine +)	8	
	9	Unassigned		Unassigned	9	
	10	GND	Grey/pink (GY-PK) / pink (PK)	GND	10	
	11	Unassigned		Unassigned	11	
	12	U_s	Red/blue (RD-BU) / gray (GY)	U_s	12	
		Unassigned	Unassigned	Unassigned		
		Unassigned	Unassigned	Unassigned		
		Unassigned				



View X



View Y

Alternative plug connector at customer end

Type	Cross sections	Part no.
ALH1	**6 x 2 x 0.25 mm²**	01986732

4.14.14 Cable carrier installation of power cables

Technical specifications of the cable

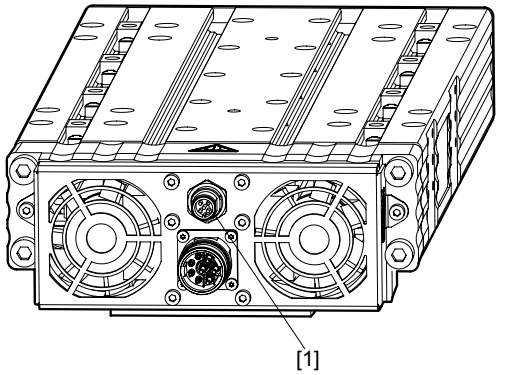
Installation type		Cable carrier				
Cable cross sections		**4 x 1.5 mm² + 3 x 1 mm²**	**4 x 2.5 mm² + 3 x 1 mm²**	**4 x 4 mm² + 3 x 1 mm²**	**4 x 6 mm + 3 x 1.5 mm²**	**4 x 10 mm² + 3 x 1.5 mm²**
Manufacturer		**Nexans**				
Manufacturer designation		PSL(LC)C11Y-J 4x...+3A.../C		PSL11YC11Y-J 4x... +3A.../C		
Operating voltage Uo/	[VAC]	600 / 1000				
Temperature range	[°C]	–20 to + 60				
Max. temperature	[°C]	+ 90 (conductor)				
Min. bending radius	[mm]	150	170	155	175	200
Diameter D	[mm]	15.0 ±1.4	16.2 ±0.7	15.3 ±0.5	17.4 ±0,5	20.5 ±0.5
Maximum acceleration	[m/s²]	20				
Max. velocity	[m/min]	200 at max. travel distance of 5 m				
Core identification		BK with lettering WH + GN/YE				
Sheath color		Orange similar to RAL 2003				
Approval(s)		DESINA/VDE/UL/cULus				
Capacitance core/shielding	[nF/km]	105	105	170	170	170
Capacitance core/core	[nF/km]	65	65	95	95	95
Halogen-free		yes				
Silicone-free		yes				
CFC-free		yes				
Inner insulation (cable)		Polyolefin		TPM		
Outer insulation (sheath)		TPU (PUR)				
Flame-retardant/self-extinguishing		yes				
Conductor material		E-Cu blank				
Shielding		Braided tinned Cu shield (optically covered > 85 %)				
Weight (cable)	[kg/km]	280	380	410	540	750

4.14.15 Cable carrier installation of feedback cable:

Technical specifications of the cable

Installation type		**Cable carrier**
Accessory designation		**AL1H / ES1H**
Cable cross sections		**6 x 2 x 0.25 mm²**
Manufacturer		**Nexans**
Manufacturer designation		SSL11YC11Y6x 2 x 0.25
Operating voltage Uo/	[VAC]	300
Temperature range	[°C]	–20 to + 60
Max. temperature	[°C]	+90 (+194) (on conductor)
Min. bending radius	[mm]	100
Diameter D	[mm]	9.8 ± 0.2
Maximum acceleration	[m/s²]	20
Max. velocity	[m/min]	200
Core identification		WH/BN, GN/YE, GY/PK, BU/RD, BK/VT, GY-PK/RD-BU
Sheath color		Green similar to RAL 6018
Approval(s)		DESINA / UL / VDE / cULus
Capacitance core/shielding	[nF/km]	100
Capacitance core/core	[nF/km]	55
Halogen-free		yes
Silicone-free		yes
CFC-free		yes
Inner insulation (core)		PP
Outer insulation (sheath)		TPE-U
Flame-retardant/self-extinguishing		yes
Conductor material		E-Cu blank
Shielding		Braided tinned Cu
Weight	[kg/km]	130

4.14.16 Power supply for the fan



[1] M12 fan connection, 5-pole

The fans in power design are supplied via a commercially available 5-pole, M12 plug connection with DC 24 V.

The power demand of the fan is as follows for

- sizes 50 to 100: 7.2 W
- Size 150: 18 W

Customer connection cables are not available from SEW-EURODRIVE.

Suitable connection cables can be ordered from manufacturers, such as:

- Phoenix CONTACT
- Hirschmann
- Harting

.

The following table is an extract from trailing cables available from Phoenix CONTACT:

Sensor/actuator cables, straight M12 socket, 3-pin (suitable for 5-pin connector)

Cable length	Article designation	Article number
3 m	SAC-3P-3,0-PUR/M12FS	16 94 49 9
5 m	SAC-3P-5.0-PUR/M12FS	16 83 51 0
10 m	SAC-3P-10.0-PUR/M12FS	16 93 03 4

4.14.17 UWU51A switched-mode power supply

For the SL2-Power System design, the UWU51A switched-mode power supply is available for powering the fan.

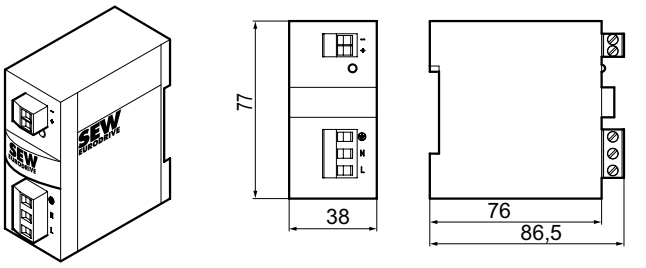
Input: 100 ... 240 V_{AC} –6 % / +10 %, 50/60 Hz

Output: DC 24 V –1 % / +2 %, 1.25 A

Connection: Terminal screws 0.2 ... 2.5 mm^2, separable.

Degree of protection: IP20; attachment to EN 5022 support rail in the control cabinet

Part number: 0 187 441 1



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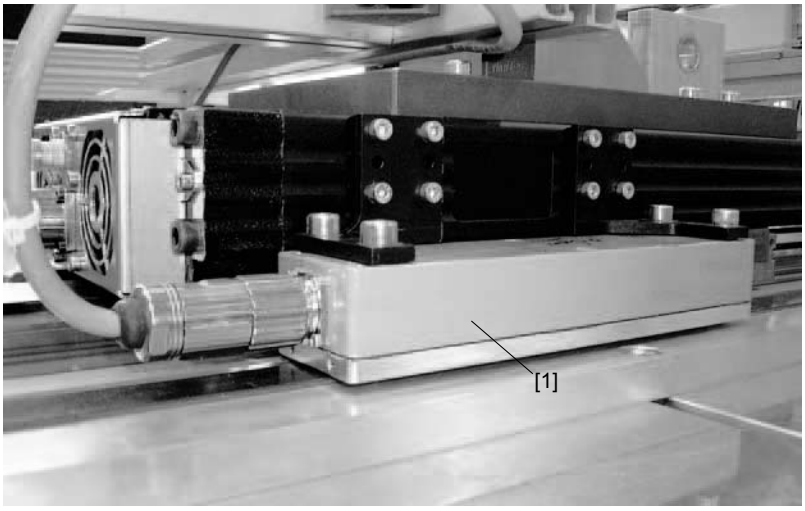
4.15 Technical data of the absolute linear measuring system AL1H

The absolute linear measuring system corresponds to the linear measuring system from SICK / Stegmann.



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4.15.1 Technical data and characteristic features to DIN 32878:

General data	
Measuring length	max. 40 m
Magnetic tape length of the measuring gauge	+130 mm[1)]
Reproducibility	± 10 µm
Measurement accuracy	type ± 0.3 mm/m at 20 °C
Max. traveling velocity	6 m/s
Temperature expansion coefficient T_k steel band	16 µm/°C/m
Position tolerances and dimensions	See scale drawing
Mass • Sensor part • Magnetic tape	 0.693 kg 0.433 kg/m
Materials • Sensor parts • Magnetic tape • Stainless steel band	 AlmgSiPbF28 Tromaflex 928 No. 1.4435
Ambient temperature, operation	0 °C ... +60 °C
Degree of protection	IP65

1) Constant due to technical limitations

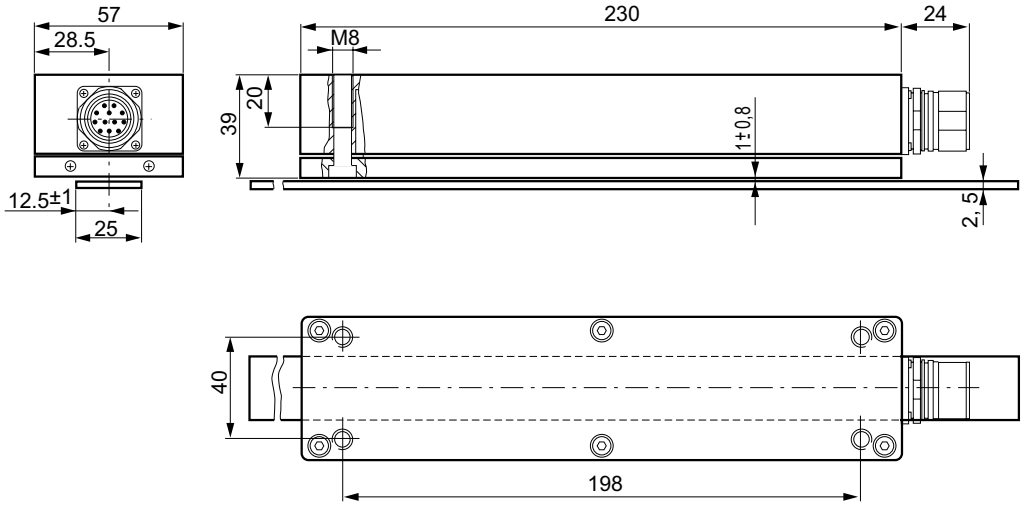
4.15.2 HIPERFACE® interface data

General data	
Cycle length	5 mm ±3 %
Position resolution (cycle length/32 = 5 mm/32)	156.25 µm
Initialization time	2500 ms
Supply voltage	7 V ... 12 V
Power consumption	4.3 W
Interface signals	
Process data channel • SIN, COS • REFSIN, REFCOS	 0.9 Vpp ... 1.1 Vpp 2,2 V ... 2.8 V
Non-linearity within a sine, cosine period, differential non-linearity	± 50 µm
Parameter channel	to EIA 485

STOP	**STOP**
	External magnetic fields should not exceed the surface of the material measure 64 mT (640 Oe; 52 kA/m) as this could cause irreparable damage to the coding on the material measure. Magnetic fields > 1 mT on the measuring system influence measuring accuracy.

4.15.3 Scale drawings and position tolerances

General tolerances to DIN ISO 2768-mk



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4.15.4 Additional information

Data for the AL1H linear measuring system in this documentation were based on the data available from SICK / Stegmann at the time of printing. The design and units are subject to change. The data from SICK / Stegmann apply.

Current information can be found in

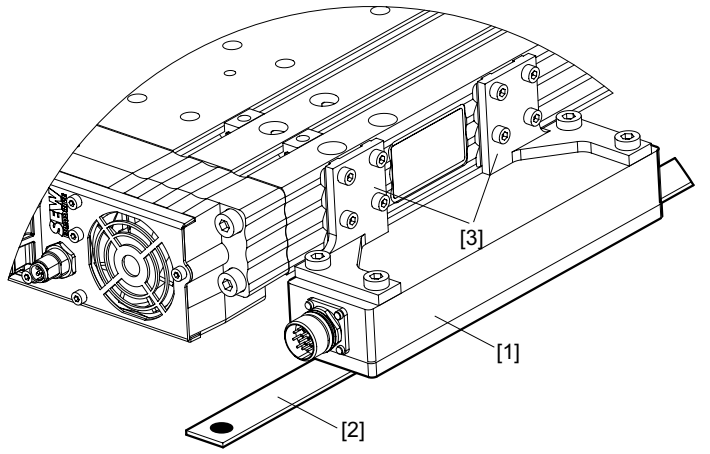
- the operating instructions from SICK / Stegmann, which are enclosed with the linear motor

or

- at www.stegmann.de

4.15.5 Encoder mount-on components

For the SL2-Advance System and SL2-Power System, mount-on components are available for these encoders under the part number 13328301.



[1] Linear sensor
[2] Measuring tape
[3] Encoder mount-on components

Function	SEW part number	Description
Linear sensor	1332 8263	AL1H, HIPERFACE®, 12-pin unit connector M23
Measuring tape	1332 8271	Magnet tape with adhesive tape
Mount-on components	1332 8301	LinCoder® L230 mount-on components for SL2-Advance System / SL2-Power System cooling unit
Feedback cable MOVIDRIVE®	0595 1518	Encoder cable for MOVIDRIVE®, approved for use with cable carriers. The maximum permitted length of the encoder cable is 85 m
Feedback cable MOVIAXIS®	1333 2244	Encoder cable for MOVIAXIS®, approved for use with cable carriers. Note: The maximum permitted cable length with MOVIAXIS® is 34 m when connected to X13 basic unit, and 75 m when connected to XGH multi-encoder card.
Feedback extension cable MOVIAXIS® MOVIDRIVE®	1333 3879	Encoder cable extension for MOVIDRIVE® and MOVIAXIS®, approved for use with cable carriers

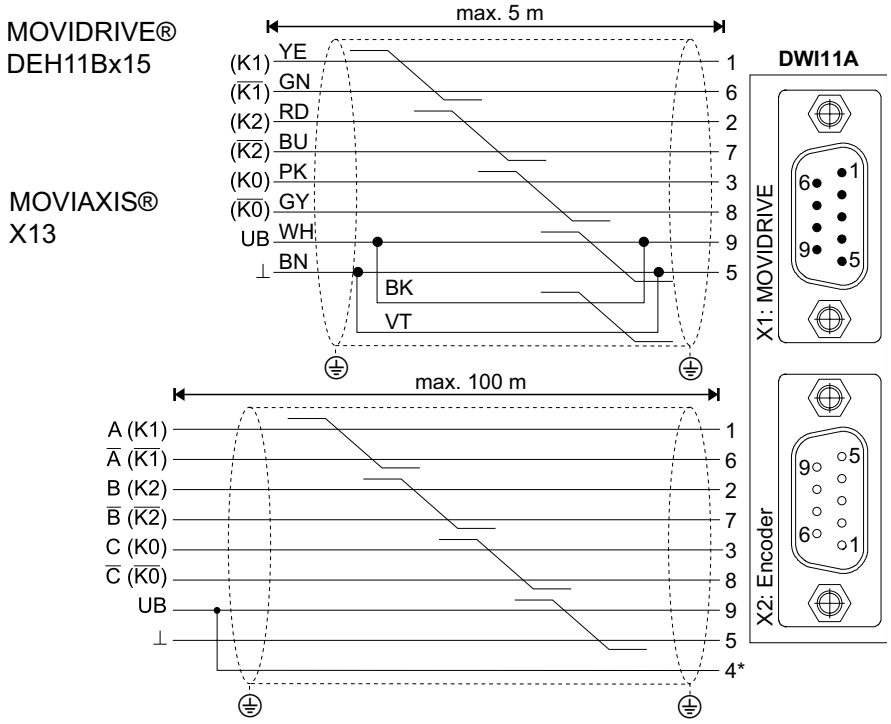
NOTE

Please contact SEW-EURODRIVE for distances ≥ 20 m.

