



Operating instructions



SL2 synchronous linear motors



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1 General information

1.1 About this documentation

The documentation at hand is the original.

This documentation is an integral part of the product. The documentation is intended for all employees who perform work on the product.

Make sure this documentation is accessible and legible. Ensure that persons responsible for the systems and their operation as well as persons who work on the product independently have read through the documentation carefully and understood it. If you are unclear about any of the information in this documentation or if you require further information, contact SEW-EURODRIVE.

1.2 Other applicable documentation

Observe the corresponding documentation for all additional components.

1.3 Structure of the safety notes

1.3.1 Meaning of signal words

The following table shows the graduation and meaning of the signal words in the safety notes.

Signal word	Meaning	Consequences if not observed
▲ DANGER	Imminent danger	Death or severe injuries
▲ WARNING	Possibly dangerous situation	Death or severe injuries
▲ CAUTION	Possibly dangerous situation	Minor injuries
NOTICE	Possible damage to property	Damage to the product or its environment
INFORMATION	Useful information or tip: Simplifies handling of the product.	

1.3.2 Structure of section-related safety notes

Section-related safety notes do not apply to a specific action but to several actions pertaining to one subject. The hazard symbols used either indicate a general hazard or a specific hazard.

This is the formal structure of a safety note for a specific section:



SIGNAL WORD

Type and source of hazard.

Possible consequence(s) if disregarded.

- Measure(s) to prevent the hazard.

1.3.3 Meaning of the hazard symbols

The hazard symbols in the safety notes have the following meaning:

Hazard symbol	Meaning
	General hazard
	Warning of dangerous electrical voltage
	Warning about magnetic field

1.3.4 Structure of embedded safety notes

Embedded safety notes are directly integrated into the instructions just before the description of the dangerous step.

This is the formal structure of an embedded safety note:

⚠ SIGNAL WORD! Type and source of danger. Possible consequence(s) if disregarded. Measure(s) to prevent danger.

1.4 Decimal separator in numerical values

In this document, a period is used to indicate the decimal separator.

Example: 30.5 kg

1.5 Rights to claim under limited warranty

Read the information in this documentation. This is essential for fault-free operation and fulfillment of any rights to claim under limited warranty. Read the documentation before you start working with the product.

1.6 Product names and trademarks

The product names mentioned in this documentation are trademarks or registered trademarks of the respective titleholders.

1.7 Copyright notice

© 2025 SEW-EURODRIVE. All rights reserved. Copyright law prohibits the unauthorized reproduction, modification, distribution and use of this document – in whole or in part.

1.8 Recycling, reprocessing, reuse

When manufacturing products, SEW-EURODRIVE makes sure to keep the use of new natural resources to a minimum in the interests of the circular economy. Key aspects here are the recycling of materials as well as the inspection and/or processing of returned components and their reuse in new products. These processes are only used at SEW-EURODRIVE if the resulting materials and components correspond to the quality of new products.

2 Safety notes

2.1 Preliminary information

The following general safety notes serve the purpose of preventing injury to persons and damage to property. They primarily apply to the use of products described in this documentation. If you use additional components, also observe the relevant warning and safety notes.

2.2 Duties of the user

As the user, you must ensure that the basic safety notes are observed and complied with. Make sure that persons responsible for the machinery and its operation as well as persons who work on the device independently have read through the documentation carefully and understood it.

As the user, you must ensure that all of the work listed in the following is carried out only by qualified specialists:

- Setup and installation
- Installation and connection
- Startup
- Maintenance and repairs
- Shutdown
- Disassembly

Ensure that the persons who work on the product pay attention to the following regulations, conditions, documentation, and information:

- The national and regional regulations governing safety and the prevention of accidents
- Product safety label on the product
- All other associated project planning documents, installation and startup instructions, as well as connection and wiring diagrams
- Do not assemble, install, or operate damaged products
- All system-specific specifications and regulations

Ensure that systems in which the product is installed are equipped with additional monitoring and protection devices. Observe the applicable safety regulations and legislation governing technical work equipment and accident prevention regulations.

2.3 Target group

Specialist for mechanical work	Any mechanical work may be performed only by adequately qualified specialists. Specialists in the context of this documentation are persons who are familiar with the design, mechanical installation, troubleshooting, and maintenance of the product, and who possess the following qualifications: • Qualifications in the field of mechanics in accordance with the national regulations • Familiarity with this documentation
Specialist for electrotechnical work	Any electrotechnical work may be performed only by electrically skilled persons with a suitable education. Electrically skilled persons in the context of this documentation are persons who are familiar with electrical installation, startup, troubleshooting, and maintenance of the product, and who possess the following qualifications: • Qualifications in the field of electrical engineering in accordance with the national regulations • Familiarity with this documentation
Additional qualifications	In addition to that, these persons must be familiar with the valid safety regulations and laws, as well as with the requirements of the standards, directives, and laws specified in this documentation. The persons must have the express authorization of the company to operate, program, parameterize, label, and ground devices, systems, and circuits in accordance with the standards of safety technology.
Instructed persons	All work in the areas of transport, storage, installation, operation and waste disposal may only be carried out by persons who are trained and instructed appropriately. These instructions must enable the persons to carry out the required activities and work steps safely and in accordance with regulations.

2.4 Designated use

The product is intended for installation in electrical systems or machines.

In case of installation in electrical systems or machines, startup of the product is prohibited until it is determined that the machine meets the requirements stipulated in the local laws and directives. For Europe, Machinery Directive 2006/42/EC as well as the EMC Directive 2014/30/EU apply. Observe EN 60204-1 (Safety of machinery - electrical equipment of machines). The product meets the requirements stipulated in the Low Voltage Directive 2014/35/EU.

The product in combination with the linear measuring system AL1H is only designated for the use in large-scale fixed installations or in stationary industrial tools according to RoHS Directive 2011/65/EU.

The standards given in the declaration of conformity apply to the product.

The systems can be mobile or stationary. The motors must be suitable for operation with inverters. Do not connect any other loads to the product. Never connect capacitive loads to the product.

Technical data and information on the connection conditions are provided on the nameplate and in chapter "Technical data" in the documentation. Always comply with the data and conditions.

Unintended or improper use of the product may result in severe injury to persons and damage to property.

Do not use the product as a climbing aid.

2.4.1 Restrictions under the European WEEE Directive 2012/19/EU

You may use options and accessories from SEW-EURODRIVE exclusively in connection with products from SEW-EURODRIVE.

2.4.2 Hoist applications

To avoid danger of fatal injury by falling hoists, observe the following points when using the product in lifting applications:

- Use mechanical protection devices.
- Perform a hoist startup.

2.4.3 Restrictions of use

The following applications are prohibited unless the device is explicitly designed for such use:

- Use in potentially explosive areas
- Use in areas exposed to harmful oils, acids, gases, vapors, dust, and radiation
- Use in applications with impermissibly high mechanical vibration and shock loads
- Use at an elevation of more than 4000 m above sea level

The product can be used at altitudes above 1000 m above sea level up to 4000 m above sea level under the following conditions:

- The reduction of the nominal output current and/or line voltage is taken into account as per chapter "Technical data" in the associated product manual.
- Above 2000 m above sea level, the air and creepage distances are only sufficient for overvoltage class II according to EN 60664. At altitudes above 2000 m above sea level, limiting measures must therefore be taken that reduce the line side overvoltage from category III to category II for the entire system.
- If a protective electrical separation is required, implement it outside the product at altitudes of more than 2000 m above sea level.

2.5 Creating a safe working environment

Before you work on the product, ensure a safe working environment. Observe the following basic safety notes:

2.5.1 Performing work on the product safely

Defective or damaged product

Never install defective or damaged products. Observe the following information to avoid injuries or damage:

- Before installation, check the product for external damage and replace a damaged product.

Use of hazardous substances, lubricants, adhesives

Observe the following information to avoid poisoning or fire hazards:

- Observe the safety data sheets of the used hazardous substances, lubricants and adhesives.
- Wear safety gloves.

Hot surfaces

The surfaces of the product can become very hot during operation. Observe the following information to avoid burns:

- Let the product and its accessories cool down before touching it.
- Do not touch any surfaces of the product during operation, except for the control elements.
- Observe the information signs and product safety labels on the product.

Falling load

Observe the following information to avoid death or severe injury due to falling loads:

- Do not stand under the load.
- Secure the area where loads can fall down.
- Use personal protective equipment (such as helmet and safety shoes).
- Use a suitable lifting tool (chain hoist, forklift) and transport protection.

Moving parts

When working on the product, there may be a risk from moving parts and uncontrolled component movements. Observe the following information to avoid body parts getting crushed or pulled in:

- Switch off the product before you start working on it.
- Observe all technical data of the product.
- Do not reach into the hazard zone.
- Observe the 5 safety rules.

2.5.2 Performing electrical work safely

Observe the following information to perform electrical work safely:

Electrical work may only be performed by an electrically skilled person or an electronically instructed person under the supervision of an electrically skilled person.

The fact that the operation or display elements are no longer illuminated does not indicate that the product has been disconnected from the supply system and no longer carries any voltage.

Live parts

Always adhere to the 5 safety rules for all work on electrical components:

1. Disconnect.
2. Secure the device against a restart.
3. Check that no voltage is applied.
4. Ground and short-circuit.
5. Cover or isolate neighboring live parts.

Depending on the situation, it is possible to deviate from rules 4 and 5. Observe standard EN 50110-1.

Danger due to electric arc

An electric arc may occur when plug-in connections are disconnected or connected while voltage is applied (e.g. connection between drive and control). In order to avoid damaging electrical components, observe the following information:

- Do not disconnect power connections during operation.
- Do not connect power connections during operation.
- Ensure that the product is de-energized before disconnecting and connecting the plug-in connections.

Dangerous voltage due to charged capacitors

Voltage from charged capacitors can still be present in live components or power connections after disconnecting from the supply voltage. Observe the following information:

- Observe the following waiting period after disconnecting the supply voltage and before performing any electrical work: **10 minutes**.
- Ensure that the unit is de-energized.
- Observe the information signs and product safety labels on the product.

2.6 Transport

Inspect the shipment for damage as soon as you receive the delivery. Inform the shipping company immediately about any damage. If the product or the packaging is damaged, do not assemble, install, connect, or start up the product. If the packaging is damaged, the product itself may also be damaged.