4.16 Connecting non-SEW encoders with 5 V supply voltage

Many incremental encoders are not suited for direct connection to the 12 V supply of the encoder evaluation.

Encoders with 5 V supply voltage can be supplied by the SEW inverters MOVIDRIVE® or MOVIAXIS® if a DWI11A isused between inverter and encoder to convert the voltage.



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4.16.1 MOVIDRIVE®

HIPERFACE® encoder card type DEH X15 option: DWI11A X1: MOVIDRIVE®

For fixed routing: 8179573

4.16.2 MOVIAXIS®

Encoder connection X13: DWI11A X1

For fixed installation 13331531

The cable from MOVIDRIVE® can be used if no temperature sensor is additionally evaluated on the encoder input.

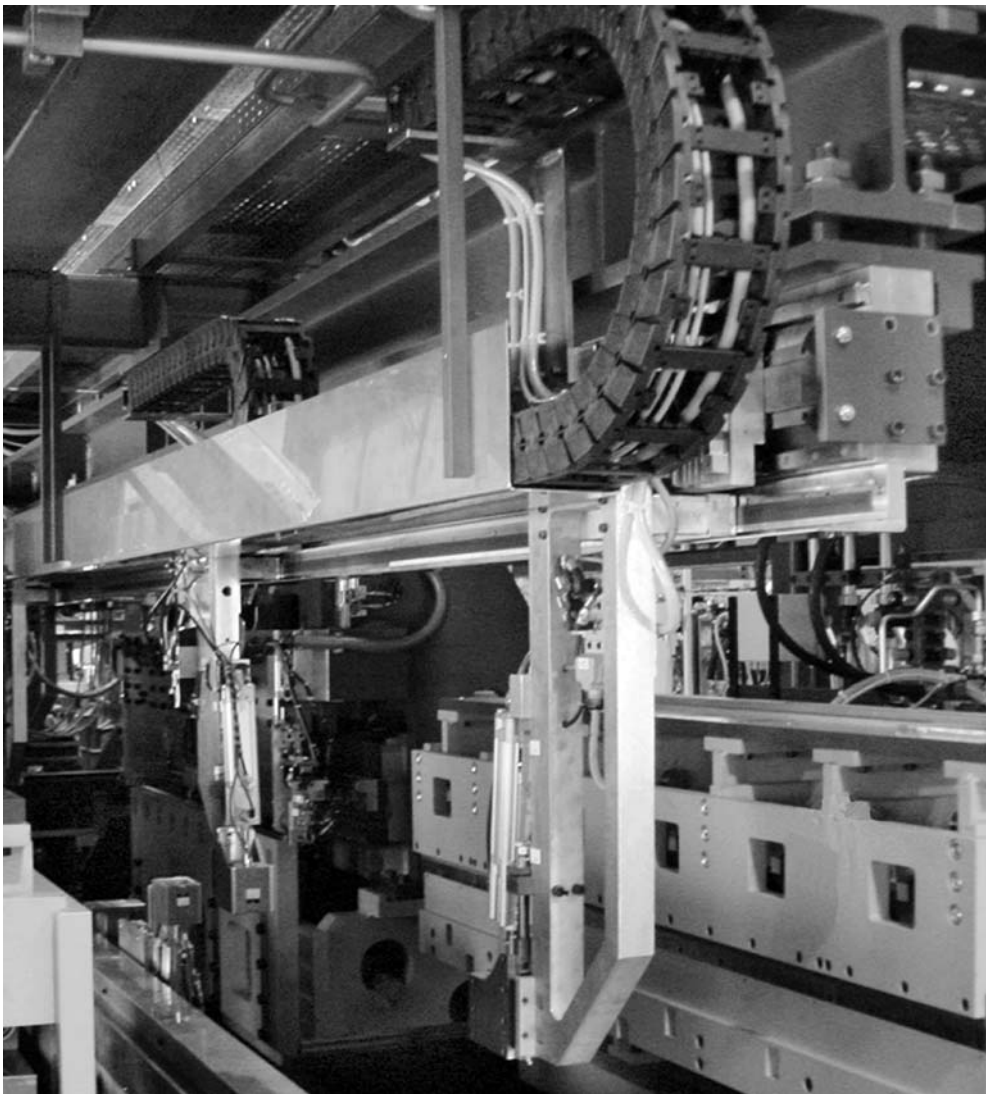
5 Additional Information on System Components

General information

The peripheral devices required by the linear motor due to fast acceleration, strong thrust and change forces as well as high travel velocities have to be considered in more detail.

This section gives the user information on the design of the system components in a complete linear motor.

STOP	**STOP**
	SEW-EURODRIVE offers this section mainly to assist you in the design of a complete system. SEW-EURODRIVE highly recommends contacting the manufacturers of individual components to prevent damages or faulty designs. We have listed a few of these manufacturers in the following component descriptions.



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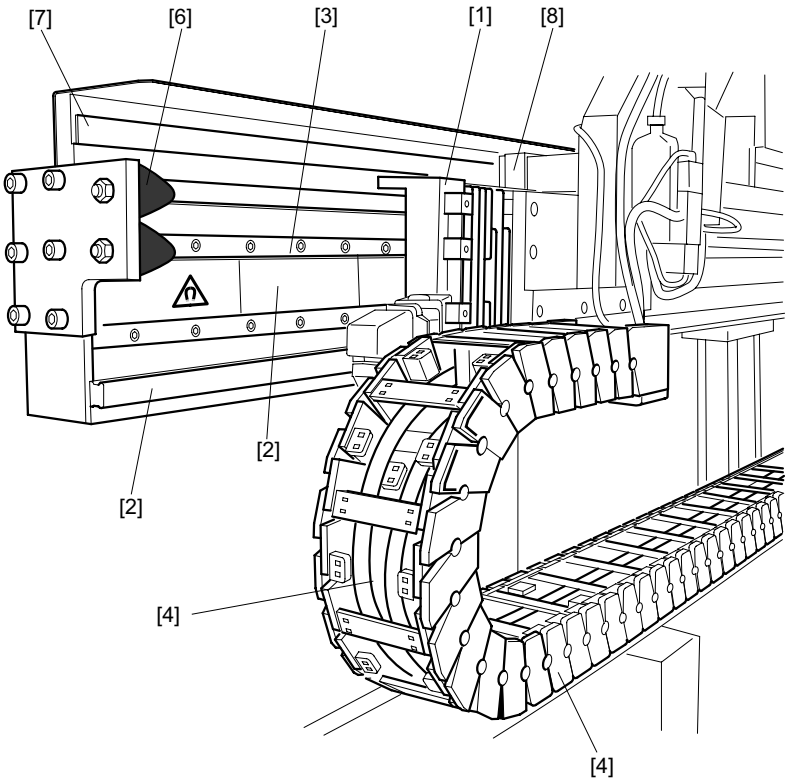
System components

The SL2 linear motor significantly reduces the effort involved in designing a drive system. A traditional system with a servomotor requires the motion to be converted from rotational to linear movement.

This conversion is no longer required when using the linear motor. Toothed belts, spindles or gear racks etc. are not necessary. However, just like the traditional rotary system, a linear motor system still requires peripheral system components for an optimum power yield from the drive system.

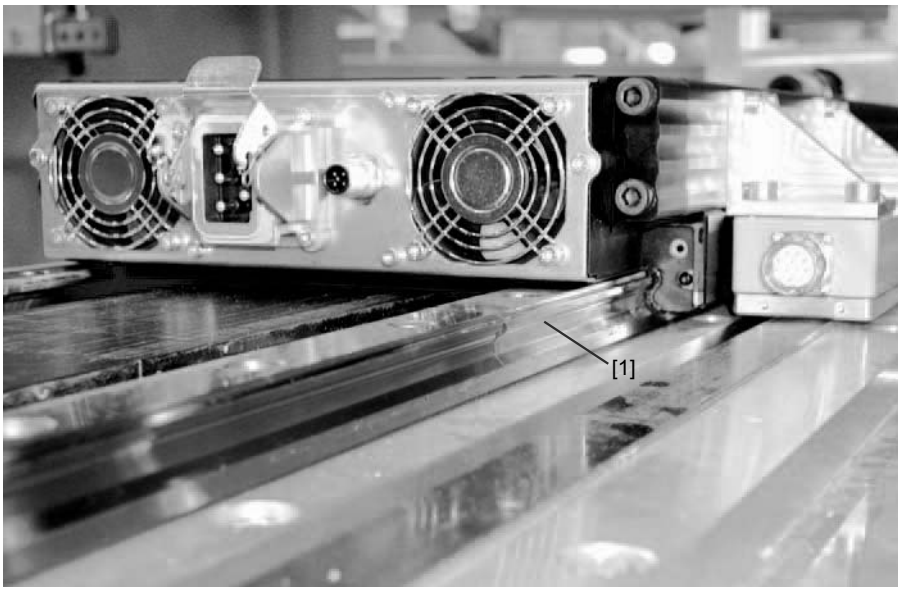


[1] SL2 synchronous linear motor
[2] Secondary
[3] Linear guide systems
[4] Cable carrier
[5] Power and feedback cables
[6] Buffers
[7] Material measure for the linear measuring system
[8] Linear measuring system

Notes on scope of delivery

You will find a description of the scope of delivery for SL2 synchronous linear motors from SEW-EURODRIVE in section 2.4.

5.1 Linear guide systems



55395AXX

[1] Linear guide system

5.1.1 Function

- Carry and guide customer loads
- Handle magnetic attraction forces between primary and secondary
- Guide the measuring system

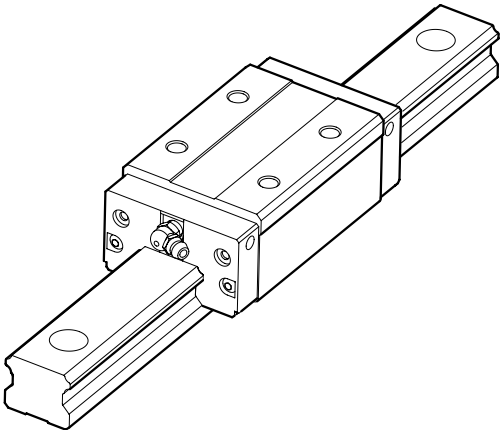
5.1.2 Special requirements for linear drives

- High accelerations

  Linear motor drives permit high accelerations during operation. The guide system, especially the rolling elements of the guide carriers, is also subject to these forces.
- High travel speeds
- Frequent load changes
- Accuracy
- Noise level
- Overhung loads due to heat expansion

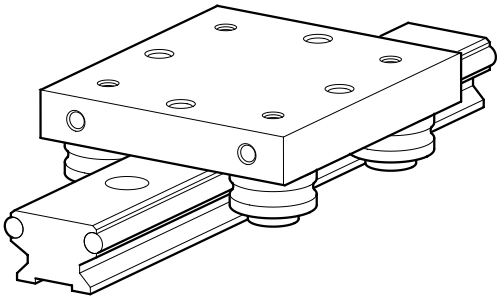
5.1.3 Designs

A Profile rail guides with rolling elements



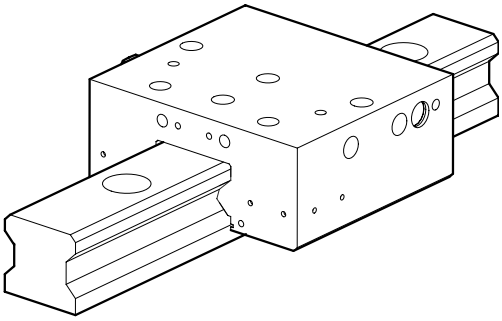
52892AXX

B Guides with track rollers



52894AXX

C Profile rail guides with plain bearings



52895AXX

5.1.4 Comparison of linear guide systems

	Roller bearing guides	Roller guides	Plain bearing guides
Function	Rolling friction through roller bearings low friction	Rolling friction through track rollers very low friction	Sliding friction through friction partner higher friction
Fields of application	Standard applications	Standard applications	Special cases • with tough ambient conditions • applications involving food
Mechanical loads	Medium to high	Low	Low to medium
Traveling velocity ranges	2-6 (10) m/s	1-2 m/s	0-2 m/s up to 10 m/s with IGUS Drylin
Play	None or very low	None or very low	Play always present
Noise level	Medium to high	Quiet	Low to medium
Ambient temperature	Average	Average	Extremely low/high
Ambient conditions	Usual conditions special applications possible with special seals		Dirt, dust, corrosion
Costs	High	Inexpensive to medium	Inexpensive
Required maintenance	Lubrication	Lubrication	No maintenance, In case of wear → replace sliding elements
Manufacturer	THK GmbH www.thk.com INA-Schaeffler KG www.ina.com SKF Linearsysteme www.linearmotion.skf.com NSK RHP www.nsk.com Schneeberger GmbH www.schneeberger.com HIWIN GmbH www.hiwin.com	Rexroth Star GmbH www.boschrexroth.com INA-Schaeffler KG www.ina.com	igus GmbH www.igus.com Deinhammer www.deinhammer.com

5.1.5 General design notes for linear guide systems

Special consideration must be given to the design of the structures surrounding the guide system. The mechanical machine design must be planned with adequate stability and rigidity, in accordance with the operating forces that occur. This ensures that they comply with the tolerances for mounting surfaces required by the guide system manufacturers.

For example, it will be impossible to maintain the distances between the guide rails during operation if the system design is too unstable. The result is increased wear and a reduced rating life of the guide system.

The primary and secondary will generate heat during operation. This heat will result in an expansion of the components, particularly the primary components. These expansions will exert additional overhung loads on the guide system.

The heat generation in the secondary is usually negligible. Any noticeable expansions due to heat in the secondary components representing a thermal load on the engine bed will only be noticed with small strokes (< 50 mm) or if the motor generates forces during standstill.

Recommendations for reduction of the temperature effects:

- Keep rail distances small
- Use materials with low heat expansion coefficients
- Provide proper heat dissipation for the primary components (cooling fins)
- Provide installation option for floating bearings at guide carrier on guide rail

	**NOTE**
	These requirements are taken into consideration with the motor cooling unit for the SL2-Advance System and SL2-Power System.

5.2 Brake

5.2.1 Function

Holding of loads with drive in de-energized state particularly with

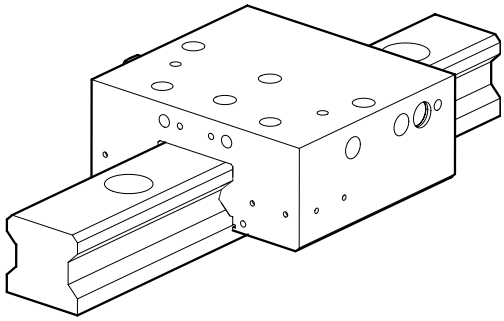
- Vertical mounting positions (hoist axes)
- Emergency stop
- Arresting of supporting tables as stop function
- Securing against unintentional shifting

5.2.2 Special requirements for linear drives

- Lightweight, compact design of brake with high performance rating
- Fast application and release
- Low-effort system

5.2.3 Brake mounting on SL2-Basic

Pneumatic brake

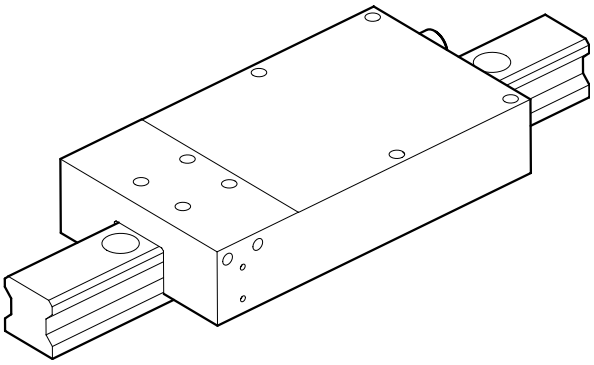


52895AXX

- High holding forces
- Very compact and lightweight
- Fits most profile rail guide systems
- For medium cycle times
- Requires pneumatic system supply
- Also available with spring-loaded brake as emergency brake

Manufacturer	
Zimmer GmbH	www.zimmer-gmbh.com
Hema Maschinen- und Apparateschutz GmbH	www.hema-schutz.de

Electric motor-driven holding brake

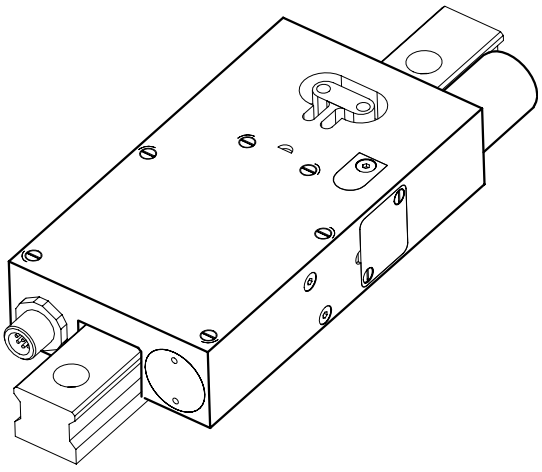


53032AXX

- High holding forces
- Very compact and lightweight
- Fits most profile rail guide systems
- Easy to integrate in drive concept
- Brake applies slowly
- Must be actively applied with current

Manufacturer	
Zimmer GmbH	www.zimmer-gmbh.com

Electric motor-driven opening and holding brake

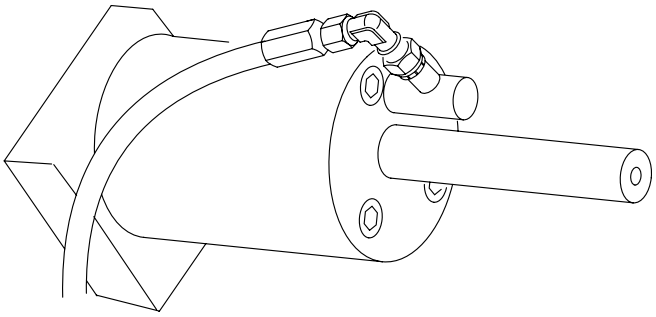


55736AXX

- Brake applies very quickly and releases slowly, allows short cycles times
- High holding forces
- Spring-loaded brake as emergency brake
- Fits profile rail guide systems - upon request -

Manufacturer	
Zimmer GmbH	www.zimmer-gmbh.com

Hydraulic stack brake type "Linear stop"

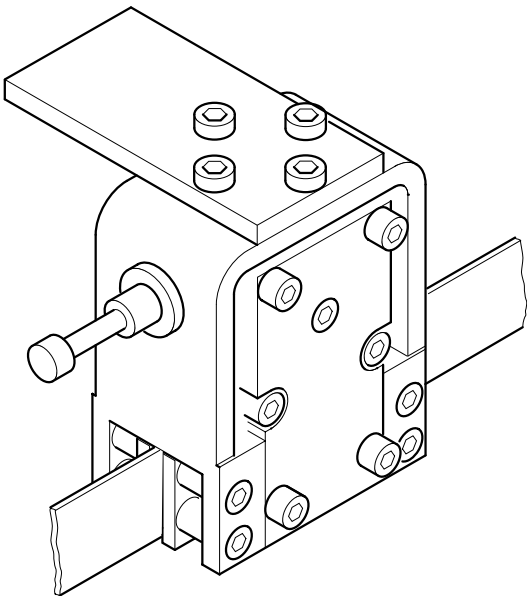


56199AXX

- Very high holding forces, robust
- Activated using hydraulic pressure
- Separate brake system outside the linear drive; particularly suitable for vertical applications

Manufacturer	
Mayr GmbH & Co. KG	www.mayer.de
Ortlinghaus-Werke GmbH	www.ortlinghaus.com
Sitema	www.sitema.de

Band brake

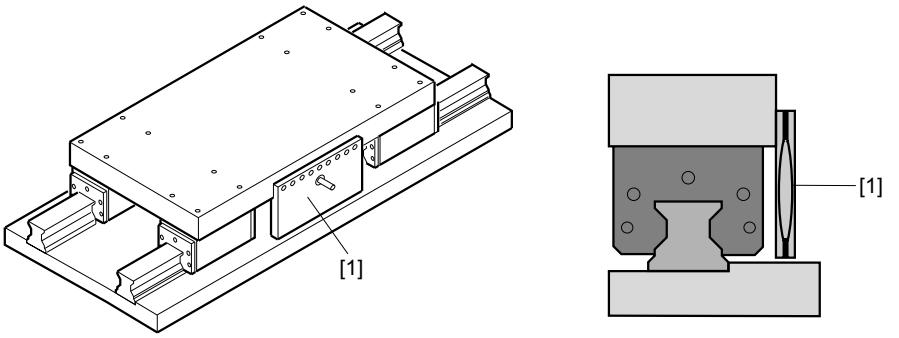


59483AXX

- High holding forces, robust
- Pneumatically and hydraulically operated.
- Separate brake system outside the linear drive

Manufacturer	
Ortlinghaus-Werke GmbH	www.ortlinghaus.com

Pneumatic clamping element



59485AXX

[1] Pneumatic clamping element

- High holding forces
- Pneumatically operated
- Separate brake system outside the linear drive

Manufacturer	
Hema Maschinen- und Apparateschutz GmbH	www.hema-schutz.de

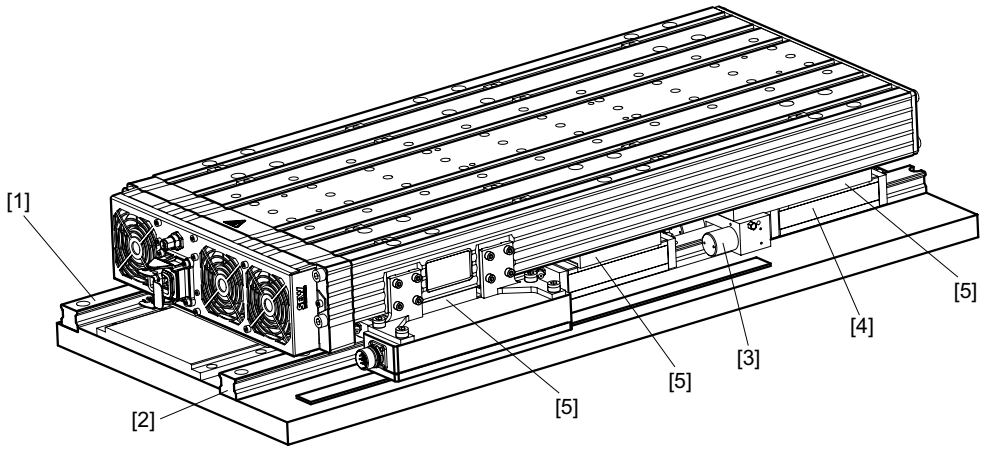
5.2.4 Brake mounting on SL2-Advance and SL2-Power System

For the SL2-Advance System and SL2-Power System, brakes with dimensions to DIN 645-1; series 1M, 1L for profile rail roller bearing guides can be used.

	NOTE
	Smaller guide systems are used here compared to the guide types described in the section linear guide systems. The guide system is connected to the brake using adapter plates.

Brakes can be mounted on both guide rails (fixed bearing and floating bearing end). One particular advantage of this system is that the brake at the floating bearing end is mounted to the cooling unit together with the guide carriage via the floating bearing. The brake is not affected by thermal expansions.

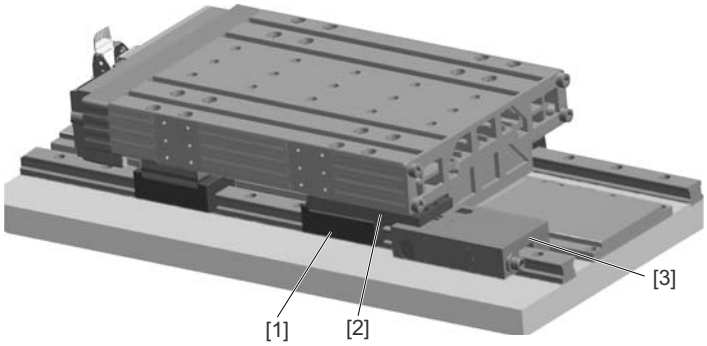
Compact brake designs, such as the pneumatic brakes, can be integrated between the guide carriages.



55390AXX

[1] Floating bearing end
[2] Fixed bearing end
[3] Pneumatic brake
[4] Guide carriage
[5] Adapter plate

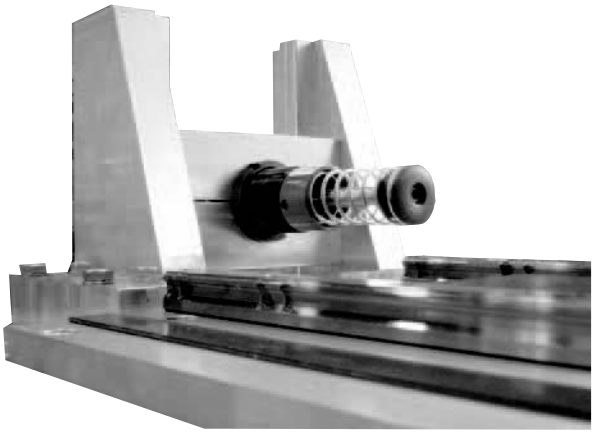
Longer brakes can be mounted on the end of the cooling unit. Please contact SEW-EURODRIVE if you have any questions on this topic.



55391AXX

[1] Guide carriage
[2] Adapter plate
[3] Electrical brake

5.3 Buffers/shock absorbers



52763AXX

5.3.1 Function

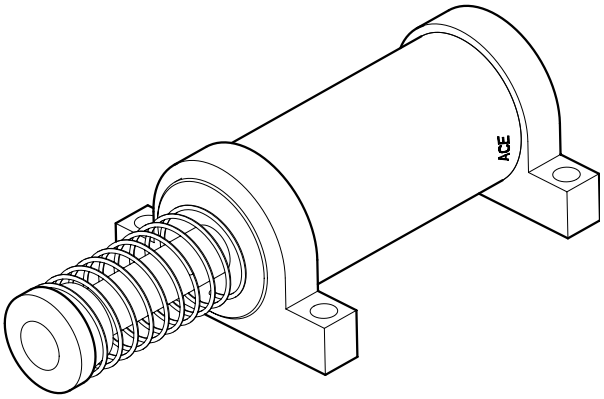
Reduce kinetic energy from moving parts in case of problems to protect them from extreme mechanical loads.

5.3.2 Special requirements for linear drives

- High traveling velocities and high kinetic energy levels usually occur in the motion cycles of linear drives.
- We highly recommend contacting the manufacturers to prevent greater damage in case of a problem.

5.3.3 Designs

Hydraulic shock absorbers

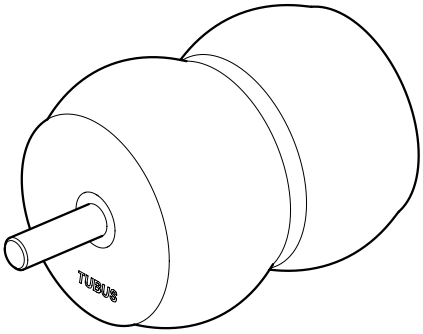


52893AXX

- Large and effective reduction of kinetic energy
- No rebound of the contact mass
- Low reactive forces on the moved weight and the surrounding structure

Manufacturer	
ACE Stoßdämpfer GmbH	www.ace-ace.com
Zimmer GmbH	www.zimmer-gmbh.com

Rubber buffer, cellular buffer



52896AXX

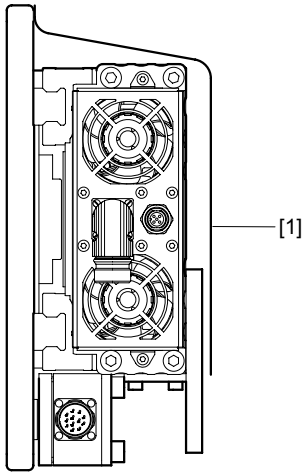
- Simple design, inexpensive, maintenance free
- Compact, requires little installation space in direction of movement
- No rebound of the contact mass

Manufacturer	
ACE Stoßdämpfer GmbH	www.ace-ace.com
Wampfler AG	Wampfler AG www.wampfler.com

5.4 Covers

The cover is required when linear motors are employed in environmental conditions in which foreign matter such as dust, sawdust, sand or granules are present. This protects components such as the linear motor, guide system, and measuring system.

The simplest and most dependable protection, whenever possible, is an arrangement of the linear drive with cover plate [1].



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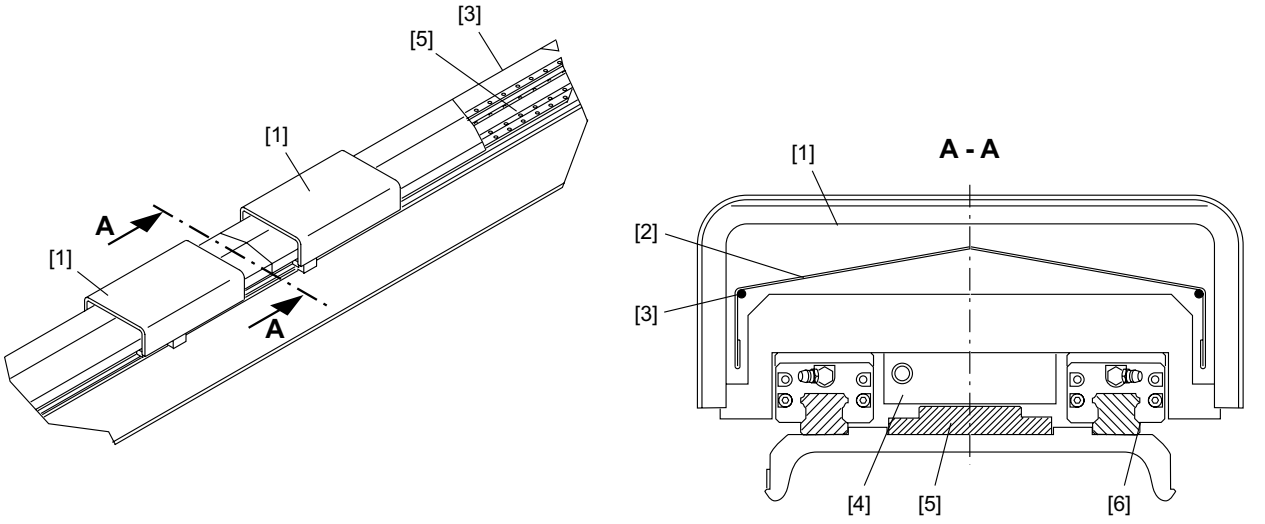
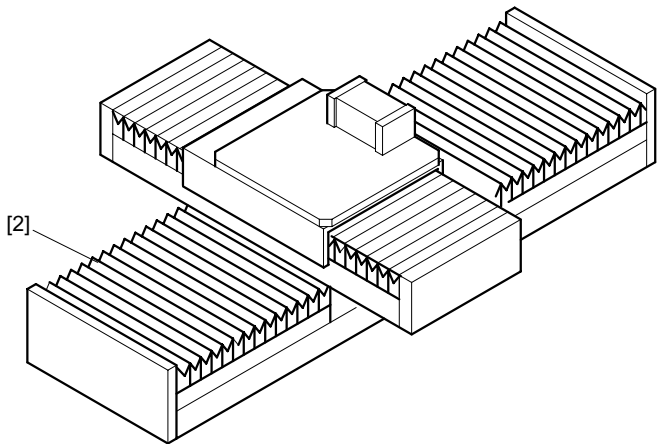
With horizontal linear axes, a slide design in table mounting can be used as an alternative. A roof-shaped covering suspended on tensioning ropes inside the slide design covers the travel section.