Observe the following notes when transporting the device:

- Ensure that the product is not subject to mechanical impact.
- Before transportation, cover the connections with the supplied protection caps.
- Only place the product on the cooling fins or on the side without connectors during transportation.
- Always use all attachment points if available. The attachment points are designed to carry only the mass of the product. Do not apply any additional loads.

If necessary, use suitable, adequately dimensioned transport aids.

Observe the notes on the climatic conditions in accordance with chapter "Technical data" in the corresponding product manual.

2.7 Functional safety technology

If the documentation does not expressly permit it, the product must not perform any safety sub-function without higher-level safety systems.

2.8 Installation/assembly

Ensure that the product is installed and cooled in accordance with the regulations in the documentation.

Protect the product from excessive mechanical strain. The product and its mounted components must not protrude into the path of persons or vehicles. Ensure that no components are deformed or no insulation spaces are modified, particularly during transportation. Electrical components must not be mechanically damaged or destroyed.

Observe the notes in chapter "Mechanical installation" (→ 28) in the documentation.

2.9 Electrical installation

Ensure that all of the required covers are correctly attached after the electrical installation.

Make sure that protective measures and protection devices comply with the applicable regulations (e.g. EN 60204-1 or EN 61800-5-1).

2.9.1 Required protective measure

Make sure that the product is correctly attached to the ground connection.

2.9.2 Stationary application

The necessary preventive measure for the product is:

Type of energy transfer	Preventive measure
Direct power supply	Ground connection

2.9.3 Regenerative operation

Avoid manually displacing the primary, otherwise electrical voltage is present at open plug connectors.

2.10 Protective separation

The product meets all requirements for protective separation of power and electronics connections in accordance with IEC 61800-5-1. The connected signal circuits must meet requirements according to SELV (**S**afety **E**xtra **L**ow **V**oltage) or PELV (**P**rotective **E**xtra **L**ow **V**oltage) to ensure protective separation. The installation must meet the requirements for protective separation.

In order to avoid exceeding the permitted contact voltages in SELV or PELV power circuits in the event of an error, continuous equipotential bonding is required in the vicinity of these power circuits. If this is not possible, other protective measures must be taken. These protective measures are described in IEC 61800-5-1.

2.11 Danger due to magnetic fields

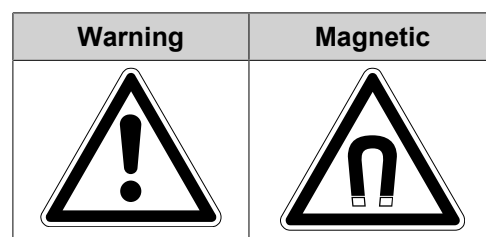
Parts of the linear motor are equipped with permanent magnets that create strong magnetic fields even when the motor is de-energized. During operation, additional electromagnetic fields are generated.

In Germany, workplaces at which persons are exposed to electromagnetic fields must comply with accident prevention regulation BGV B 11 "Electromagnetic Fields". In other countries, the corresponding national and local regulations and provisions must be complied with.

The magnetic field generated by the permanent magnets of the linear motor cause strong forces of attraction with magnetizable materials. The attraction of other objects can cause injuries such as crushing.

Observe the following points when performing any work on the linear motor:

- Magnetic fields may pose a health risk. This especially applies to persons with pacemakers.
- Even at a distance of 100 mm, the magnetic flux density of the secondaries present is < 5 mT (at 150 mm < 0.5 mT).
- Parts of the linear motor that are equipped with permanent magnets must be marked with caution signs.



- Never place the parts of the linear motor that are equipped with permanent magnets onto metal surfaces.
- Never bring metal parts near the linear motor.
- Wear work gloves during transport and installation.
- Hold the tools firmly (using both hands). Bring tools to the linear motor slowly.
- Only perform assembly work together with a second person.

2.12 Startup/operation

Make sure the connection boxes are closed and screwed before connecting the supply voltage.

Depending on the degree of protection, products may have live, uninsulated, and sometimes moving or rotating parts as well as hot surfaces during operation.

Additional protective measures may be required for applications with increased hazard potential. Be sure to check the effectiveness of the protection devices after every modification.

In the event of deviations from normal operation, switch off the product. Possible deviations are increased temperatures, noise, or vibration, for example. Determine the cause. Contact SEW-EURODRIVE if necessary.

Risk of burns due to arcing: Do not disconnect power connections during operation. Do not connect power connections during operation.

When the system is switched on, dangerous voltages are present on all voltage-controlled product parts as well as any cables and terminals that are connected. This also applies even when the product is inhibited and the motor is in an idle state. Do not touch the components during operation.

If you disconnect the product from the voltage supply, do not touch any live components or power connections because capacitors might still be charged. Observe the following minimum switch-off time:

10 minutes.

Observe the corresponding information signs on the product.

The fact that the operation or display elements are no longer illuminated does not indicate that the product has been disconnected from the supply system and no longer carries any voltage.

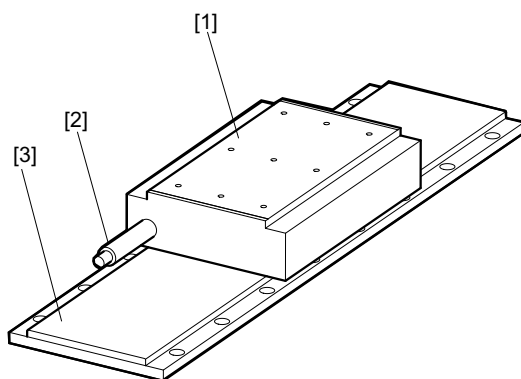
Mechanical blocking or internal protective functions of the product can cause a motor standstill. Removing the cause of this problem or performing a reset can result in the machine or the system re-starting on its own. First, disconnect the product from the supply system before you start troubleshooting.

Risk of burns: The surface temperature of the product can exceed 60 °C during operation. Do not touch the product during operation. Let the product cool down before touching it.

3 Motor structure

3.1 Product designs

3.1.1 SL2-Basic



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

Description

The SL2-Basic linear motor consists of the main components primary and secondary. Further components such as e.g. a motor cooling unit are not installed.

The SL2-Basic is available in the following sizes:

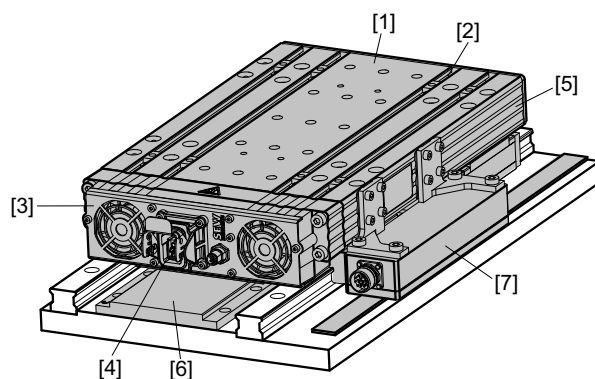
- SL2-P025
- SL2-P050
- SL2-P100
- SL2-P150
- SL2-P200
- SL2-P250

The lengths VS, S, M, ML are not available for all sizes. For available assignments, refer to chapter "SL2-Basic motor data".

Areas of application

In general, no restrictions for the use of SL2-Basic linear motors exist. The compact design makes this linear motor suitable for even applications with very limited space.

3.1.2 SL2-Advance System



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- [1] Motor cooling unit motor option
- [2] Prepared grooves as the fastening system for installation by the customer
- [3] Forced cooling fan for motor cooling unit¹⁾
- [4] Electrical connector
- [5] Primary (not visible) mounted in motor cooling unit
- [6] Secondary
- [7] Linear encoder

1) in SL2-Power System only

Description

The SL2-Advance System product group consists of the primaries, which are installed in a motor cooling unit at the factory, and secondaries.

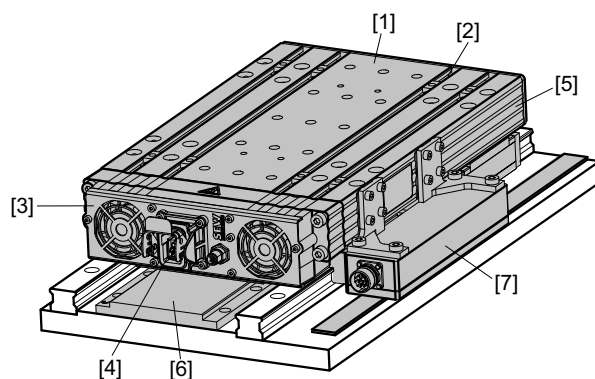
With the following motor sizes the motor cooling unit is available for all lengths (except for SL2-P150VS) as system components:

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

Areas of application

Can generally be used for all areas of application of the SL2 linear motor. There are no restrictions.

3.1.3 SL2-Power System



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- [1] Motor cooling unit motor option
- [2] Prepared grooves as the fastening system for installation by the customer
- [3] Forced cooling fan for motor cooling unit¹⁾
- [4] Electrical connector
- [5] Primary (not visible) mounted in motor cooling unit
- [6] Secondary
- [7] Linear encoder

1) in SL2-Power System only

Description

The SL2-Power System product group consists of the primaries, which are installed ex works in a motor cooling unit with forced cooling fan, and secondaries.

With the following motor sizes the motor cooling unit is available for all lengths (except for SL2-P150VS) as system components:

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

Areas of application

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

3.1.4 Design of the subsystems

At SEW-EURODRIVE, the motor is installed in the motor cooling unit and connected to a standardized power connector. When the SL2-Power design is used, the 24 V supply of the fans is routed via a separate connector.

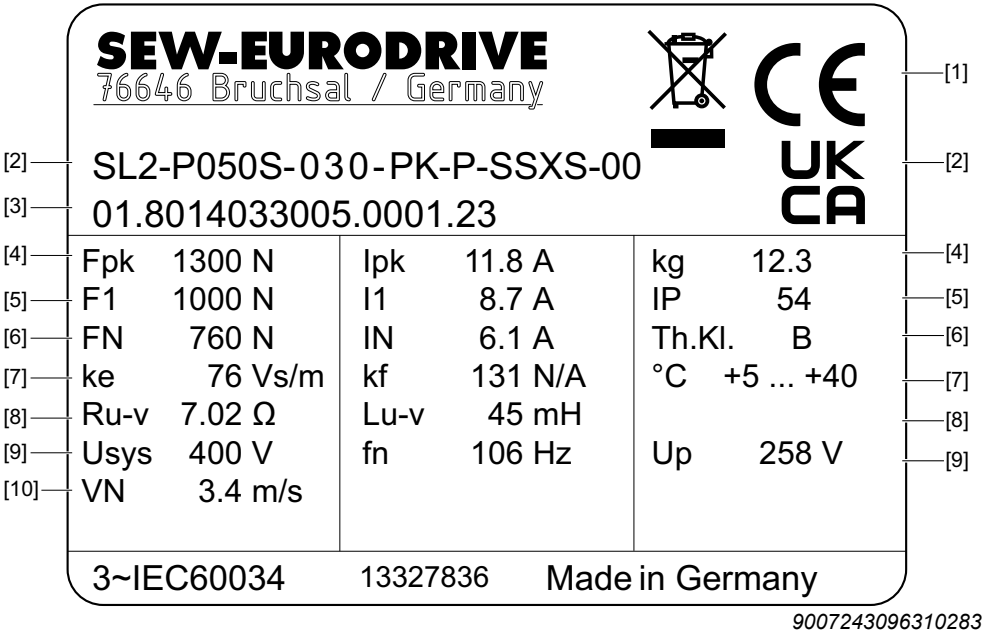
3.2 Type designation

The following table shows an example of a type designation:

SL2-P050S-030-PK-P-SSXS-00	
SL2	Motor series
P	Primary section
050	Motor size
S	Motor length
030	Speed class
PK	Temperature sensor
P	Motor design
SSXS	Connection variant
00	Design

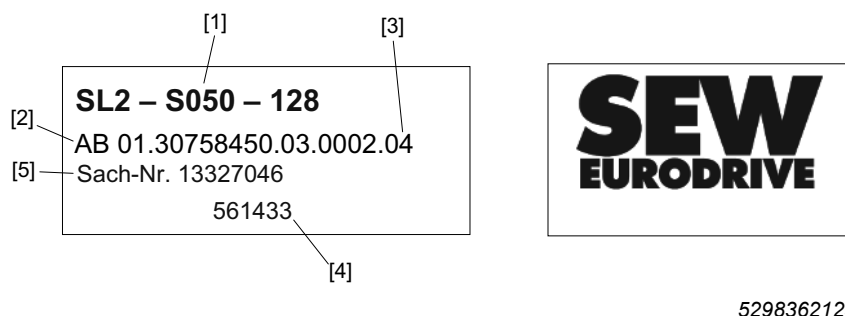
3.3 Nameplate

The following figure shows an example of the nameplate of the SL2 linear motor:



Line	Information
[1]	Mark
[2]	- Type designation - Mark
[3]	Serial number
[4]	- Peak feed force - Maximum permitted current - Mass
[5]	- Maximum permitted force available up to V₁ - Maximum permitted current at F₁ - Degree of protection according to IEC 60034-5
[6]	- Rated force - Rated current - Thermal class
[7]	- Voltage constant - Force factor - Permitted ambient temperature range
[8]	- Winding resistance - IE class
[9]	- DC link voltage - Rated frequency - Internal voltage
[10]	Rated speed

3.3.1 Label of the secondary



- [1] Type code
- [2] Serial number
- [3] Year of manufacture
- [4] Production number
- [5] Part number

3.4 Scope of delivery

3.4.1 Included in the scope of delivery

The scope of delivery of SL2 linear motors includes the following:

- Primaries
- Secondaries with permanent magnets

Additionally available as an option:

- Prefabricated power and encoder cables
- Control and regulation systems
- Linear encoders
- Encoder mount-on components

3.4.2 System components for the SL2 linear motor

The SL2 linear motor consists of the following system components:

- SL2-Basic
 - Primary
 - Secondary
- SL2-Advance System
 - Primary mounted in motor cooling unit
 - Secondary
 - Electrical connectors
 - T-slot nuts
- SL2-Power System
 - Primary mounted in motor cooling unit
 - Secondary

- Electrical connectors
- Forced cooling fan mounted and electrically wired
- T-slot nuts

4 Transportation and storage

4.1 Transport

Regarding transport, observe the safety notes in chapter "Danger due to magnetic fields".

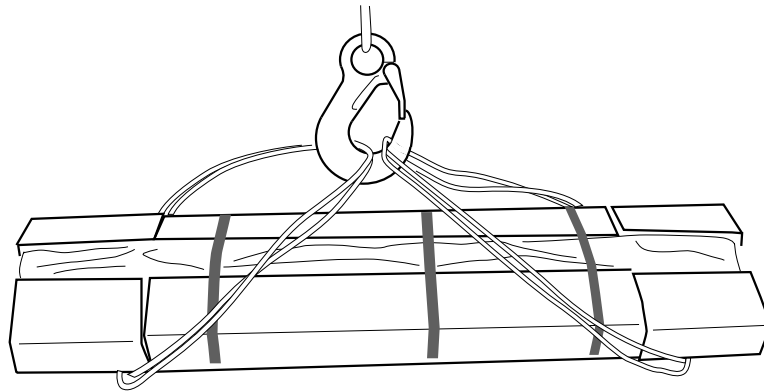
4.1.1 Primaries of SL2-Basic

Primaries of the SL2-Basic with a net weight of more than 18 kg are equipped with the following transportation aids:

- SL2-P100M/ML
- SL2-P150S/M/ML
- SL2-P200S/M/ML
- SL2-P250VS/S/M/ML

Packaged primary

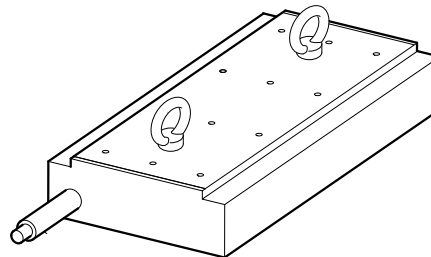
- Only transport the packaged primary using the attached crane sling.
- The weight of the primary is indicated on the nameplate or the dimension sheet.



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Unpacked primary

- The primary has 2 M6 threads designated for lifting eyebolts (not included in the delivery) for transportation.



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4.1.2 Primaries of SL2-Advanced System and SL2-Power System

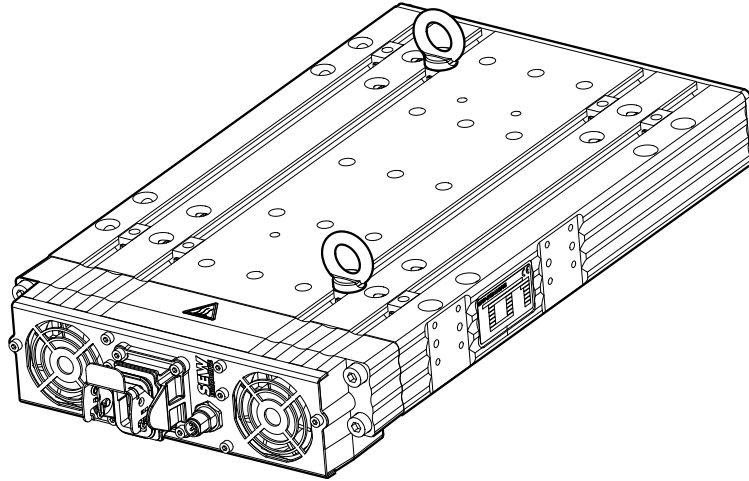
The following primaries of the SL2-Advanced System and SL2-Power System with a net weight of more than 18 kg can be removed from the box using a lifting device:

- SL2-P050M/ML

- SL2-P100S/M/ML
- SL2-P150S/M/ML

Unpacked primary

- The T-slot nuts on the motor cooling unit are equipped with two M8 lifting eyebolts (not included in the delivery) for transportation.



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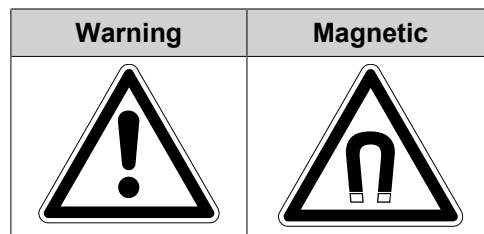
4.2 Storage and corrosion protection

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 indoors.
- The storage location must be clean and dry.
- The storage temperature should be between -5 °C and +70 °C.
- The humidity must not exceed 95%.
- The original packaging must not be damaged.

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



4.3 Return delivery to SEW-EURODRIVE

When returning secondaries, make sure that there is sufficient distance between the magnetic components. Separate the secondary using non-magnetic plates of at least 40 mm.

If possible, use the original packaging from SEW-EURODRIVE.

5 Mechanical installation

5.1 Before you start

Only install the device if the following conditions are met:

- The drive is undamaged (no damage caused by transportation or storage).
- All transport protection has been removed.
- Ambient temperature is as specified on the nameplate.

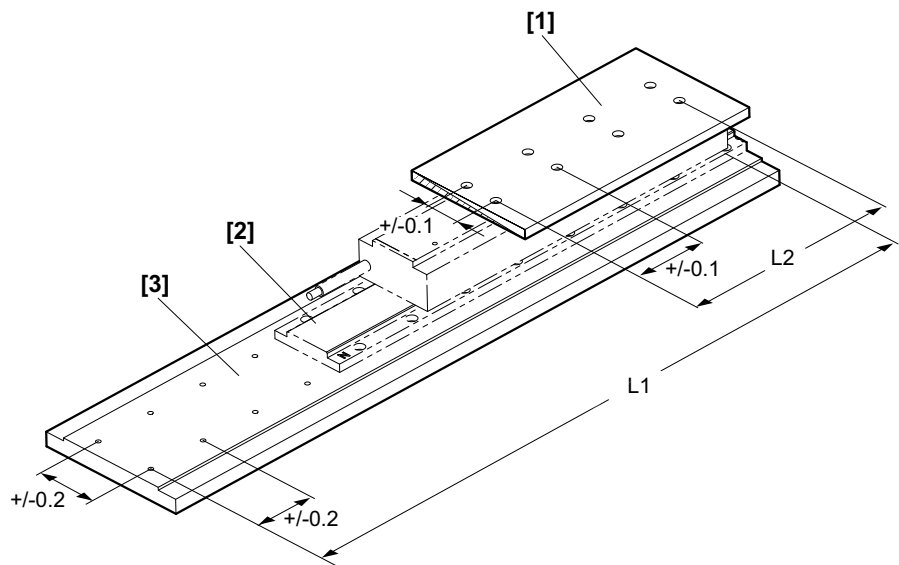
Note that the temperature range of the mounted gear unit might also be restricted (see operating instructions of the gear unit).