63617AXX

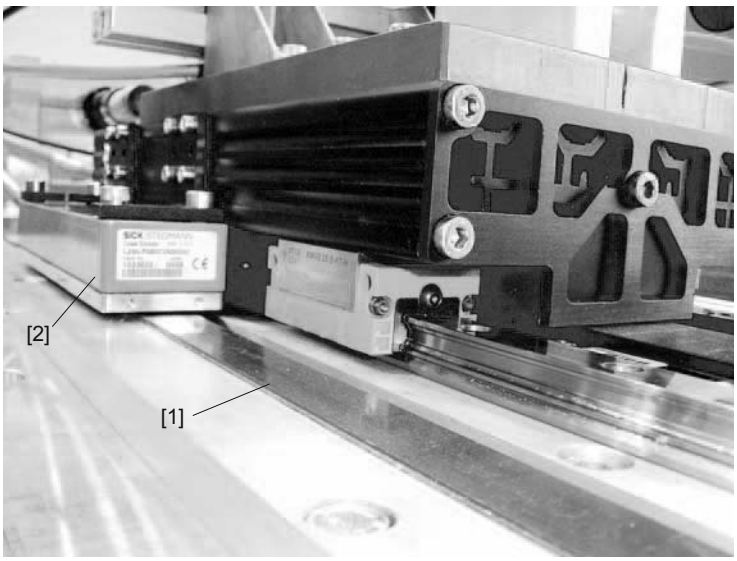
[1] Slide
[2] Roof-shaped cover made of light metal
[3] Tensioning ropes
[4] Primary, winding
[5] Secondary, permanent magnet
[6] Guide
[7] Joint of the cover

For shorter travel distances, bellow covers [2] can be provided.



Manufacturer	
Hema Maschinen- und Apparateschutz GmbH	www.hema-schutz.de
Arno Arnold GmbH	www.arno-arnold.de
Möller Werke GmbH	www.moellergroup.com

5.5 Encoder systems



55369AXX

Linear measuring systems record the motor encoder position without mechanical contact between the material measure for the linear measuring system [1] and the linear sensor [2]. These encoder systems are used in linear motors for motor commutation, velocity control and positioning of the drive system.

Linear measuring systems are available as:

- optical
- magnetic
- inductive

systems.

Each of these methods has its advantages and disadvantages and has to be evaluated and selected based on the requirements of the individual application.

5.5.1 Selection criteria

Observe the following criteria when selecting the linear measuring system:

- Physical measuring principle
- Resolution
- Signal format
- Sensitivity
- Supply voltage
- Installation tolerances (air gap, max. permitted deviation)
- Traveling velocity
- Vibration

For applications with SL2 linear motors, the linear measuring systems with sine and cosine signals should be used.

You should check the installation precision prior to making the selection. Optical and inductive systems tolerate only minor deviations from their installation dimensions. Inductive systems are not sensitive to dirt, particularly metallic dust.

Larger deviations in the air gap in magnetic systems do not result in an incorrect measurement (in the 1/10 mm range).

5.5.2 Absolute-value measuring system

Use the magnetic encoder with HIPERFACE® interface from SICK /Stegmann if you need to provide the **absolute distance information**. The encoder can be directly connected to the HIPERFACE® interface on MOVIAXIS® or MOVIDRIVE® MDX61B and be processed up to a traveling velocity of 6 m/s.

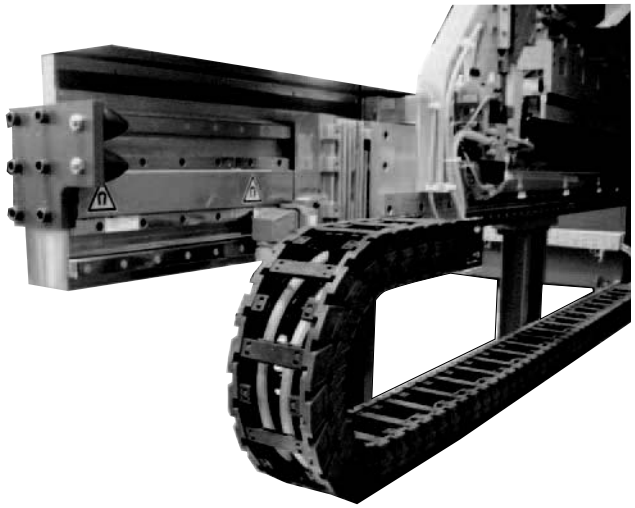
The SEW AL1H has the same design as the LinCoder® 230 from SICK / Stegmann.

5.5.3 Contact

You will find additional information on the encoder systems described above at the following addresses:

Manufacturer	
SICK / Stegmann GmbH & Co KG	www.stegmann.com / www.sick.com
Heidenhain GmbH	www.heidenhain.com
ELGO- Elektrik GmbH	www.elgo.com
SIKO GmbH	www.siko.de
AMO GmbH	www.amo-gmbh.com
NUMERIK JENA GmbH	www.numerikjena.de
Willtec eK	www.willtec.de
RSF Elektronik	www.RSF.at

5.6 Cable carriers



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Cable carriers are the reliable power and data suppliers for mobile users. They have become integral components in numerous applications.

The range of applications includes those, for example, for

- high accelerations and velocities,
- long travel distances,
- large, unsupported distances,
- low-noise operation in heavily contaminated environments.

5.6.1 Unsupported use of the cable carrier

An unsupported cable carrier is one in which the carrying run of the cable carrier does not touch the return side.

The critical value in unsupported applications is acceleration rather than the traveling velocity. High accelerations can cause the cable carrier to vibrate and affect its life. This effect is particularly true for those cable carriers that already show a slack that is greater than the unsupported straight line.

5.6.2 Accommodation

You can install different forms of data lines and power cables in such a system. In addition to the quality of the cables, their arrangement within the carrier and the space available play an important role in determining the life of a system. Different arrangement options let you customize the cable carrier to accommodate the special needs of each application.

Manufacturer	
IGUS GmbH	www.igus.com

5.7 Power and feedback cables

	NOTE
	SEW-EURODRIVE offers power and feedback cables, see chapter 4.11.

52682AXX

5.7.1 Function

Power supply of motor and feedback of TF evaluation (including KTY) in one cable.

Feedback of encoder signals to servo controller.

5.7.2 Special requirements:

The same principles apply to the selection of cables as to the selection/configuration of cables for all cable carrier applications.

The very high dynamics that are also transmitted to the cables via the power supply chain should be one of the main criteria when selecting the cable to prevent untwisting or premature parting of the cable.

Additonal selection criteria for cables:

- Observe bending radius
- Suitable for cable carriers - rated for highly dynamic processes
- Shielded power cable, with specially shielded inlet for TF feedback (hybrid cable)
- Encoder cable stranded in pairs and shielded
- No oversizing of cables → weight
- Use EMC compliant plug connectors

Manufacturer	
IGUS GmbH	www.igus.com
Nexans	www.nexans.com
Lapp Kabel	www.lapp.com
Helu Kabel	www.helukabel.com

6 Checklist/Request Form for SL2 Synchronous Linear Motors

Fill in check list and forward to:

SEW-EURODRIVE GmbH & Co KG
MEA Department
Fax: +49 7251 75-502313
Phone: +49 7251 75-2304

Query from: .....

Name: .....

E-mail:
.....

Street: .....

Zip code:
.....

Place, date:
.....

SEW-EURODRIVE technical office: .....

Contact person at SEW-EURODRIVE .....

Query for SL2 linear motor with request for

☐ Project planning

☐ Return call

☐ Examination / Check

Required motor system

☐ SL2-Basic (without cooling element)

☐ SL2-Advance System (with cooling element and without forced cooling fan)

☐ SL2-Power System (with cooling element and forced cooling fan)

☐ AL1H linear measuring system

1. Short description of drive

☐ Vertical axis (hoist) ☐ Horizontal axis (trolley)

Machine type, function of axis, approximate number of units p.a. if known:

.....

.....

2. Motor data

Project planning based on operating data (2.A) or travel diagram (2.B):

2.A Project planning via dynamic/ static operating point

Thrust forces peak force: [N] .....

Permanent force: [N] .....

Max. traveling velocity: [m/s] .....

Rated traveling velocity: [m/s]) .....

Acceleration profile:

☐ Linear ramp ☐ Fifth-degree polynomal ☐ Other

In addition, for SL2-Advance System / SL2-Power System

External loads on the primary

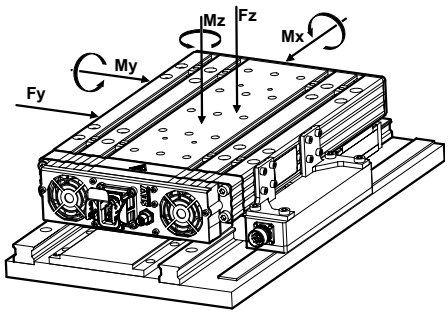
Mx [Nm] .....

My [Nm] .....

Mz [Nm] .....

Fy [N] .....

Fz [N] .....



Other/comments:

.....

.....

2.B Project planning via travel diagram

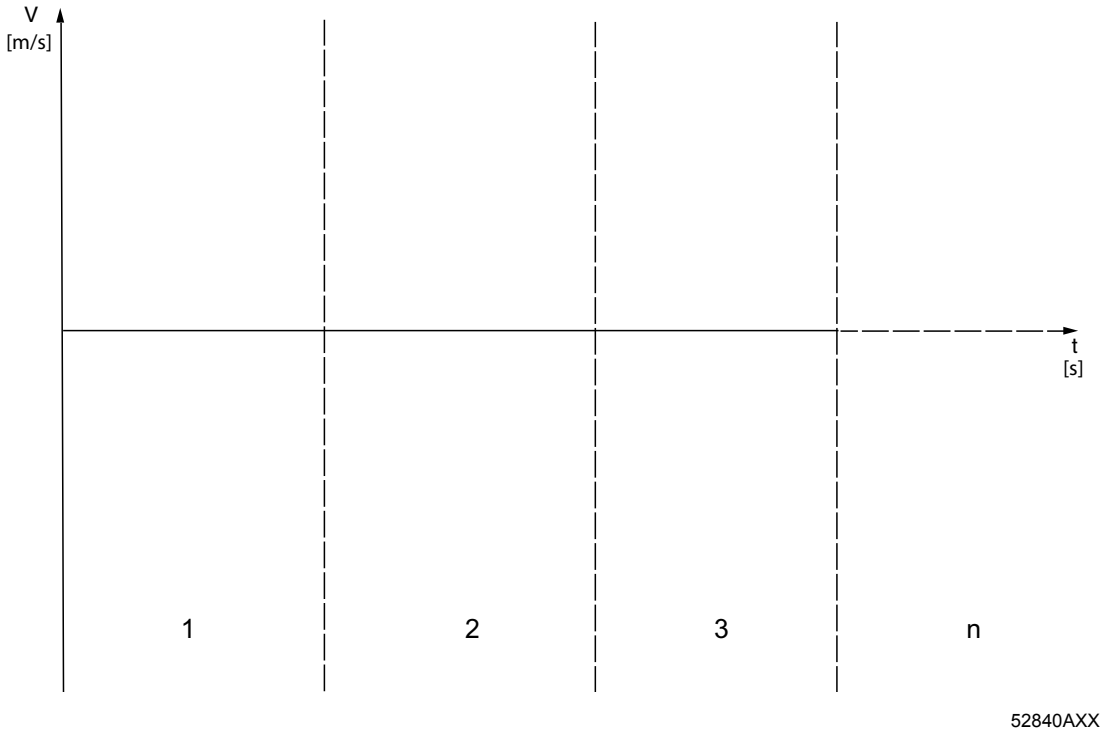


Figure 1: Travel diagram

		Section 1:	Section 2:	Section 3:	Section n
Mass of the load	[kg]				
Process forces	[N]				
Acceleration time	[ms]				
Braking time	[ms]				
Travel time	[ms]				
V_{max}	[m/s]				
Distance	[mm]				
Rest period until repeat of cycle	[ms]				
Rest period with power supply / without power supply					

3. Linear measuring systems

Manufacturer: ..... Type: .....

Positioning accuracy: .....µm Repeat accuracy: .....µm

Output signal: ☐ HIPERFACE® (AL1H) ☐ Sinus 1Vss ☐ 5 V TTL

With sinus 1 Vss or 5 V TTL only:

Can the motor system be moved after power-on up to 48 mm with MOVIDRIVE® and 80 mm with MOVIAXIS® (commutation search of the system)?:

☐ Yes ☐ No

Comments:

.....

.....

4. Servo controllers

Type (if not SEW servo controller): .....

Supply voltage (V_{mains} , z. B. 3 x 400 V): .....

5. Communication interface to servo controller

Manufacturer: ..... Type: .....

to servo controller.....

Comments:

.....

.....

.....

6. Operating conditions

Ambient temperature: .....°C

Degree of protection: .....

Contaminations:

- Magnetic shavings: .....
- Non-magnetic shavings:
  .....
- Dust: .....

Liquid coolants: .....Oil and lubricants: .....

Other: .....

7. Electrical connection

SL2-Basic: Length of cable extension (standard = 1 m)

☐ 1 m

☐ 4 m

SL2-Advance System / SL2-Power System

☐ No prefabricated cable

☐ Prefabricated power cable .....m (max. 100 m)

☐ Prefabricated feedback cable for AL1H .....m (max. 100 m)

8. Mechanical installation

Tolerance for mounting surfaces of primary and secondary

☐ ± 0.05 mm

☐ Better

☐ Worse

How many?.....

Material of mounting surface:
.....

9. Linear bearing

Required to determine the friction factor of guide systems

☐ Recirculating linear ball bearing

☐ Track roller bearing

☐ Plain bearings

☐ Air-lubricated bearing

Other manufacturers/type:
.....

10. Brake

Manufacturer/type:
.....

☐ Consultation regarding brake mounting required (only for SL2-Advance System / SL2 -Power System)

7 Index

Address Directory

Germany			
Headquarters **Production** **Sales**	**Bruchsal**	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 42 D-76646 Bruchsal P.O. Box Postfach 3023 • D-76642 Bruchsal	Tel. +49 7251 75-0 Fax +49 7251 75-1970 http://www.sew-eurodrive.de sew@sew-eurodrive.de
Production	**Graben**	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 1 D-76676 Graben-Neudorf P.O. Box Postfach 1220 • D-76671 Graben-Neudorf	Tel. +49 7251 75-0 Fax +49 7251 75-2970
	Östringen	SEW-EURODRIVE Östringen GmbH Franz-Gurk-Straße 2 D-76684 Östringen P.O. Box Postfach 1174 • D-76677 Östringen	Tel. +49 7253 92540 Fax +49 7253 925490 oestringen@sew-eurodrive.de
Service Competence Center	**Central**	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 1 D-76676 Graben-Neudorf	Tel. +49 7251 75-1710 Fax +49 7251 75-1711 sc-mitte@sew-eurodrive.de
	North	SEW-EURODRIVE GmbH & Co KG Alte Ricklinger Straße 40-42 D-30823 Garbsen (near Hannover)	Tel. +49 5137 8798-30 Fax +49 5137 8798-55 sc-nord@sew-eurodrive.de
	East	SEW-EURODRIVE GmbH & Co KG Dänkritzer Weg 1 D-08393 Meerane (near Zwickau)	Tel. +49 3764 7606-0 Fax +49 3764 7606-30 sc-ost@sew-eurodrive.de
	South	SEW-EURODRIVE GmbH & Co KG Domagkstraße 5 D-85551 Kirchheim (near München)	Tel. +49 89 909552-10 Fax +49 89 909552-50 sc-sued@sew-eurodrive.de
	West	SEW-EURODRIVE GmbH & Co KG Siemensstraße 1 D-40764 Langenfeld (near Düsseldorf)	Tel. +49 2173 8507-30 Fax +49 2173 8507-55 sc-west@sew-eurodrive.de
	Electronics	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 42 D-76646 Bruchsal	Tel. +49 7251 75-1780 Fax +49 7251 75-1769 sc-elektronik@sew-eurodrive.de
	Drive Service Hotline / 24 Hour Service		+49 180 5 SEWHELP +49 180 5 7394357
Technical Offices	**Augsburg**	SEW-EURODRIVE GmbH & Co KG August-Wessels-Straße 29 D-86156 Augsburg	Tel. +49 821 22779-10 Fax +49 821 22779-50 tb-augsburg@sew-eurodrive.de
	Berlin	SEW-EURODRIVE GmbH & Co KG Lilienthalstraße 3a D-12529 Schönefeld	Tel. +49 33762 2266-30 Fax +49 33762 2266-36 tb-berlin@sew-eurodrive.de
	Bodensee	SEW-EURODRIVE GmbH & Co KG Burgbergring 91 D-88662 Überlingen	Tel. +49 7551 9226-30 Fax +49 7551 9226-56 tb-bodensee@sew-eurodrive.de
	Bremen	SEW-EURODRIVE GmbH & Co KG Bornstr.19 ... 22 D-28195 Bremen	Tel. +49 421 33918-10 Fax +49 421 33918-22 tb-bremen@sew-eurodrive.de
	Dortmund	SEW-EURODRIVE GmbH & Co KG Hildastraße 10 D-44145 Dortmund	Tel. +49 231 912050-10 Fax +49 231 912050-20 tb-dortmund@sew-eurodrive.de
	Dresden	SEW-EURODRIVE GmbH & Co KG Hauptstraße 32 D-01445 Radebeul	Tel. +49 351 26338-0 Fax +49 351 26338-38 tb-dresden@sew-eurodrive.de

Germany			
	Erfurt	SEW-EURODRIVE GmbH & Co KG Blumenstraße 70 D-99092 Erfurt	Tel. +49 361 21709-70 Fax +49 361 21709-79 tb-erfurt@sew-eurodrive.de
	Güstrow	SEW-EURODRIVE GmbH & Co KG Am Gewerbegrund 3 D-18273 Güstrow P.O. Box Postfach 1216 • D-18262 Güstrow	Tel. +49 3843 8557-80 Fax +49 3843 8557-88 tb-guestrow@sew-eurodrive.de
	Hamburg	SEW-EURODRIVE GmbH & Co KG Bramfelder Straße 119 D-22305 Hamburg	Tel. +49 40 298109-60 Fax +49 40 298109-70 tb-hamburg@sew-eurodrive.de
	Hannover/ Garbsen	SEW-EURODRIVE GmbH & Co KG Alte Ricklinger Str.40-42 D-30823 Garbsen P.O. Box Postfach 1104 53 • D-30804 Garbsen	Tel. +49 5137 8798-10 Fax +49 5137 8798-50 tb-hannover@sew-eurodrive.de
	Heilbronn	SEW-EURODRIVE GmbH & Co KG Zeppelinstraße 7 D-74357 Bönnigheim P.O. Box Postfach 68 • D-74355 Bönnigheim	Tel. +49 7143 8738-0 Fax +49 7143 8738-25 tb-heilbronn@sew-eurodrive.de
	Herford	SEW-EURODRIVE GmbH & Co KG Radewiger Straße 21 D-32052 Herford P.O. Box Postfach 4108 • D-32025 Herford	Tel. +49 5221 9141-0 Fax +49 5221 9141-20 tb-herford@sew-eurodrive.de
	Karlsruhe	SEW-EURODRIVE GmbH & Co KG Ettlinger Weg 2 D-76467 Bietigheim P.O. Box Postfach 43 • D-76463 Bietigheim	Tel. +49 7245 9190-10 Fax +49 7245 9190-20 tb-karlsruhe@sew-eurodrive.de
	Kassel	SEW-EURODRIVE GmbH & Co KG Lange Straße 14 D-34253 Lohfelden	Tel. +49 561 95144-80 Fax +49 561 95144-90 tb-kassel@sew-eurodrive.de
	Koblenz	SEW-EURODRIVE GmbH & Co KG Bahnstraße 17a D-56743 Mendig	Tel. +49 2652 9713-30 Fax +49 2652 9713-40 tb-koblenz@sew-eurodrive.de
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	Mannheim	SEW-EURODRIVE GmbH & Co KG Radeberger Straße 2 D-68309 Mannheim	Tel. +49 621 71683-10 Fax +49 621 71683-22 tb-mannheim@sew-eurodrive.de
	München	SEW-EURODRIVE GmbH & Co KG Domagkstraße 5 D-85551 Kirchheim	Tel. +49 89 90955-110 Fax +49 89 90955-150 tb-muenchen@sew-eurodrive.de
	Münster	SEW-EURODRIVE GmbH & Co KG Von-Vincke-Straße 14 D-48143 Münster	Tel. +49 251 41475-11 Fax +49 251 41475-50 tb-muenster@sew-eurodrive.de

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	Regensburg	SEW-EURODRIVE GmbH & Co KG Im Gewerbepark A15 D-93059 Regensburg	Tel. +49 941 46668-68 Fax +49 941 46668-66 tb-regensburg@sew-eurodrive.de
	Rhein-Main	SEW-EURODRIVE GmbH & Co KG Niederstedter Weg 5 D-61348 Bad Homburg	Tel. +49 6172 9617-0 Fax +49 6172 9617-50 tb-rheinmain@sew-eurodrive.de
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	Ulm	SEW-EURODRIVE GmbH & Co KG Dieselstraße 14 D-89160 Dornstadt	Tel. +49 7348 9885-0 Fax +49 7348 9885-90 tb-ulm@sew-eurodrive.de
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	Zwickau / Meerane	SEW-EURODRIVE GmbH & Co KG Dänkritzer Weg1 D-08393 Meerane	Tel. +49 3764 7606-0 Fax +49 3764 7606-20 tb-zwickau@sew-eurodrive.de

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Assembly **Sales** **Service**	**Bordeaux**	SEW-USOCOME Parc d'activités de Magellan 62, avenue de Magellan - B. P. 182 F-33607 Pessac Cedex	Tel. +33 5 57 26 39 00 Fax +33 5 57 26 39 09
	Lyon	SEW-USOCOME Parc d'Affaires Roosevelt Rue Jacques Tati F-69120 Vaulx en Velin	Tel. +33 4 72 15 37 00 Fax +33 4 72 15 37 15
	Paris	SEW-USOCOME Zone industrielle 2, rue Denis Papin F-77390 Verneuil l'Etang	Tel. +33 1 64 42 40 80 Fax +33 1 64 42 40 88
Technical Offices	**Alsace Franche-Comté**	SEW-USOCOME 1, rue Auguste Gasser F-68360 Soultz	Tel. +33 3 89 74 51 62 Fax +33 3 89 76 58 71
	Alsace Nord	SEW-USOCOME 15, rue Mambourg F-68240 Sigolsheim	Tel. +33 3 89 78 45 11 Fax +33 3 89 78 45 12
	Aquitaine	SEW-USOCOME Parc d'activités de Magellan 62, avenue de Magellan B.P.182 F-33607 Pessac Cedex	Tel. +33 5 57 26 39 00 Fax +33 5 57 26 39 09

France			
	Ardennes Lorraine	SEW-USOCOME 1, rue de la Forêt F-54250 Champigneulles	Tel. +33 3 83 96 28 04 Fax +33 3 83 96 28 07
	Bourgogne	SEW-USOCOME 10, rue de la Poste F-71350 Saint Loup Géanges	Tel. +33 3 85 49 92 18 Fax +33 3 85 49 92 19
	Bretagne Ouest	SEW-USOCOME 4, rue des Châtaigniers F-44830 Brains	Tel. +33 2 51 70 54 04 Fax +33 2 51 70 54 05
	Centre Auvergne	SEW-USOCOME 27, avenue du Colombier F-19150 Laguenne	Tel. +33 5 55 20 12 10 Fax +33 5 55 20 12 11
	Centre Pays de Loire	SEW-USOCOME 9, rue des Erables F-37540 Saint Cyr sur Loire	Tel. +33 2 47 41 33 23 Fax +33 2 47 41 34 03
	Champagne	SEW-USOCOME Impasse des Ouises F-10120 Saint André les Vergers	Tel. +33 3 25 79 63 24 Fax +33 3 25 79 63 25
	Lyon Nord-Est	SEW-USOCOME Parc d'Affaires Roosevelt Rue Jacques Tati F-69120 Vaulx en Velin	Tel. +33 4 72 15 37 03 Fax +33 4 72 15 37 15
	Lyon Ouest	SEW-USOCOME Parc d'Affaires Roosevelt Rue Jacques Tati F-69120 Vaulx en Velin	Tel. +33 4 72 15 37 04 Fax +33 4 72 15 37 15
	Lyon Sud-Est	SEW-USOCOME Montée de la Garenne F-26750 Génissieux	Tel. +33 4 75 05 65 95 Fax +33 4 75 05 65 96
	Nord	SEW-USOCOME 30, rue Léon Garet F-62520 Le Touquet	Tel. +33 3 21 90 21 40 Fax +33 3 21 90 21 44
	Normandie	SEW-USOCOME 5 rue de la Limare F-14250 Brouay	Tel. +33 2 31 37 92 86 Fax +33 2 31 74 68 15
	Paris Est	SEW-USOCOME Résidence Le Bois de Grâce 2, allée des Souches Vertes F-77420 Champs sur Marne	Tel. +33 1 64 68 40 50 Fax +33 1 64 68 45 00
	Paris Ouest	SEW-USOCOME 42 avenue Jean Jaurès F-78580 Maule	Tel. +33 1 30 90 89 86 Fax +33 1 30 90 93 15
	Paris Picardie	SEW-USOCOME 25 bis, rue Kléber F-92300 Levallois Perret	Tel. +33 1 41 05 92 74 Fax +33 1 41 05 92 75
	Paris Sud	SEW-USOCOME 6. chemin des Bergers Lieu-dit Marchais F-91410 Roinville sous Dourdan	Tel. +33 1 60 81 10 56 Fax +33 1 60 81 10 57
	Provence	SEW-USOCOME Résidence Les Hespérides Bât. B2 67, boulevard des Alpes F-13012 Marseille	Tel. +33 4 91 18 00 11 Fax +33 4 91 18 00 12
	Pyrénées	SEW-USOCOME 179, route de Grazac F-31190 Caujac	Tel. +33 5 61 08 15 85 Fax +33 5 61 08 16 44

France			
	Sud-Atlantique	SEW-USOCOME 12, rue des Pinsons F-44120 Vertou	Tel. +33 2 40 80 32 23 Fax +33 2 40 80 32 13

Algeria			
Sales	**Alger**	Réducom 16, rue des Frères Zaghnoun Bellevue El-Harrach 16200 Alger	Tel. +213 21 8222-84 Fax +213 21 8222-84 reducom_sew@yahoo.fr

Argentina			
Assembly **Sales** **Service**	**Buenos Aires**	SEW EURODRIVE ARGENTINA S.A. Centro Industrial Garin, Lote 35 Ruta Panamericana Km 37,5 1619 Garin	Tel. +54 3327 4572-84 Fax +54 3327 4572-21 sewar@sew-eurodrive.com.ar http://www.sew-eurodrive.com.ar

Australia			
Assembly **Sales** **Service**	**Melbourne**	SEW-EURODRIVE PTY. LTD. 27 Beverage Drive Tullamarine, Victoria 3043	Tel. +61 3 9933-1000 Fax +61 3 9933-1003 http://www.sew-eurodrive.com.au enquires@sew-eurodrive.com.au
	Sydney	SEW-EURODRIVE PTY. LTD. 9, Sleigh Place, Wetherill Park New South Wales, 2164	Tel. +61 2 9725-9900 Fax +61 2 9725-9905 enquires@sew-eurodrive.com.au
	Perth	SEW-EURODRIVE PTY. LTD. 105 Robinson Avenue Belmont, W.A. 6104	Tel. +61 8 9478-2688 Fax +61 8 9277-7572 enquires@sew-eurodrive.com.au
	Brisbane	SEW-EURODRIVE PTY.LTD. 1 /34 Collinsvale St Rocklea, Queensland, 4106	Tel. +61 7 3272-7900 Fax +61 7 3272-7901 enquires@sew-eurodrive.com.au
Technical Offices	**Adelaide**	SEW-EURODRIVE PTY. LTD. Unit 1/601 Anzac Highway Glenelg, S.A. 5045	Tel. +61 8 8294-8277 Fax +61 8 8294-2893 enquires@sew-eurodrive.com.au
	Townsville	SEW-EURODRIVE PTY. LTD. 12 Leyland Street Garbutt, QLD 4814	Tel. +61 7 4779 4333 Fax +61 7 4779 5333 enquires@sew-eurodrive.com.au

Austria			
Assembly **Sales** **Service**	**Wien**	SEW-EURODRIVE Ges.m.b.H. Richard-Strauss-Strasse 24 A-1230 Wien	Tel. +43 1 617 55 00-0 Fax +43 1 617 55 00-30 http://sew-eurodrive.at sew@sew-eurodrive.at
Technical Offices	**Linz**	SEW-EURODRIVE Ges.m.b.H. Reuchlinstr. 6/3 A-4020 Linz	Tel. +43 732 655 109-0 Fax +43 732 655 109-20 tb-linz@sew-eurodrive.at
	Graz	SEW-EURODRIVE Ges.m.b.H. Grabenstraße 231 A-8045 Graz	Tel. +43 316 685 756-0 Fax +43 316 685 755 tb-graz@sew-eurodrive.at
	Dornbirn	SEW-EURODRIVE Ges.m.b.H. Lustenauerstraße 27/1 A-6850 Dornbirn	Tel. +43 5572 3725 99-0 Fax +43 5572 3725 99-20 tb-dornbirn@sew-eurodrive.at

Bangladesh			
Sales	**Dhaka**	Jainex Industrial and Engineering Ltd B 12 Apon Nibash East Nasirabad Bangladesh	Tel. +880 1713103502 Fax +880 31 613041 jainexbd@onlinectg.net

Belarus			
Sales	**Minsk**	SEW-EURODRIVE BY RybalkoStr. 26 BY-220033 Minsk	Tel.+375 (17) 298 38 50 Fax +375 (17) 29838 50 sales@sew.by

Belgium			
Assembly **Sales** **Service**	**Brüssel**	SEW Caron-Vector S.A. Avenue Eiffel 5 B-1300 Wavre	Tel. +32 10 231-311 Fax +32 10 231-336 http://www.sew-eurodrive.be info@caron-vector.be
Service Competence Center	**Industrial Gears**	SEW Caron-Vector S.A. Rue de Parc Industriel, 31 BE-6900 Marche-en-Famenne	Tel. +32 84 219-878 Fax +32 84 219-879 http://www.sew-eurodrive.be service-wallonie@sew-eurodrive.be
Technical Office	**Vlaanderen**	SEW Caron-Vector S.A. Verlorenbroodstraat, 122, bus 6 B-9820 Merelbeke	Tel. +32 92 1686 25 Fax +32 92 2741 55

Brazil			
Production **Sales** **Service**	**Sao Paulo**	SEW-EURODRIVE Brasil Ltda. Avenida Amâncio Gaiolli, 152 - Rodovia Presidente Dutra Km 208 Guarulhos - 07251-250 - SP SAT - SEW ATENDE - 0800 7700496	Tel. +55 11 6489-9133 Fax +55 11 6480-3328 http://www.sew-eurodrive.com.br sew@sew.com.br
	Additional addresses for service in Brazil provided on request!		