- You have ensured that there are no oils, acids, gases, vapors, radiation, etc. present.

Observe the safety notes in chapter "Danger due to magnetic fields" as well as the following points:

- Install the secondaries after having completed all other mounting work and directly before starting up the drive to avoid the risk of crushing.
- Only remove the packaging of the secondary immediately prior to mounting it.
- Cover the permanent magnets with a non-magnetizable material such as wood for as long as possible.
- Use customized installation aids to facilitate and safeguard mounting work.
- Make sure that the primary is grounded according to regulations with the PE ground busbar in the control cabinet as the reference potential.

5.2 Tolerances



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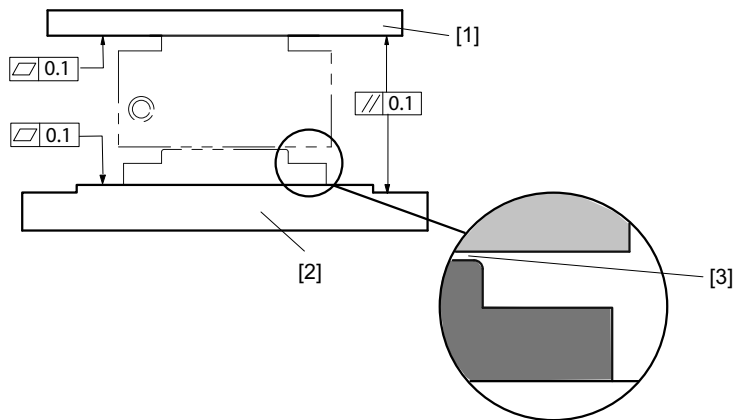
- | | | |
|-----|-------------------|--|
| [1] | Primary carrier | Max. deflection length/width 0.1 mm, referring to the largest primary |
| [2] | Secondary | Max. deflection 0.1 mm, referring to a length of 512 mm |
| [3] | Secondary carrier | L1 ± 0.3 mm, with reference to the total length
L2 ± 0.2 mm, with reference to the total length |

Air gap

INFORMATION



If the customer's structure is not stiff enough to meet the tolerances, SEW-EURODRIVE recommends increasing the air gap. Observe the derating as described in chapter "Derating".



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- | | |
|-----|---|
| [1] | Primary carrier (mounting plate) |
| [2] | Secondary carrier (base body, e.g. machine bed) |
| [3] | Air gap |

Form and position tolerances

The shape and position tolerances must be observed for the correct function of the SL2 linear motor, see also the figure above. Depending on the linear encoder used, differing dimensions and tolerances may be necessary with regard to the mount-on components. These tolerances regarding dimensions and positions are sufficient for the functionality of the encoder systems from SEW-EURODRIVE.

In the operating state at the steady-state temperature of the SL2 linear motor, these dimension and position tolerances must be observed. Also consider the influence of loads on the customer side.

5.3 Orientation of the system components

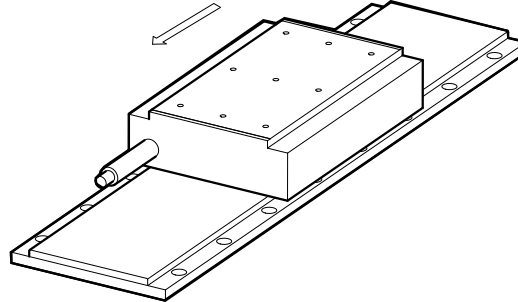
To ensure the proper functioning of the SL2 linear motor system, observe the following orientations of SL2 primaries with regard to the measuring system components.

Observe the direction arrows in the following illustrations!

If the orientation is incorrect, failures can occur during electronic startup and during operation!

5.3.1 SL2-Basic**Definition of the direction of movement**

The primary of the SL2-Basic moves toward the cable output if the cores are connected to the primary in the order U-V-W.



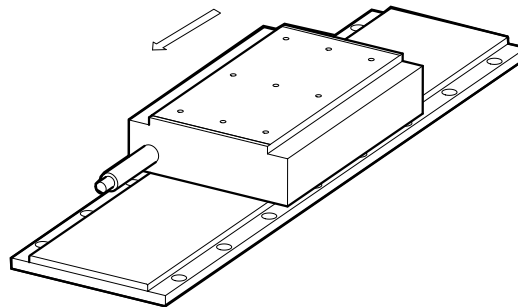
SL2-Basic

57058747915

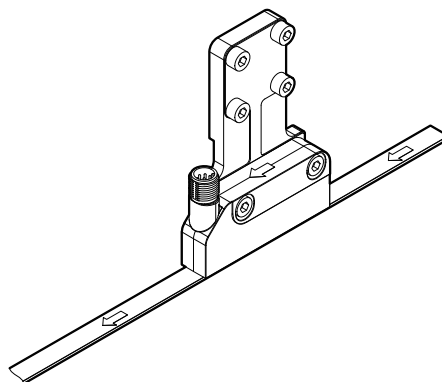
Orientation of the system components with respect to each other with measuring system

Note the arrows in the following illustrations. The arrows describe the positive direction of travel.

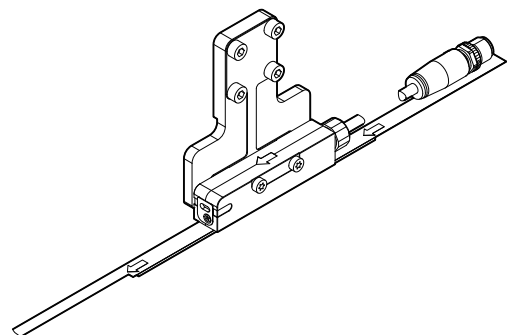
Basic



AL2H/AL3H



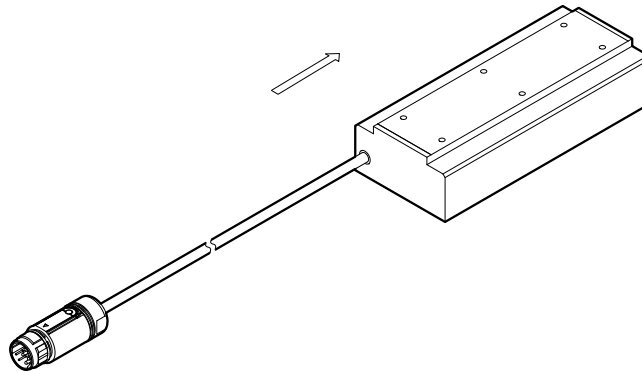
AL3Y



5.3.2 SL2-Basic connector design AVX0

Definition of the direction of movement

The primary of the SL2-Basic in connector design AVX0 moves toward the cable output if the primary is connected according to the wiring diagram from SEW-EURODRIVE.

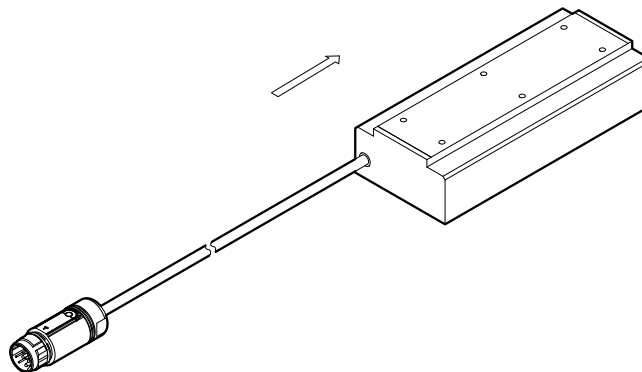


57058758667

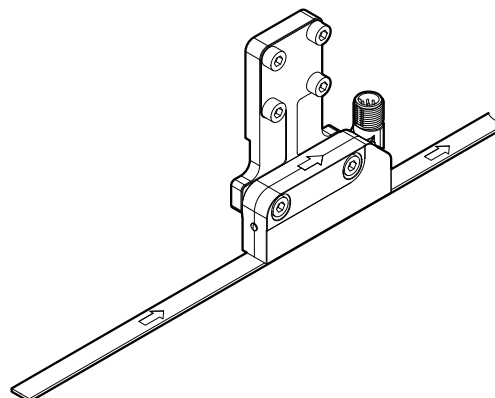
Orientation of the system components with regard to each other with measuring system

Note the arrows in the following illustrations. The arrows describe the positive direction of travel.

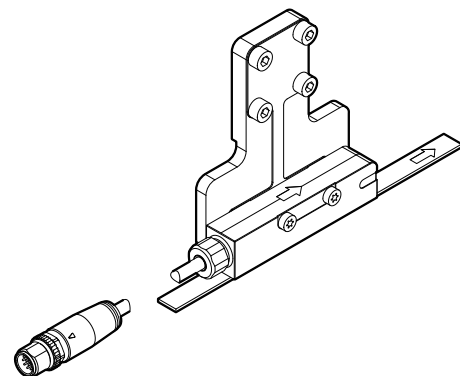
Basic AVX0



AL2H/AL3H

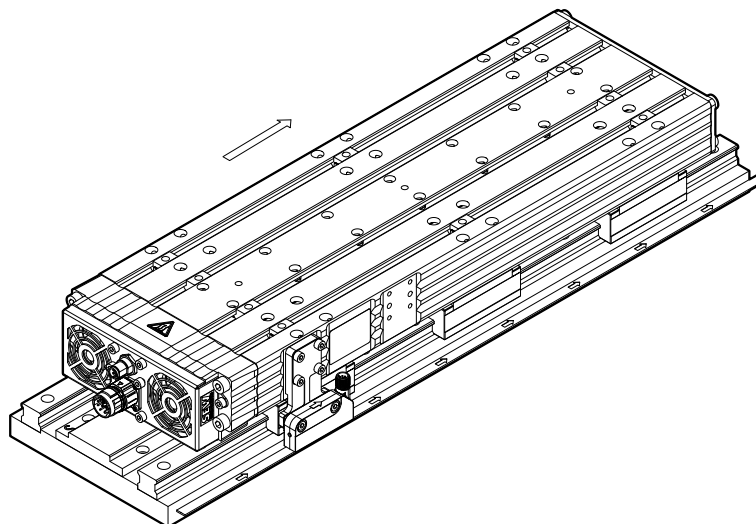


AL3Y



5.3.3 SL2-Advance/Power with measuring system**Definition of the direction of movement**

The primaries of SL2-Advance/Power move in the opposite direction of the connector side if the primaries are connected according to the wiring diagram from SEW-EURODRIVE.