Bulgaria			
Sales	**Sofia**	BEVER-DRIVE GmbH Bogdanovetz Str.1 BG-1606 Sofia	Tel. +359 2 9151160 Fax +359 2 9151166 bever@fastbg.net

Cameroon			
Sales	**Douala**	Electro-Services Rue Drouot Akwa B.P. 2024 Douala	Tel. +237 33 431137 Fax +237 33 431137

Canada			
Assembly **Sales** **Service**	**Toronto**	SEW-EURODRIVE CO. OF CANADA LTD. 210 Walker Drive Bramalea, Ontario L6T3W1	Tel. +1 905 791-1553 Fax +1 905 791-2999 http://www.sew-eurodrive.ca marketing@sew-eurodrive.ca
	Vancouver	SEW-EURODRIVE CO. OF CANADA LTD. 7188 Honeyman Street Delta. B.C. V4G 1 E2	Tel. +1 604 946-5535 Fax +1 604 946-2513 marketing@sew-eurodrive.ca
	Montreal	SEW-EURODRIVE CO. OF CANADA LTD. 2555 Rue Leger LaSalle, Quebec H8N 2V9	Tel. +1 514 367-1124 Fax +1 514 367-3677 marketing@sew-eurodrive.ca
	Additional addresses for service in Canada provided on request!		

Chile			
Assembly **Sales** **Service**	**Santiago de Chile**	SEW-EURODRIVE CHILE LTDA. Las Encinas 1295 Parque Industrial Valle Grande LAMPA RCH-Santiago de Chile P.O. Box Casilla 23 Correo Quilicura - Santiago - Chile	Tel. +56 2 75770-00 Fax +56 2 75770-01 http://www.sew-eurodrive.cl ventas@sew-eurodrive.cl

China			
Production **Assembly** **Sales** **Service**	**Tianjin**	SEW-EURODRIVE (Tianjin) Co., Ltd. No. 46, 7th Avenue, TEDA Tianjin 300457	Tel. +86 22 25322612 Fax +86 22 25322611 info@sew-eurodrive.cn http://www.sew-eurodrive.cn
Assembly **Sales** **Service**	**Suzhou**	SEW-EURODRIVE (Suzhou) Co., Ltd. 333, Suhong Middle Road Suzhou Industrial Park Jiangsu Province, 215021	Tel. +86 512 62581781 Fax +86 512 62581783 suzhou@sew-eurodrive.cn
	Guangzhou	SEW-EURODRIVE (Guangzhou) Co., Ltd. No. 9, JunDa Road East Section of GETDD Guangzhou 510530	Tel. +86 20 82267890 Fax +86 20 82267891 guangzhou@sew-eurodrive.cn
	Shenyang	SEW-EURODRIVE (Shenyang) Co., Ltd. 10A-2, 6th Road Shenyang Economic Technological Development Area Shenyang, 110141	Tel. +86 24 25382538 Fax +86 24 25382580 shenyang@sew-eurodrive.cn
	Wuhan	SEW-EURODRIVE (Wuhan) Co., Ltd. 10A-2, 6th Road No. 59, the 4th Quanli Road, WEDA 430056 Wuhan	Tel. +86 27 84478398 Fax +86 27 84478388

Colombia			
Assembly **Sales** **Service**	**Bogotá**	SEW-EURODRIVE COLOMBIA LTDA. Calle 22 No. 132-60 Bodega 6, Manzana B Santafé de Bogotá	Tel. +57 1 54750-50 Fax +57 1 54750-44 http://www.sew-eurodrive.com.co sewcol@sew-eurodrive.com.co

Croatia			
Sales **Service**	**Zagreb**	KOMPEKS d. o. o. PIT Erdödy 4 II HR 10 000 Zagreb	Tel. +385 1 4613-158 Fax +385 1 4613-158 kompeks@inet.hr

Czech Republic			
Sales	**Praha**	SEW-EURODRIVE CZ S.R.O. Business Centrum Praha Lužná 591 CZ-16000 Praha 6 - Vokovice	Tel. +420 255 709 601 Fax +420 220 121 237 http://www.sew-eurodrive.cz sew@sew-eurodrive.cz
Technical Offices	**Brno**	SEW-EURODRIVE CZ S.R.O. Křenová 52 CZ -60200 Brno	Tel. +420 543256151 + 543256163 Fax +420 543256845
	Hradec Králové	SEW-EURODRIVE CZ S.R.O. Čechova 498 CZ-50202 Hradec Králové	Tel. +420 495510141 Fax +420 495521313
	Plzeň	SEW-EURODRIVE CZ S.R.O. Areal KRPA a.s. Zahradni 173/2 CZ-32600 Plzeň	Tel. +420 378775300 Fax +420 377970710
	Klatovy	SEW-EURODRIVE CZ S.R.O. Technická kancelář Klatovy Domažlická 800 CZ-33901 Klatovy	Tel. +420 376310729 Fax +420 376310725

Denmark			
Assembly **Sales** **Service**	**Kopenhagen**	SEW-EURODRIVEA/S Geminivej 28-30 DK-2670 Greve	Tel. +45 43 9585-00 Fax +45 43 9585-09 http://www.sew-eurodrive.dk sew@sew-eurodrive.dk

Egypt			
Sales **Service**	**Cairo**	Copam Egypt for Engineering & Agencies 33 El Hegaz ST, Heliopolis, Cairo	Tel. +20 2 22566-299 + 1 23143088 Fax +20 2 22594-757 http://www.copam-egypt.com/ copam@datum.com.eg

Estonia			
Sales	**Tallin**	ALAS-KUUL AS Reti tee 4 EE-75301 Peetri küla, Rae vald, Harjumaa	Tel. +372 6593230 Fax +372 6593231 veiko.soots@alas-kuul.ee

Finland			
Assembly **Sales** **Service**	**Lahti**	SEW-EURODRIVE OY Vesimäentie 4 FIN-15860 Hollola 2	Tel. +358 201 589-300 Fax +358 3 780-6211 sew@sew.fi http://www.sew-eurodrive.fi
Technical Offices	**Helsinki**	SEW-EURODRIVE OY Luutnantintie 5 FIN-00410 Helsinki	Tel. +358 201 589-300 Fax + 358 9 5666-311 sew@sew.fi
	Vaasa	SEW-EURODRIVE OY Hietasaarenkatu 18 FIN-65100 Vaasa	Tel. +358 201 589-300 Fax +358 6 3127-470 sew@sew.fi
	Rovaniemi	SEW-EURODRIVE OY Valtakatu 4 A FIN-96100 Rovaniemi	Tel. +358 201 589-300 Fax +358 201 589-239 sew@sew.fi
Production **Assembly** **Service**	**Karkkila**	SEW Industrial Gears OY Valurinkatu 6 FIN-03600 Karkkila	Tel. +358 201 589-300 Fax +358 201 589-310 sew@sew.fi http://www.sew-eurodrive.fi

Gabon			
Sales	**Libreville**	Electro-Services B.P. 1889 Libreville	Tel. +241 7340-11 Fax +241 7340-12

Great Britain			
Assembly **Sales** **Service**	**Normanton**	SEW-EURODRIVE Ltd. Beckbridge Industrial Estate P.O. Box No.1 GB-Normanton, West- Yorkshire WF6 1QR	Tel. +44 1924 893-855 Fax +44 1924 893-702 http://www.sew-eurodrive.co.uk info@sew-eurodrive.co.uk
Technical Offices	**London**	SEW-EURODRIVE Ltd. 764 Finchely Road, Temple Fortune GB-London N.W.11 7TH	Tel. +44 20 8458-8949 Fax +44 20 8458-7417
	Midlands	SEW-EURODRIVE Ltd. 5 Sugar Brook court, Aston Road, Bromsgrove, Worcs B60 3EX	Tel. +44 1527 877-319 Fax +44 1527 575-245
	Scotland	SEW-EURODRIVE Ltd. Scottish Office No 37 Enterprise House Springkerse Business Park GB-Stirling FK7 7UF Scotland	Tel. +44 17 8647-8730 Fax +44 17 8645-0223

Greece			
Sales **Service**	**Athen**	Christ. Boznos & Son S.A. 12, Mavromichali Street P.O. Box 80136, GR-18545 Piraeus	Tel. +30 2 1042 251-34 Fax +30 2 1042 251-59 http://www.boznos.gr info@boznos.gr

Greece			
Technical Office	**Thessaloniki**	Christ. Boznos & Son S.A. Maiandrou 21 562 24 Evosmos, Thessaloniki	Tel. +30 2 310 7054-00 Fax +30 2 310 7055-15 info@boznos.gr

Hong Kong			
Assembly **Sales** **Service**	**Hong Kong**	SEW-EURODRIVE LTD. Unit No. 801-806, 8th Floor Hong Leong Industrial Complex No. 4, Wang Kwong Road Kowloon, Hong Kong	Tel. +852 2 7960477 + 79604654 Fax +852 2 7959129 contact@sew-eurodrive.hk

Hungary			
Sales **Service**	**Budapest**	SEW-EURODRIVE Kft. H-1037 Budapest Kunigunda u. 18	Tel. +36 1 437 06-58 Fax +36 1 437 06-50 office@sew-eurodrive.hu

Iceland			
Sales	**Reykjavik**	Vélaverk ehf. Bolholti 8, 3h. IS - 105 Reykjavik	Tel. +354 568 3536 Fax +354 568 3537 velaverk@velaverk.is

India			
Assembly **Sales** **Service**	**Vadodara**	SEW-EURODRIVE India Private Limited Plot No. 4, GIDC POR Ramangamdi • Vadodara - 391 243 Gujarat	Tel. +91 265 2831086 Fax +91 265 2831087 http://www.seweurodriveindia.com sales@seweurodriveindia.com subodh.ladwa@seweurodriveindia.com
Technical Offices	**Bangalore**	SEW-EURODRIVE India Private Limited 308, Prestige Centre Point 7, Edward Road Bangalore - 560052 - Karnataka	Tel. +91 80 22266565 Fax +91 80 22266569 salesbang@seweurodriveindia.com ganesh@seweurodriveindia.com
	Kolkata	SEW EURODRIVE India Private Limited 2nd floor, Room No. 35 Chowringhee Court 55, Chowringhee Road Kolkata - 700 071 - West Bengal	Tel. +91 33 22827457 Fax +91 33 22894204 saleskal@seweurodriveindia.com a.j.biswas@seweurodriveindia.com
	Chandigarh	SEW EURODRIVE India Private Limited Sujit Kumar Mishra H.No.5464/3 Modern Housing Complex Manimajra Chandigarh -160101	Tel. +91 9878469579 Fax +91 1722738664 saleschand@seweurodriveindia.com
	Chennai	SEW-EURODRIVE India Private Limited 2nd Floor, Josmans Complex, No. 5, McNichols Road, Chetpet Chennai - 600031 - Tamil Nadu	Tel. +91 44 42849813 Fax +91 44 42849816 saleschen@seweurodriveindia.com c.v.shivkumar@seweurodriveindia.com
	Coimbatore	SEW-EURODRIVE India Private Limited Office No 60 Arpee Centre (Opp Annapoorna Hotel) 420 N, NSR Road, Saibaba Colony Coimbatore 641 0111 - Tamil Nadu	Tel. +91 422 2455420 Fax +91 422 2443988 salescmb@seweurodriveindia.com p.selvakumar@seweurodriveindia.com
	Madgaon	SEW-EURODRIVE India Private Limited Flat No.-G1, Shivas-Laxmi Prasad Co-Operative Housing Society, Padmanarayan Estate, Near Jivottaam Math, Gagole Madgao, Goa - 403 602	samrat.chakravorty@seweurodriveindia.com

India			
	Hyderabad	SEW-EURODRIVE India Private Limited 408, 4th Floor, Meridian Place Green Park Road Amerpeet Hyderabad - 500016 - Andhra Pradesh	Tel. +91 40 23414698 Fax +91 40 23413884 saleshyd@seweurodriveindia.com ma.choudary@seweurodriveindia.com
	Jamshedpur	SEW-EURODRIVE India Private Limited Flat No.: B/2, B.S. Apartment Road No.: 4, Contractor's area, Bistupur Jamshedpur 831 001 - Jharkhand	Tel. +91 9934123671 siddhartha.mishra@seweurodriveindia.com
	Mumbai	SEW-EURODRIVE India Private Limited 312 A, 3rd Floor, Acme Plaza, J.B. Nagar, Andheri Kurla Road, Andheri (E) Mumbai - 400059 - Maharashtra	Tel. +91 22 28348440 Fax +91 22 28217858 salesmumbai@seweurodriveindia.com p.s.ray@seweurodriveindia.com
	New Delhi	SEW-EURODRIVE India Private Limited 418-419, Suneja Tower-1 District Centre, Janak Puri New Delhi 110 058	Tel. +91 11 25544111 Fax +91 11 25544113 salesdelhi@seweurodriveindia.com vikram.juneja@seweurodriveindia.com
	Pune	SEW-EURODRIVE India Private Limited Office No. 2 & 7, First Floor, Triveni Apartment Model Colony, Gokhale Road Pune 411016 - Maharashtra	Tel. +91 20 25671751 Fax +91 20 25661668 salespune@seweurodriveindia.com praveen.hosur@seweurodriveindia.com
	Raipur	SEW-EURODRIVE India Private Limited Flat No-0-102, First Floor Satyam Appt., Golchha Park Nr Mining Office, Ring Road-1 Raipur 492 001 - Chhattisgarh	Tel. +91 9893290624 sutanu.sarkar@seweurodriveindia.com