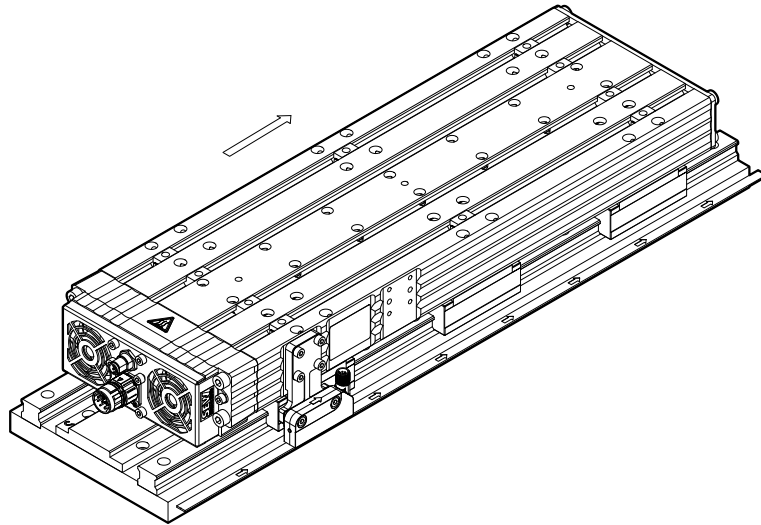


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Orientation of the system components with regard to each other with measuring system

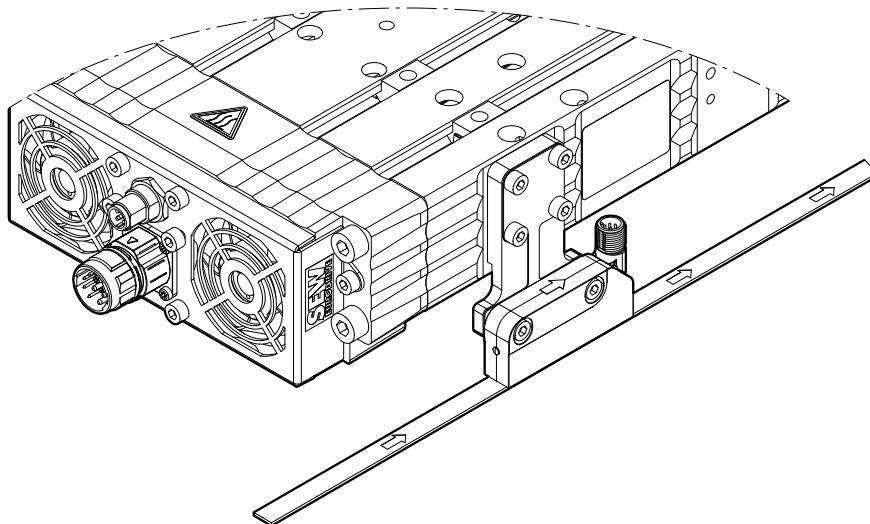
Note the arrows in the following illustrations. The arrows describe the positive direction of travel.

Advance/Power



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AL2H/AL3H

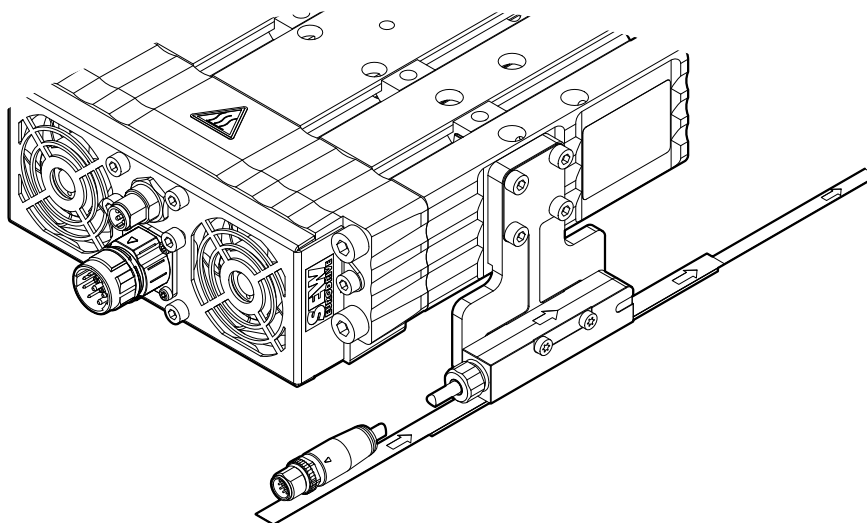


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5 Mechanical installation

Orientation of the system components

AL3Y



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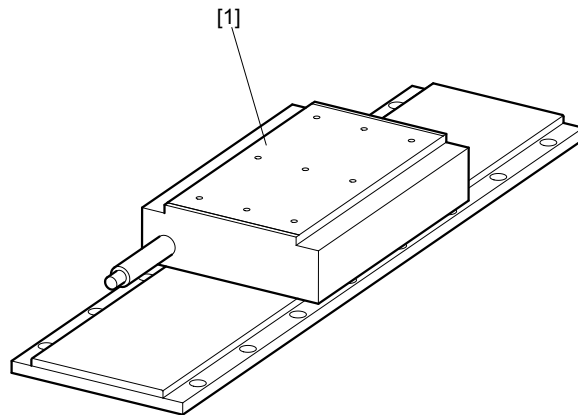
5.4 Installation of the SL2-Basic

INFORMATION



First, install the primary. Install the secondaries directly before starting up the drive and after having completed all other mounting work.

5.4.1 Preparing the SL2-Basic primary for installation



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Mounting surfaces [1]:

The mounting surfaces of the primary are treated with an anti-corrosion agent at the factory. The anti-corrosion agent must not be removed.

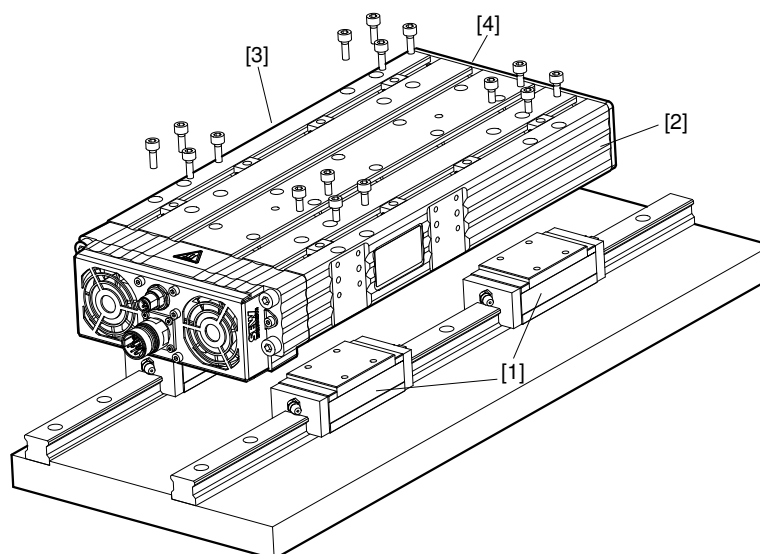
Prior to installation, only lightly wipe the surface with a lint free cloth to remove any dust, dirt, etc.

Retaining screws:

All M5 tapped holes in the mounting surface must be used for fastening. Use screws of size M5, strength class 8.8 or higher. The minimum depth of engagement is $7 + 1$ mm.

The tightening torque is always 6 Nm and must not be exceeded even when using screws of a higher strength class.

5.5 Installation of the SL2-Advanced System and SL2-Power System



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- [1] Guide carriage
- [2] Locating bearing side
- [3] Non-locating bearing side
- [4] End plate

The SL2-Advance System and the SL2-Power System are fastened onto the guide carriages [1] with screws. Bores for cylinder screws to DIN EN ISO 4762 on the primary housing are intended for this purpose (screws are not included in the scope of delivery).

This screw connection essentially determines the mechanical load capacity of the primary. Only use screws in strength class 8.8.

The maximum surface pressure of 230 N/mm^2 below the screw head must not be exceeded. The friction coefficient μ_{head} beneath the screw head is 0.15.

Type	Bearing side	Screw size	Tightening torque Nm	Number of screws for respective primary length			
				VS	S	M	ML
SL2-050	Locating bearing side [2]	M6×12	10	8	8	12	12
	Non-locating bearing side [3]	M6×16	10	8	8	12	12
SL2-100	Locating bearing side [2]	M8×16	20	8	8	12	12
	Non-locating bearing side [3]	M8×20	20	8	8	12	12
SL2-150	Locating bearing side [2]	M8×16	20	-	8	8	12
	Non-locating bearing side [3]	M8×20	20	-	8	8	12

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5.5.1 Prerequisite for assembly

First assemble the guide system including the guide carriage according to the manufacturer's specifications. Especially observe the requirements regarding accuracy of the mounting surfaces, see chapter "Tolerances" (→  29).

5.5.2 Installing the primary

1. Wipe the surface of the primary lightly with a lint free cloth to remove any dust, dirt, etc.
2. Align the guide carriages [1] on the guide rails (see figure on the previous page) so that the primary can be installed.
3. Place the primary onto the guide carriages [1]. Use suitable hoists for heavy components, see chapter "Transportation and storage" (→  25).
4. Insert all screws for fastening the primary to the guide carriages [1]. The screws need not be greased or lubricated.

INFORMATION



Use a magnetic hexagon socket tool to insert the screws. They prevent screws from falling out in unfavorable mounting positions. If screws fall inside the primary housing, it is essential that you remove them. The end plate [4] can be removed for easier access (see illustration on the previous page).