Indonesia			
Technical Office	**Jakarta**	SEW-EURODRIVE Pte Ltd. Jakarta Liaison Office, Menara Graha Kencana Jl. Perjuangan No. 88, LT 3 B, Kebun Jeruk, Jakarta 11530, Indonesia	Tel. +62 21 5359066 Fax +62 21 5363686 Service Hotline: +65 61000 739 sew@cbn.net.id

Ireland			
Sales **Service**	**Dublin**	Alperton Engineering Ltd. 48 Moyle Road Dublin Industrial Estate Glasnevin, Dublin 11	Tel. +353 1 830-6277 Fax +353 1 830-6458 info@alperton.ie http://www.alperton.ie

Israel			
Sales	**Tel-Aviv**	Liraz Handasa Ltd. Ahofer Str 34B / 228 58858 Holon	Tel. +972 3 5599511 Fax +972 3 5599512 http://www.liraz-handasa.co.il office@liraz-handasa.co.il

Italy			
Assembly **Sales** **Service**	**Milano**	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Via Bernini,14 I-20020 Solaro (Milano)	Tel. +39 02 96 9801 Fax +39 02 96 799781 http://www.sew-eurodrive.it sewit@sew-eurodrive.it
Technical Offices	**Bologna**	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Via della Grafica, 47 I-40064 Ozzano dell'Emilia (Bo)	Tel. +39 051 65-23-801 Fax +39 051 796-595
	Caserta	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Viale Carlo III Km. 23,300 I-81020 S. Nicola la Strada (Caserta)	Tel. +39 0823 219011 Fax +39 0823 421414

Italy			
	Firenze	RIMA Via Einstein, 14 I-50013 Campi Bisenzio (Firenze)	Tel. +39 055 898 58-21 Fax +39 055 898 58-30
	Pescara	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Viale Europa,132 I-65010 Villa Raspa di Spoltore (PE)	Tel. +39 085 41-59-427 Fax +39 085 41-59-643
	Torino	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Filiale Torino c.so Unione Sovietica 612/15 - int. C I-11035 Torino	Tel. +39 011 3473780 Fax +39 011 3473783
	Verona	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Via P. Sgulmero, 27/A I-37132 Verona	Tel. +39 045 89-239-11 Fax +39 045 97-6079

Ivory Coast			
Sales	**Abidjan**	SICA Ste industrielle et commerciale pour l'Afrique 165, Bld de Marseille B.P. 2323, Abidjan 08	Tel. +225 2579-44 Fax +225 2584-36

Japan			
Assembly **Sales** **Service**	**Iwata**	SEW-EURODRIVE JAPAN CO., LTD 250-1, Shimoman-no, Iwata Shizuoka 438-0818	Tel. +81 538 373811 Fax +81 538 373814 http://www.sew-eurodrive.co.jp sewjapan@sew-eurodrive.co.jp
Technical Offices	**Fukuoka**	SEW-EURODRIVE JAPAN CO., LTD. C-go, 5th-floor, Yakuin-Hiruzu-Bldg. 1-5-11, Yakuin, Chuo-ku Fukuoka, 810-0022	Tel. +81 92 713-6955 Fax +81 92 713-6860 sewkyushu@jasmine.ocn.ne.jp
	Osaka	SEW-EURODRIVE JAPAN CO., LTD. B-Space EIRAI Bldg., 3rd Floor 1-6-9 Kyoumachibori, Nishi-ku, Osaka, 550-0003	Tel. +81 6 6444--8330 Fax +81 6 6444--8338 sewosaka@crocus.ocn.ne.jp
	Tokyo	SEW-EURODRIVE JAPAN CO., LTD. Izumi-Bldg. 5 F 3-2-15 Misaki-cho Chiyoda-ku, Tokyo 101-0061	Tel. +81 3 3239-0469 Fax +81 3 3239-0943 sewtokyo@basil.ocn.ne.jp

Korea			
Assembly **Sales** **Service**	**Ansan-City**	SEW-EURODRIVE KOREA CO., LTD. B 601-4, Banweol Industrial Estate 1048-4, Shingil-Dong Ansan 425-120	Tel. +82 31 492-8051 Fax +82 31 492-8056 http://www.sew-korea.co.kr master@sew-korea.co.kr
	Busan	SEW-EURODRIVE KOREA Co., Ltd. No. 1720 - 11, Songjeong - dong Gangseo-ku Busan 618-270	Tel. +82 51 832-0204 Fax +82 51 832-0230 master@sew-korea.co.kr
Technical Offices	**Daegu**	SEW-EURODRIVE KOREA Co., Ltd. No.1108 Sungan officetel 87-36, Duryu 2-dong, Dalseo-ku Daegu 704-712	Tel. +82 53 650-7111 Fax +82 53 650-7112
	DaeJeon	SEW-EURODRIVE KOREA Co., Ltd. No. 1502, Hongin officetel 536-9, Bongmyung-dong, Yusung-ku Daejeon 305-301	Tel. +82 42 828-6461 Fax +82 42 828-6463

Korea			
	Kwangju	SEW-EURODRIVE KOREA Co., Ltd. 4fl., Dae-Myeong B/D 96-16 Unam-dong, Buk-ku Kwangju 500-170	Tel. +82 62 511-9172 Fax +82 62 511-9174
	Seoul	SEW-EURODRIVE KOREA Co., Ltd. No.504 Sunkyung officetel 106-4 Kuro 6-dong, Kuro-ku Seoul 152-054	Tel. +82 2 862-8051 Fax +82 2 862-8199

Latvia			
Sales	**Riga**	SIA Alas-Kuul Katlakalna 11C LV-1073 Riga	Tel. +371 7139253 Fax +371 7139386 http://www.alas-kuul.com info@alas-kuul.com

Lebanon			
Sales	**Beirut**	Gabriel Acar & Fils sarl B. P. 80484 Bourj Hammoud, Beirut	Tel. +961 1 4947-86 +961 1 4982-72 +961 3 2745-39 Fax +961 1 4949-71 gacar@beirut.com

Lithuania			
Sales	**Alytus**	UAB Irseva Naujoji 19 LT-62175 Alytus	Tel. +370 315 79204 Fax +370 315 56175 info@irseva.lt http://www.sew-eurodrive.lt

Luxembourg			
Assembly **Sales** **Service**	**Brüssel**	CARON-VECTOR S.A. Avenue Eiffel 5 B-1300 Wavre	Tel. +32 10 231-311 Fax +32 10 231-336 http://www.sew-eurodrive.lu info@caron-vector.be

Malaysia			
Assembly **Sales** **Service**	**Johore**	SEW-EURODRIVE SDN BHD No. 95, Jalan Seroja 39, Taman Johor Jaya 81000 Johor Bahru, Johor West Malaysia	Tel. +60 7 3549409 Fax +60 7 3541404 sales@sew-eurodrive.com.my
Technical Offices	**Kota Kinabalu**	SEW-EURODRIVE Sdn Bhd (Kota Kinabalu Branch) Lot No. 2,1st Floor, Inanam Baru Phase III, Miles 5.1 /2, Jalan Tuaran, Inanam 89350 Kota Kinabalu Sabah, Malaysia	Tel. +60 88 424792 Fax +60 88 424807
	Kuala Lumpur	SEW-EURODRIVE Sdn. Bhd. No. 2, Jalan Anggerik Mokara 31/46 Kota Kemuning Seksyen 31 40460 Shah Alam Selangor Darul Ehsan	Tel. +60 3 5229633 Fax +60 3 5229622 sewpjy@po.jaring.my
	Kuching	SEW-EURODRIVE Sdn. Bhd. Lot 268, Section 9 KTLD Lorong 9, Jalan Satok 93400 Kuching, Sarawak East Malaysia	Tel. +60 82 232380 Fax +60 82 242380

Malaysia			
	Penang	SEW-EURODRIVE Sdn. Bhd. No. 38, Jalan Bawal Kimsar Garden 13700 Prai, Penang	Tel. +60 4 3999349 Fax +60 4 3999348 seweurodrive@po.jaring.my

Mauritania			
Sales	**Zouérate**	AFRICOM - SARL En Face Marché Dumez P.B. 88 Zouérate	Tel. +222 54 40134 Fax +222 54 40538 cybertiris@mauritel.mr

Mexico			
Assembly **Sales** **Service**	**Queretaro**	SEW-EURODRIVE MEXIKO SA DE CV SEM-981118-M93 Tequisquiapan No. 102 Parque Industrial Queretaro C.P. 76220 Queretaro, Mexico	Tel. +52 442 1030-300 Fax +52 442 1030-301 http://www.sew-eurodrive.com.mx scmexico@seweurodrive.com.mx

Morocco			
Sales	**Casablanca**	Afit 5, rue Emir Abdelkader MA 20300 Casablanca	Tel. +212 22618372 Fax +212 22618351 ali.alami@premium.net.ma

Netherlands			
Assembly **Sales** **Service**	**Rotterdam**	VECTOR Aandrijftechniek B.V. Industrieweg 175 NL-3044 AS Rotterdam Postbus 10085 NL-3004 AB Rotterdam	Tel. +31 10 4463-700 Fax +31 10 4155-552 http://www.vector.nu info@vector.nu

New Zealand			
Assembly **Sales** **Service**	**Auckland**	SEW-EURODRIVE NEW ZEALAND LTD. P.O. Box 58-428 82 Greenmount drive East Tamaki Auckland	Tel. +64 9 2745627 Fax +64 9 2740165 http://www.sew-eurodrive.co.nz sales@sew-eurodrive.co.nz
	Christchurch	SEW-EURODRIVE NEW ZEALAND LTD. 10 Settlers Crescent, Ferrymead Christchurch	Tel. +64 3 384-6251 Fax +64 3 384-6455 sales@sew-eurodrive.co.nz
Technical Office	**Palmerston North**	SEW-EURODRIVE NEW ZEALAND LTD. C/-Grant Shearman, RD 5, Aronui Road Palmerston North	Tel. +64 6 355-2165 Fax +64 6 355-2316 sales@sew-eurodrive.co.nz

Norway			
Assembly **Sales** **Service**	**Moss**	SEW-EURODRIVE A/S Solgaard skog 71 N-1599 Moss	Tel. +47 69 24 10 20 Fax +47 69 24 10 40 http://www.sew-eurodrive.no sew@sew-eurodrive.no

Peru			
Assembly **Sales** **Service**	**Lima**	SEW DEL PERU MOTORES REDUCTORES S.A.C. Los Calderos, 120-124 Urbanizacion Industrial Vulcano, ATE, Lima	Tel. +51 1 3495280 Fax +51 1 3493002 http://www.sew-eurodrive.com.pe sewperu@sew-eurodrive.com.pe

Philippines			
Technical Office	**Manila**	SEW-EURODRIVE Pte Ltd Manila Liaison Office Suite 110, Ground Floor Comfoods Building Senator Gil Puyat Avenue 1200 Makati City	Tel. +63 2 894275254 Fax +63 2 8942744 sewmla@i-next.net

Poland			
Assembly **Sales** **Service**	**Lodz**	SEW-EURODRIVE Polska Sp.z.o.o. ul. Techniczna 5 PL-92-518 Łódź	Tel. +48 42 67710-90 Fax +48 42 67710-99 http://www.sew-eurodrive.pl sew@sew-eurodrive.pl
		24 Hour Service	Tel. +48 602 739 739 (+48 602 SEW SEW) sewis@sew-eurodrive.pl
Technical Office	**Tychy**	SEW-EURODRIVE Polska Sp.z.o.o. ul. Nad Jeziorem 87 PL-43-100 Tychy	Tel. +48 32 2175026 + 32 2175027 Fax +48 32 2277910
	Bydgoszcz	SEW-EURODRIVE Polska Sp.z.o.o. ul. Fordońska 246 PL-85-959 Bydgoszcz	Tel. +48 52 3606590 Fax +48 52 3606591
	Poznan	SEW-EURODRIVE Polska Sp.z.o.o. ul. Romana Maya 1 PL-61-371 Poznań	Tel. +48 61 8741640 Fax +48 61 8741641
	Szczecinek	SEW-EURODRIVE Polska Sp.z.o.o. ul. Mickiewicza 2 pok. 36 PL-78-400 Szczecinek	Tel. +48 94 3728820 Fax +48 94 3728821

Portugal			
Assembly **Sales** **Service**	**Coimbra**	SEW-EURODRIVE, LDA. Apartado 15 P-3050-901 Mealhada	Tel. +351 231 20 9670 Fax +351 231 20 3685 http://www.sew-eurodrive.pt infosew@sew-eurodrive.pt
Technical Offices	**Lisboa**	SEW-EURODRIVE, LDA. Núcleo Empresarial I de São Julião do Tojal Rua de Entremuros, 54 Fracção I P-2660-533 São Julião do Tojal	Tel. +351 21 958-0198 Fax +351 21 958-0245 esc.lisboa@sew-eurodrive.pt
	Porto	SEW-EURODRIVE, LDA. Av. 25 de Abril, 68 4440-502 Valongo	Tel. +351 229 350 383 Fax +351 229 350 384 MobilTel. +351 9 32559110 esc.porto@sew-eurodrive.pt

Romania			
Sales **Service**	**Bucureşti**	Sialco Trading SRL str. Madrid nr.4 011785 Bucuresti	Tel. +40 21 230-1328 Fax +40 21 230-7170 sialco@sialco.ro

Russia			
Assembly **Sales** **Service**	**St. Petersburg**	ZAO SEW-EURODRIVE P.O. Box 36 195220 St. Petersburg Russia	Tel. +7 812 3332522 +7 812 5357142 Fax +7 812 3332523 http://www.sew-eurodrive.ru sew@sew-eurodrive.ru
Technical Office	**Yekaterinburg**	ZAO SEW-EURODRIVE Kominterna Str. 16 Office 614 RUS-620078 Ekaterinburg	Tel. +7 343 310 3977 Fax +7 343 310 3978 eso@sew-eurodrive.ru

Russia			
	Irkutsk	ZAO SEW-EURODRIVE 5-Armii Str., 31 RUS-664011 Irkutsk	Tel. +7 3952 25 5880 Fax +7 3952 25 5881 iso@sew-eurodrive.ru
	Moskau	ZAO SEW-EURODRIVE RUS-107023 Moskau	Tel. +7 495 9337090 Fax +7 495 9337094 mso@sew-eurodrive.ru
	Novosibirsk	ZAO SEW-EURODRIVE pr. K Marksa, d.30 RUS-630087 Novosibirsk	Tel. +7 383 3350200 Fax +7 383 3462544 nso@sew-eurodrive.ru
	Togliatti	ZAO SEW-EURODRIVE Sportivnaya Str. 4B, office 2 Samarskaya obl. RUS-445057 Togliatti	Tel. +7 8482 710529 Fax +7 8482 810590

Senegal			
Sales	**Dakar**	SENEMECA Mécanique Générale Km 8, Route de Rufisque B.P. 3251, Dakar	Tel. +221 338 494 770 Fax +221 338 494 771 senemeca@sentoo.sn

Serbia			
Sales	**Beograd**	DIPAR d.o.o. Ustanicka 128a PC Košum, IV floor SCG-11000 Beograd	Tel. +381 11 347 3244 / +381 11 288 0393 Fax +381 11 347 1337 office@dipar.co.yu

Singapore			
Assembly **Sales** **Service**	**Singapore**	SEW-EURODRIVE PTE. LTD. No 9, Tuas Drive 2 Jurong Industrial Estate Singapore 638644	Tel. +65 68621701 Fax +65 68612827 http://www.sew-eurodrive.com.sg sewsingapore@sew-eurodrive.com

Slovakia			
Sales	**Bratislava**	SEW-Eurodrive SK s.r.o. Rybničná 40 SK-831 06 Bratislava	Tel. +421 2 33595 202 Fax +421 2 33595 200 sew@sew-eurodrive.sk http://www.sew-eurodrive.sk
	Žilina	SEW-Eurodrive SK s.r.o. Industry Park – PChZ ulica M.R.Štefánika 71 SK-010 01 Žilina	Tel. +421 41 700 2513 Fax +421 41 700 2514 sew@sew-eurodrive.sk
	Banská Bystrica	SEW-Eurodrive SK s.r.o. Rudlovská cesta 85 SK-974 11 Banská Bystrica	Tel. +421 48 414 6564 Fax +421 48 414 6566 sew@sew-eurodrive.sk
	Košice	SEW-Eurodrive SK s.r.o. Slovenská ulica 26 SK-040 01 Košice	Tel. +421 55 671 2245 Fax +421 55 671 2254 sew@sew-eurodrive.sk

Slovenia			
Sales **Service**	**Celje**	Pakman - Pogonska Tehnika d.o.o. UI. XIV. divizije 14 SLO - 3000 Celje	Tel. +386 3 490 83-20 Fax +386 3 490 83-21 pakman@siol.net

South Africa			
Assembly **Sales** **Service**	**Johannesburg**	SEW-EURODRIVE (PROPRIETARY) LIMITED Eurodrive House Cnr. Adcock Ingram and Aerodrome Roads Aeroton Ext. 2 Johannesburg 2013 P.O.Box 90004 Bertsham 2013	Tel. +27 11 248-7000 Fax +27 11 494-3104 http://www.sew.co.za dross@sew.co.za
	Capetown	SEW-EURODRIVE (PROPRIETARY) LIMITED Rainbow Park Cnr. Racecourse & Omuramba Road Montague Gardens Cape Town P.O.Box 36556 Chempet 7442 Cape Town	Tel. +27 21 552-9820 Fax +27 21 552-9830 Telex 576 062 dswanepoel@sew.co.za
	Durban	SEW-EURODRIVE (PROPRIETARY) LIMITED 2 Monaceo Place Pinetown Durban P.O. Box 10433, Ashwood 3605	Tel. +27 31 700-3451 Fax +27 31 700-3847 dtait@sew.co.za
	Nelspruit	SEW-EURODRIVE (PTY) LTD. 7 Christie Crescent Vintonia P.O.Box 1942 Nelspruit 1200	Tel. +27 13 752-8007 Fax +27 13 752-8008 robermeyer@sew.co.za
Technical Offices	**Port Elizabeth**	SEW-EURODRIVE PTY LTD. 8 Ruan Access Park Old Cape Road Greenbushes 6000 Port Elizabeth	Tel. +27 41 3722246 Fax +27 41 3722247 dtait@sew.co.za
	Richards Bay	SEW-EURODRIVE PTY LTD. 25 Eagle Industrial Park Alton Richards Bay P.O. Box 458 Richards Bay 3900	Tel. +27 35 797-3805 Fax +27 35 797-3819 dtait@sew.co.za

Spain			
Assembly **Sales** **Service**	**Bilbao**	SEW-EURODRIVE ESPAÑA, S.L. Parque Tecnológico, Edificio, 302 E-48170 Zamudio (Vizcaya)	Tel. +34 94 43184-70 Fax +34 94 43184-71 http://www.sew-eurodrive.es sew.spain@sew-eurodrive.es
Technical Offices	**Barcelona**	Delegación Barcelona Avenida Francesc Maciá 40-44 Oficina 4.2 E-08208 Sabadell (Barcelona)	Tel. +34 93 7162200 Fax +34 93 7233007
	Lugo	Delegación Noroeste Apartado, 1003 E-27080 Lugo	Tel. +34 639 403348 Fax +34 982 202934
	Madrid	Delegación Madrid Gran Via. 48-2° A-D E-28220 Majadahonda (Madrid)	Tel. +34 91 6342250 Fax +34 91 6340899
	Seville	MEB Pólogono Calonge, C/A Nave 2 - C E-41.077 Sevilla	Tel. +34 954 356 361 Fax +34 954 356 274 mebsa.sevilla@mebsa.com
	Valencia	MEB Músico Andreu i Piqueres, 4 E-46.900 Torrente (Valencia)	Tel. +34 961 565 493 Fax +34 961 566 688 mebsa.valencia@mebsa.com

Sri Lanka			
Sales	**Colombo**	SM International (Pte) Ltd 254, Galle Raod Colombo 4, Sri Lanka	Tel. +94 1 2584887 Fax +94 1 2582981

Sweden			
Assembly **Sales** **Service**	**Jönköping**	SEW-EURODRIVE AB Gnejsvägen 6-8 S-55303 Jönköping Box 3100 S-55003 Jönköping	Tel. +46 36 3442 00 Fax +46 36 3442 80 http://www.sew-eurodrive.se info@sew-eurodrive.se
Technical Offices	**Göteborg**	SEW-EURODRIVE AB Gustaf Werners gata 8 S-42132 Västra Frölunda	Tel. +46 31 70968 80 Fax +46 31 70968 93
	Malmö	SEW-EURODRIVE AB Borrgatan 5 S-21124 Malmö	Tel. +46 40 68064 80 Fax +46 40 68064 93
	Stockholm	SEW-EURODRIVE AB Björkholmsvägen 10 S-14146 Huddinge	Tel. +46 8 44986 80 Fax +46 8 44986 93
	Skellefteå	SEW-EURODRIVE AB Trädgårdsgatan 8 S-93131 Skellefteå	Tel. +46 910 7153 80 Fax +46 910 7153 93

Switzerland			
Assembly **Sales** **Service**	**Basel**	Alfred Imhof A.G. Jurastrasse 10 CH-4142 Münchenstein bei Basel	Tel. +41 61 417 1717 Fax +41 61 417 1700 http://www.imhof-sew.ch info@imhof-sew.ch
Technical Offices	**Rhaetian Switzerland**	André Gerber Es Perreyres CH-1436 Chamblon	Tel. +41 24 445 3850 Fax +41 24 445 4887
	Bern / Solothurn	Rudolf Bühler Muntersweg 5 CH-2540 Grenchen	Tel. +41 32 652 2339 Fax +41 32 652 2331
	Central Switzerland and Ticino	Beat Lütolf Baumacher 11 CH-6244 Nebikon	Tel. +41 62 756 4780 Fax +41 62 756 4786
	Zürich	René Rothenbühler Nörgelbach 7 CH-8493 Saland	Tel. +41 52 386 3150 Fax +41 52 386 3213
	Bodensee and East Switzerland	Markus Künzle Eichweg 4 CH-9403 Goldach	Tel. +41 71 845 2808 Fax +41 71 845 2809

Taiwan (R.O.C.)			
Sales	**Nan Tou**	Ting Shou Trading Co., Ltd. No. 55 Kung Yeh N. Road Industrial District Nan Tou 540	Tel. +886 49 255353 Fax +886 49 257878
	Taipei	Ting Shou Trading Co., Ltd. 6F-3, No. 267, Sec. 2 Tung Hwa South Road, Taipei	Tel. +886 2 27383535 Fax +886 2 27368268 Telex 27 245 sewtwn@ms63.hinet.net

Thailand			
Assembly **Sales** **Service**	**Chonburi**	SEW-EURODRIVE (Thailand) Ltd. 700/456, Moo.7, Donhuaroh Muang Chonburi 20000	Tel. +66 38 454281 Fax +66 38 454288 sewthailand@sew-eurodrive.com
Technical Offices	**Bangkok**	SEW-EURODRIVE (Thailand) Ltd. 6th floor, TPS Building 1023, Phattanakarn Road Suanluang Bangkok,10250	Tel. +66 2 7178149 Fax +66 2 7178152 sewthailand@sew-eurodrive.com
	Hadyai	SEW-EURODRIVE (Thailand) Ltd. Hadyai Country Home Condominium 59/101 Soi.17/1 Rachas-Utid Road. Hadyai, Songkhla 90110	Tel. +66 74 359441 Fax +66 74 359442 sewthailand@sew-eurodrive.com
	Khonkaen	SEW-EURODRIVE (Thailand) Ltd. 4th Floor, Kaow-U-HA MOTOR Bldg, 359/2, Mitraphab Road. Muang District Khonkaen 40000	Tel. +66 43 225745 Fax +66 43 324871 sew-thailand@sew-eurodrive.com

Tunisia			
Sales	**Tunis**	T. M.S. Technic Marketing Service 5, Rue El Houdaibiah 1000 Tunis	Tel. +216 71 4340-64 + 71 4320-29 Fax +216 71 4329-76 tms@tms.com.tn

Turkey			
Assembly **Sales** **Service**	**Istanbul**	SEW-EURODRIVE Hareket Sistemleri San. ve Tic. Ltd. Sti. Bagdat Cad. Koruma Cikmazi No. 3 TR-34846 Maltepe ISTANBUL	Tel. +90 216 4419164, 3838014, 3738015 Fax +90 216 3055867 http://www.sew-eurodrive.com.tr sew@sew-eurodrive.com.tr
Technical Offices	**Adana**	SEW-EURODRIVE Hareket Sistemleri San. ve Tic. Ltd. Sti. Kizilay Caddesi 8 Sokak No 6 Daðtekin Is Merkezi Kat 4 Daire 2 TR-01170 SEYHAN / ADANA	Tel. +90 322 359 94 15 Fax +90 322 359 94 16
	Ankara	SEW-EURODRIVE Hareket Sistemleri San. ve Tic. Ltd. Sti. Özcelik Is Merkezi, 14. Sok, No. 4/42 TR-06370 Ostim/Ankara	Tel. +90 312 3853390 / +90 312 3544715 / +90 312 3546109 Fax +90 312 3853258
	Bursa	SEW-EURODRIVE Hareket Sistemleri San. ve Tic. Ltd. Sti. Besevler Küçük Sanayi Parkoop Parçacilar Sitesi 48. Sokak No. 47 TR Nilüfer/Bursa	Tel. +90 224 443 4556 Fax +90 224 443 4558
	Izmir	SEW-EURODRIVE Hareket Sistemleri San. ve Tic. Ltd. Sti. 1203/11 Sok. No. 4/613 Hasan Atli Is Merkezi TR-35110 Yenisehir-Izmir	Tel. +90 232 4696264 Fax +90 232 4336105

Ukraine			
Sales **Service**	**Dnepropetrovsk**	SEW-EURODRIVE Str. Rabochaja 23-B, Office 409 49008 Dnepropetrovsk	Tel. +380 56 370 3211 Fax +380 56 372 2078 http://www.sew-eurodrive.ua sew@sew-eurodrive.ua

Ukraine			
Sales	**Kiev**	SEW-EURODRIVE GmbH S. Oleynika str. 21 02068 Kiev	Tel. +380 44 503 95 77 Fax +380 44 503 95 78 kso@sew-eurodrive.ua
	Donetsk	SEW-EURODRIVE GmbH 25th anniversary of RKKA av. 1-B, of. 805 Donetsk 83000	Tel. +380 62 38 80 545 Fax +380 62 38 80 533 dso@sew-eurodrive.ua

Uruguay			
Sales	**Montevideo**	SEW-EURODRIVE Uruguay, S. A. German Barbato 1526 CP 11200 Montevideo	Tel. +598 2 90181-89 Fax +598 2 90181-88 sewuy@sew-eurodrive.com.uy

USA			
Production **Assembly** **Sales** **Service** **Cooporate Offices**	**Southeast Region**	SEW-EURODRIVE INC. 1295 Old Spartanburg Highway P.O. Box 518 Lyman, S.C. 29365	Tel. +1 864 439-7537 Fax Sales +1 864 439-7830 Fax Manufacturing +1 864 439-9948 Fax Assembly +1 864 439-0566 Fax Confidential/HR +1 864 949-5557 http://www.seweurodrive.com cslyman@seweurodrive.com
Assembly **Sales** **Service**	**Northeast Region**	SEW-EURODRIVE INC. Pureland Ind. Complex 2107 High Hill Road, P.O. Box 481 Bridgeport, New Jersey 08014	Tel. +1 856 467-2277 Fax +1 856 845-3179 csbridgeport@seweurodrive.com
	Midwest Region	SEW-EURODRIVE INC. 2001 West Main Street Troy, Ohio 45373	Tel. +1 937 335-0036 Fax +1 937 440-3799 cstroy@seweurodrive.com
	Southwest Region	SEW-EURODRIVE INC. 3950 Platinum Way Dallas, Texas 75237	Tel. +1 214 330-4824 Fax +1 214 330-4724 csdallas@seweurodrive.com
	Western Region	SEW-EURODRIVE INC. 30599 San Antonio St. Hayward, CA 94544	Tel. +1 510 487-3560 Fax +1 510 487-6433 cshayward@seweurodrive.com
	Additional addresses for service in the USA provided on request!		

Venezuela			
Assembly **Sales** **Service**	**Valencia**	SEW-EURODRIVE Venezuela S.A. Av. Norte Sur No. 3, Galpon 84-319 Zona Industrial Municipal Norte Valencia, Estado Carabobo	Tel. +58 241 832-9804 Fax +58 241 838-6275 http://www.sew-eurodrive.com.ve ventas@sew-eurodrive.com.ve sewfinanzas@cantv.net

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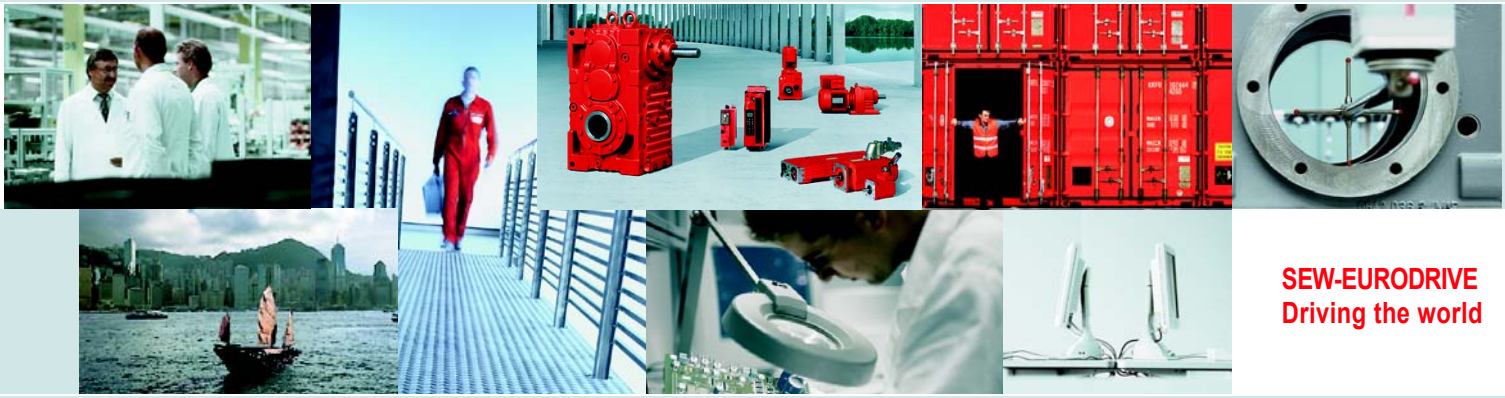

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