5. First tighten the screws at the locating bearing end [2] in accordance with the tightening torque (see table on the previous page).
6. Then tighten the screws on the non-locating bearing end [3].

5.6 Installation of secondaries

5.6.1 Installation preparation

Only unpack the individual parts immediately prior to installation.

Preparing installation of secondaries size 050-200

First prepare the M6 retaining threads in the machine base to install the secondaries.

Preparing installation of secondaries size 250

When installing size SL2-S 250, additional parallel pins are required. For this purpose, pin holes with a bore diameter of 5 H7 mm must be created in the machine base. Observe a distance tolerance of ± 0.02 mm for the bores.

Use parallel pins according to ISO 2338-5m6 for pinning.

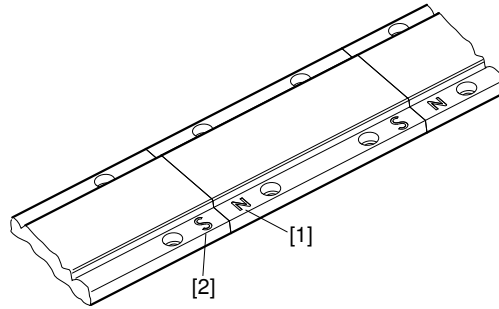
In case of blind holes, using parallel pins with female thread is recommended, so that the pins can be removed easier.

The mounting surfaces of the secondary are treated with an anti-corrosion agent at the factory. The anti-corrosion agent must not be removed. Prior to installation, only lightly wipe the surface of the primary with a lint-free cloth to remove any dust, dirt, etc.

5.6.2 Installation

The first secondary is mounted at the end of the travel distance and then proceeds in another direction. The first part can be oriented in any way. The part next to it must be oriented in the same way.

The north pole [1] (N) and the south pole [2] (S) are marked on the secondaries (see figure below). Secondaries in all different lengths can be combined with each other.



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[1] North pole

[2] South pole

All bores of the secondary must be used for fastening. For this purpose, use screws of size M6 and strength class 8.8 or higher.

The screw-in depth and the tightening torque (generally 10 Nm) depend on the customer's support structure.

Move primary over secondaries by hand prior to startup of drive to check for un-hindered operation.

Use non-magnetic testing devices, such as feeler gauges made of stainless steel, aluminum, brass or copper sheets if you are planning to check the visible air gap.



⚠ DANGER

Risk of injury due to electric shock.

Severe or fatal injuries.

Induced voltages of up to 500 V at the primary's power connector can be generated by movement of the primary (generator principle) even if the motor is not connected.

- Only remove the protection cap on the power connector of the primary immediately before connecting the power connector to the power supply.

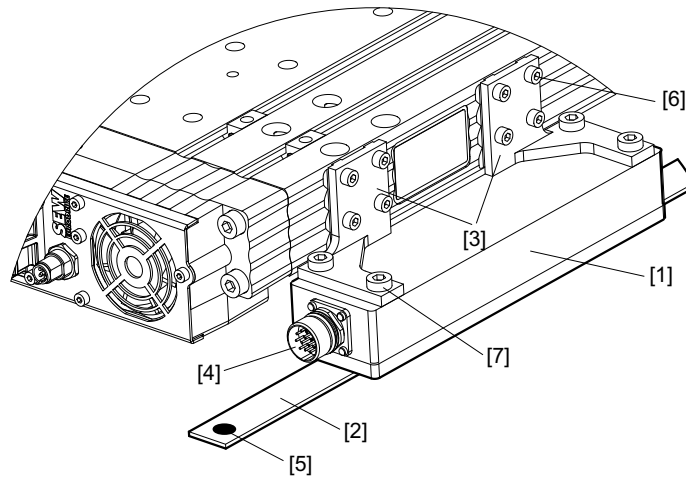
5.7 Installing the AL1H linear encoder (discontinued)

INFORMATION



Observe the assembly instructions by the encoder system manufacturer.

When installing the measuring tape [2], make sure that the end identified by a dot [5] is stuck on in the direction of the connector [4].



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- [1] Linear sensor
- [2] Measuring tape
- [3] Encoder mount-on components
- [4] Linear sensor connection
- [5] Identification of the installation direction of the measuring tape
- [6] Screw for primary housing/mount-on components
- [7] Screw for linear sensor/mount-on components

Use any non-magnetic stainless steel screws M8×20 for screwing the mount-on components [7] to the linear sensor. Tighten the screws with a tightening torque of 16 Nm.

To fasten the mount-on components [6] to the primary housing, fasten the M5×12 screws using a tightening torque of maximum 5 Nm.

NOTICE



Strong magnetic fields at the magnetic tape

Damage to property

- Do not bring the magnetic tape into contact with secondaries.

NOTICE



External magnetic fields should not exceed 64 mT (640 Oe; 52 kA/m) on the surface of the measuring element, as this can destroy the coding on the measuring element. Magnetic fields > 1 mT on the linear encoder influence the measuring accuracy.

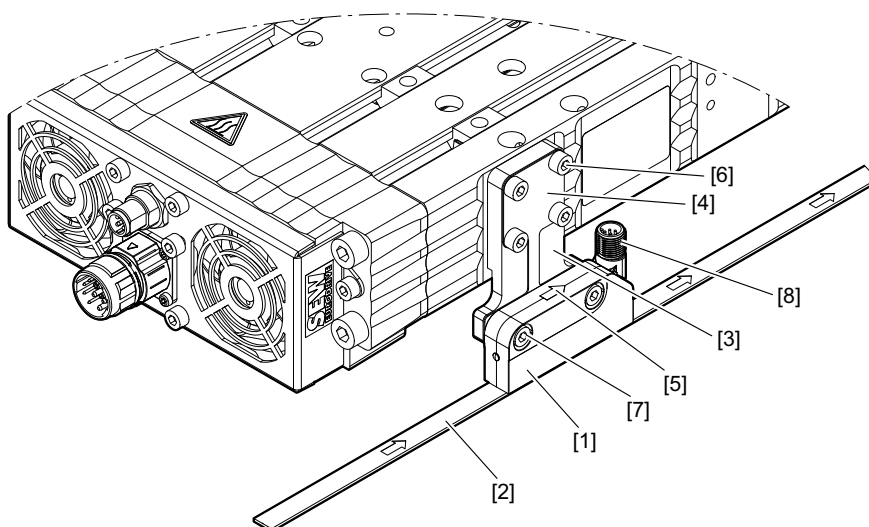
5.8 Installing linear encoders AL2H and AL3H

INFORMATION



Observe the assembly instructions by the encoder system manufacturer.

During installation, make sure that the linear sensor [1] is attached as depicted in the following figure. Also make sure that the travel direction [5] specified on the measuring tape [2] and on the linear sensor match.



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- [1] Linear sensor
- [2] Measuring tape
- [3] Mounting plate
- [4] Shield plate
- [5] Mark the positive counting direction
- [6] M5x14 screws
- [7] Screws
- [8] Linear sensor connection

1. Position the shield plate [4] between linear encoder [1] and mounting plate [3].
2. Tighten the M5x14 screws with a tightening torque of 5 Nm $\pm$ 10%.

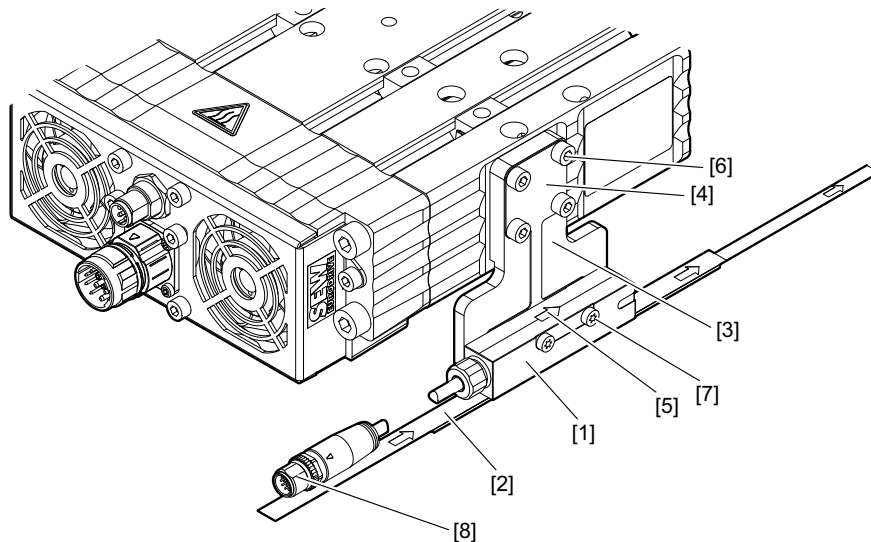
5.9 Installing the AL3Y linear encoder

INFORMATION



Observe the assembly instructions by the encoder system manufacturer.

During installation, make sure that the linear sensor [1] is attached as depicted in the following figure. Also make sure that the travel direction [5] specified on the measuring tape [2] and on the linear sensor match.



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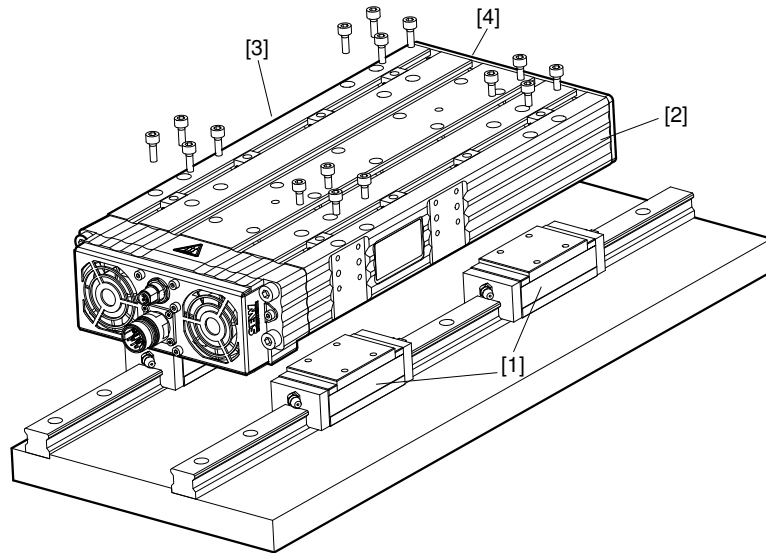
- [1] Linear sensor
- [2] Measuring tape
- [3] Mounting plate
- [4] Shield plate
- [5] Mark the positive counting direction
- [6] M5x14 screws
- [7] Screws
- [8] Linear sensor connection

1. Position the shield plate [4] between linear encoder [1] and mounting plate [3].
2. Tighten the M4x20 screws with a tightening torque of 2 Nm $\pm$ 10%.

5.10 Installation of customer components on primary

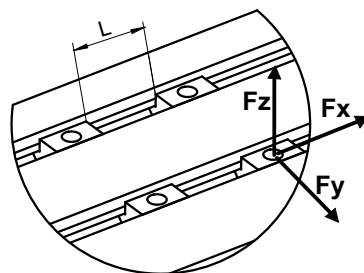
For the purpose of mounting parts supplied by the customer, the primary housing comes ready equipped ex works with T-slot nuts. If required, the distribution of the T-slot nuts within the primary housing can be adapted.

Remove the end plate [4], push the t-slot nuts with the springs into the desired groove, and screw the end plate back on.



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- [1] Guide carriage
- [2] Locating bearing side
- [3] Non-locating bearing side
- [4] End plate



Permitted static load on the groove:

- In direction F_z 12000 N
- In direction F_x 1000 N
- In direction F_y 1000 N

INFORMATION



Rule of thumb: 1000 N ($\approx$ 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 installed T-slot nuts	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 facilitate the installation/removal of customer add-on components, each cooling unit has pin bores for positioning. Additionally, the T-slot nuts are secured against displacement.

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. Customer load cases and the design of the mount-on components must be taken into consideration.

In general, the permitted load on the primary is limited by the screw itself.

6 Electrical installation

6.1 Before you start

- Observe the 5 safety rules before commencing the work: Disconnect. Secure the device against a restart. Check that no voltage is applied. Ground and short-circuit it. Cover or cordon off neighboring live parts.
- Secure the motor against unintended power-up.
- Let the unit cool down sufficiently before you start working on it.
- Repairs or modifications to the product may only be performed by trained specialists. Contact SEW-EURODRIVE Service when performing work on the unit.
- In the case of inverter supplied motors, observe the wiring instructions issued by the inverter manufacturer.

Observe the safety notes in chapter "Danger due to magnetic fields" as well as the following points:

- Make sure that the primary is grounded according to regulations with the PE ground busbar in the control cabinet as the reference potential.

6.2 Design of the subsystems

At SEW-EURODRIVE, the motor is installed in the motor cooling unit and connected to a standardized power connector. When the SL2-Power design is used, the 24 V supply of the fans is routed via a separate connector.

6.3 SL2-Basic electrical connection

INFORMATION



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

Cable extension type	1	2	3	4
Outer diameter in mm	9.2	10.8	13	17.5
Cores	4 x 1.5 + 1 x 2 x 0.5	4 x 2.5 + 1 x 2 x 0.5	4 x 4 + 1 x 2 x 1	4 x 6 + 1 x 3 x 1.5
Current-carrying capacity in A at ambient temperature 30 °C	18	26	34	44
Current-carrying capacity in A at ambient temperature 40 °C	16	23	30	40
Current-carrying capacity in A at ambient temperature 60 °C	12	17	24	31
Minimum bending radius in mm for fixed installation	20	22	26	53
Minimum bending radius in mm for cable carrier installation	92	110	130	175

Cable extension type	1	2	3	4
Identification	Power			
Phase U	BK (1)	BK (1)	BK (1)	BK (U/L1)
Phase V	BK (2)	BK (2)	BK (2)	BK (V/L2)
Phase W	BK (3)	BK (3)	BK (3)	BK (W/L3)
Protective earth	GNYE	GNYE	GNYE	GNYE
Temperature sensor identification	TF			
PTC 140/TF 1	WH	WH	WH	BK (1) ¹⁾
PTC 140/TF 2	BN	BN	BN	BK (2) ¹⁾
Temperature sensor identification	KY (discontinued)			
KTY84 – 130/Anode (-)	WH	WH	WH	BK (1) ¹⁾
KTY84 – 130/Anode (+)	BN	BN	BN	BK (2) ¹⁾
Temperature sensor identification	PK			
Pt1000/WH	WH	WH	WH	BK (1) ¹⁾
Pt1000/YE	BN	BN	BN	BK (2) ¹⁾

1) Ground BK(3) on the control cabinet side

6.4 Pin assignment of the power connection for the SL2-Advanced System and SL2 -Power System

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

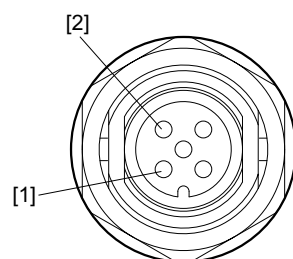
Size SL2-P050 and design AVX0

Contact	Connection	Plug connector
1	V	
4	V	
3	W	
2	PE	
A	TF1/KTY+/PK	
B	TF2/KTY-/PK	
C	n.c.	
D	n.c.	

Size SL2-P100, SL2-P150

Contact	Connection	Plug connector
U1	U1	
V1	V1	
W1	W1	
PE	Green/yellow	
3	n.c.	
4	(TF1)/KTY-/PK	
5	(TF2)/KTY+/PK	

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



- [1] +24 V
[2] Grounding

6.6 Encoder connection

Observe the following instructions when connecting an encoder:

- Only use a shielded cable with twisted pair conductors.
- 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 (minimum distance 200 mm).

6.7 Thermal motor protection

NOTICE

Thermal inertia at loads caused by high motor currents

Damage to property

- Use the KTY (discontinued) or PK temperature sensor to ensure continuous temperature monitoring.

INFORMATION



If you use a PK temperature sensor, contact SEW-EURODRIVE.

INFORMATION



In case you use a third-party inverter, consult SEW-EURODRIVE for the customer-provided thermal motor monitoring.

6.7.1 KTY84 - 130 temperature sensor (discontinued)



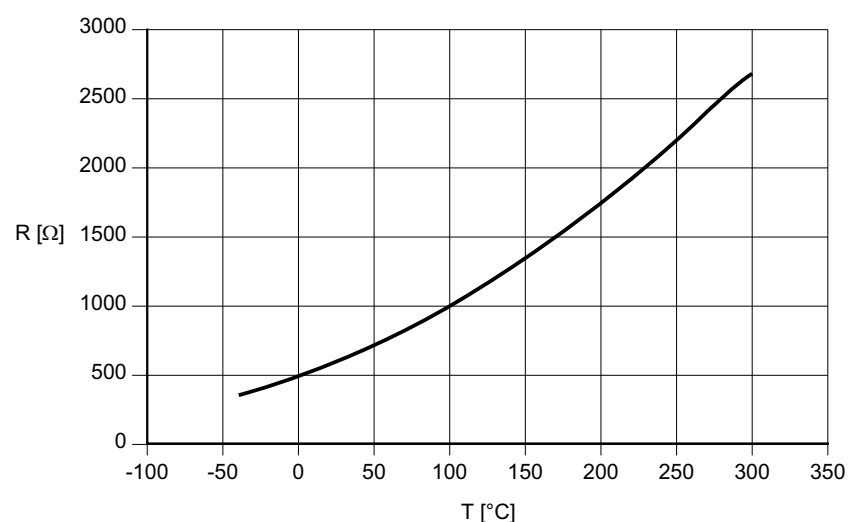
NOTICE

Excessive self-heating of the temperature sensor can damage the insulation of the temperature sensor as well as the motor winding.

Possible damage to property.

- Use test currents < 3 mA in the KTY circuit.

Typical characteristic curve of KTY:



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For detailed information on connecting the KTY sensor, refer to the contact assignments of resolver/encoder cables. Observe the correct polarity.

6.7.2 Pt1000 thermal motor protection

Type designation

/PK

Description

Thermal motor protection in combination with the corresponding evaluation electronics prevents the motor from overheating and consequently from being damaged. A temperature sensor provides only indirect protection as only one sensor value is determined.

The /PK motor design consists of a Pt1000 installed in one of the three motor windings. The Pt1000 has a nearly linear characteristic curve and a high level of accuracy. In combination with a frequency inverter containing the thermal model of the motor, the frequency inverter can also provide a motor protection function because of the /PK temperature sensor.

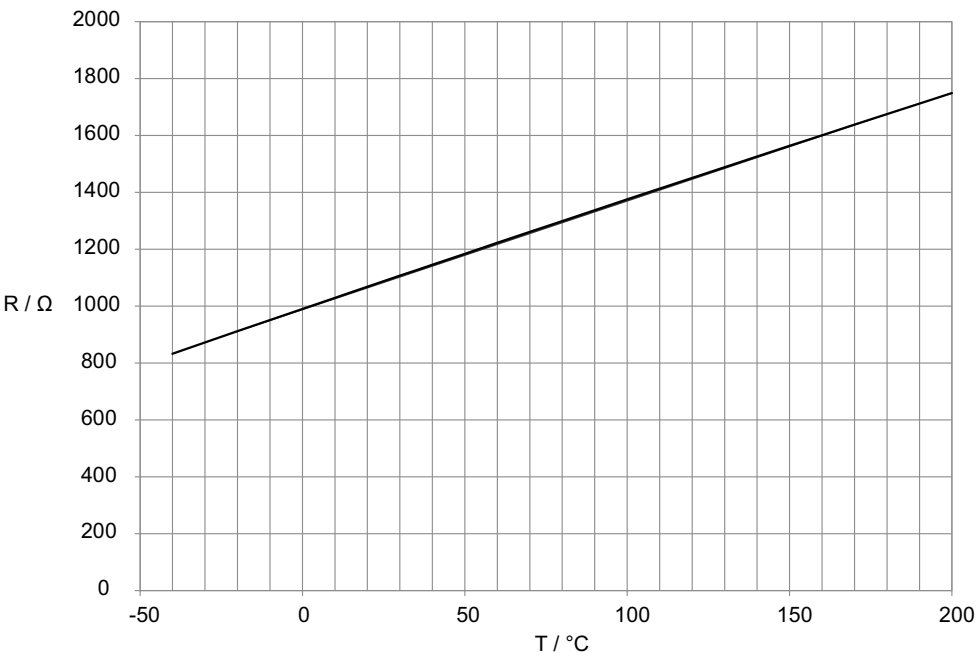
Technical data

The Pt1000 temperature sensor continuously detects the motor temperature.

	Pt1000
Connection	red – black
Total resistance at 20 – 25 °C	1050 Ω < R < 1150 Ω
Test current	< 3 mA

The temperature sensor is unipolar which means that interchanging the incoming cables does not change the measurement result.

Typical characteristic curve of Pt1000



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6.8 Switching equipment and safeguards

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

For the motors to be cooled sufficiently, they must be installed in such a way that there is sufficient clearance for unrestricted airflow.

The surface temperature may exceed 65 °C during operation. Therefore, preventive measures against unintentional touching must be taken.

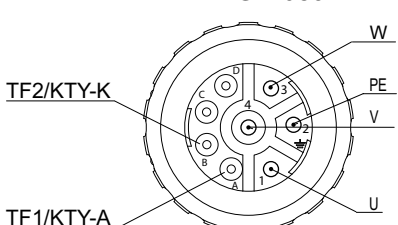
The motors are available with temperature detection (TF) to protect the motor winding against overheating. The motor windings are manufactured in thermal class B as standard.

Temperature probes are triggered at the maximum permitted winding temperature. The contacts of the temperature monitoring must be looped into the monitoring circuit of the motor.

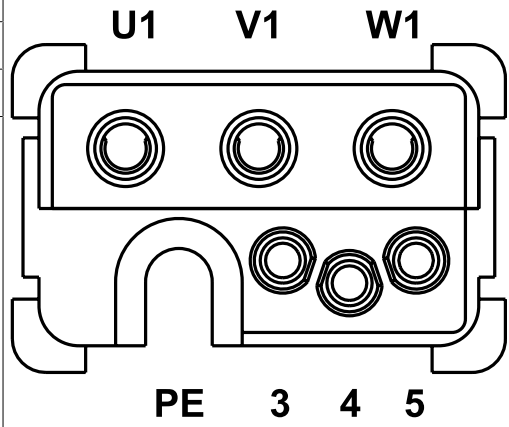
6.9 Pin assignment for the SL2-Advance System and SL2-Power System power connection

The following pin assignment is always described as viewed facing the motor.

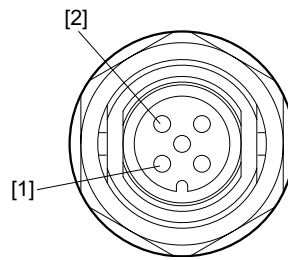
Size SL2-P050 and AVX0 design

Contact	Assigned	Connector
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	Connector
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	

6.10 Pin assignment for the SL2-Power System fan supply



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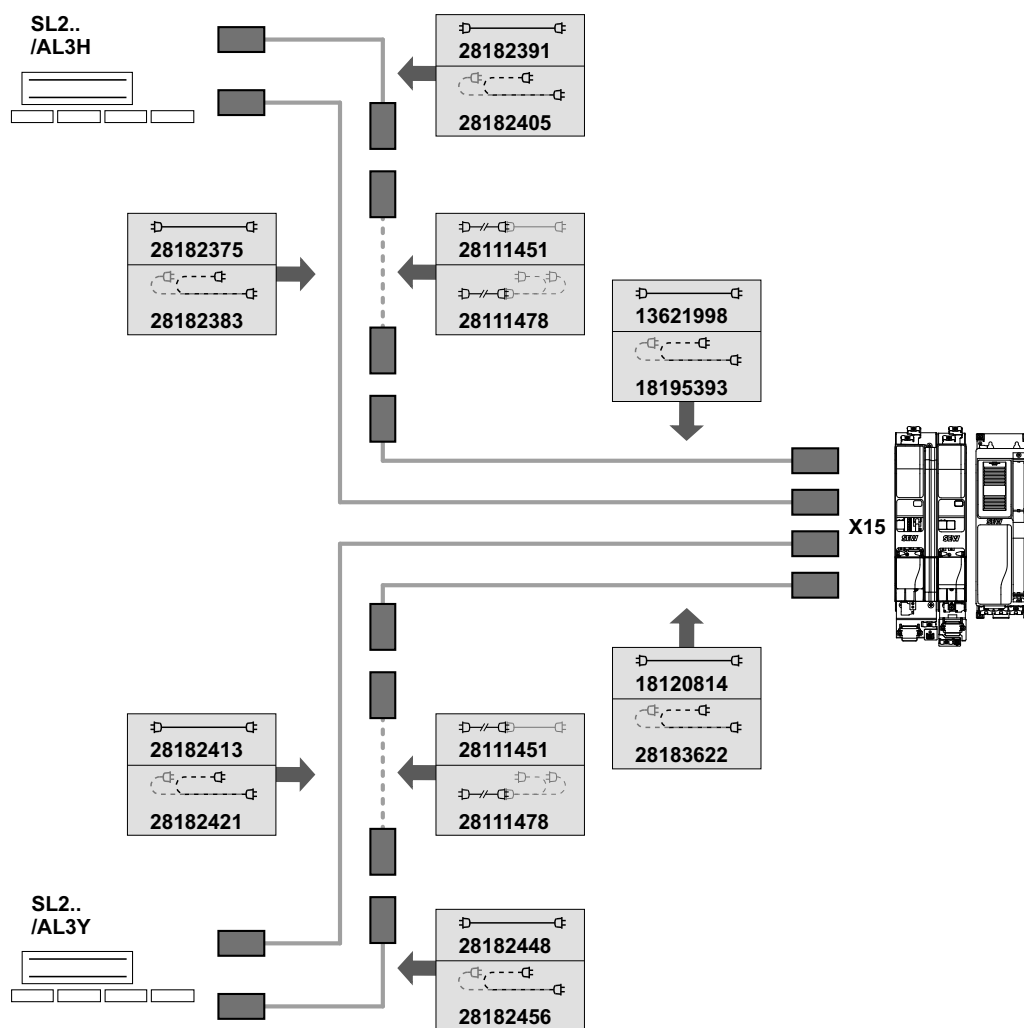
- [1] +24 V
- [2] Grounding

7 Connection technology

7.1 Key

Symbol	Meaning
	Fixed installation
	Cable carrier installation
	Cables with connector

7.2 Overview of encoder cables

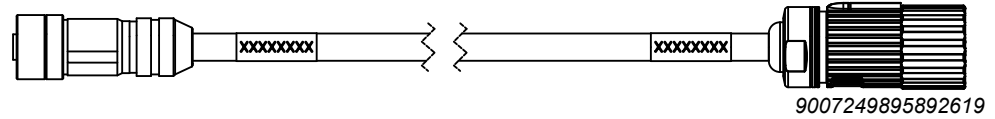


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7.3 Structure of encoder cables

7.3.1 AL3H encoder – M12, 8-pin to M23

Figure



Types

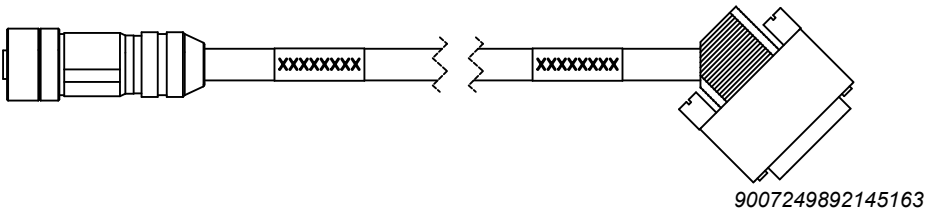
Design and cable cross section	Part number	Installation type	Encoder
4 × 2 × 0.25 (AWG 24) 2 × 0.5 (AWG 21)	28182391	Fixed installation	AL3H
4 × 2 × 0.25 (AWG 24) 2 × 0.5 (AWG 21)	28182405	Cable carrier installation	AL3H

Pin assignment for AL3H

Encoder connection				Encoder evaluation		
Connector view	Contact	Signal	Cable/ Core color	Signal	Contact	Connector view
M12, female, A-coded 	1	sin -	Green (GN)	sin -	6	M23, male, 0°-coded
	2	sin +	Yellow (YE)	sin +	5	
	3	cos -	Blue (BU)	cos -	4	
	4	cos +	Red (RD)	cos +	3	
	5	Data +	Black (BK)	Data +	8	
	6	Data -	Violet (VT)	Data -	7	
	7	GND	Pink (PK)	GND	11	
	8	V _B	Gray (GY)	V _B	12	
	—	—	Do not connect	—	1	
	—	—		—	2	
	—	—		—	9	
	—	—		—	10	

7.3.2 AL3H encoder – M12, 8-pin to D-Sub15

Figure



Types

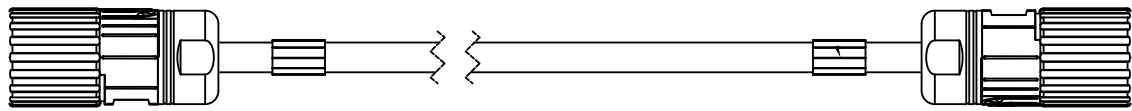
Design and cable cross section	Part number	Installation type	Encoder
4 × 2 × 0.25 (AWG 24) 2 × 0.5 (AWG 21)	28182375	Fixed installation	AL3H
4 × 2 × 0.25 (AWG 24) 2 × 0.5 (AWG 21)	28182383	Cable carrier installation	AL3H

Pin assignment for AL3H

Encoder connection				Encoder evaluation		
Connector view	Contact	Signal	Cable/ Core color	Signal	Contact	Connector view
M12, female, A-coded 	1	sin -	Green (GN)	sin -	10	D-sub15 male
	2	sin +	Yellow (YE)	sin +	2	
	3	cos -	Blue (BU)	cos -	9	
	4	cos +	Red (RD)	cos +	1	
	5	Data +	Black (BK)	Data +	4	
	6	Data -	Violet (VT)	Data -	12	
	7	GND	Pink (PK)	GND	8	
	8	V _B	Gray (GY)	V _B	15	
	—	—	Do not connect	—	3	
	—	—		—	5	
	—	—		—	6	
	—	—		—	7	
	—	—		—	11	
	—	—		—	13	
	—	—		—	14	

7.3.3 AL3H encoder – M23 to M23

Figure



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Types

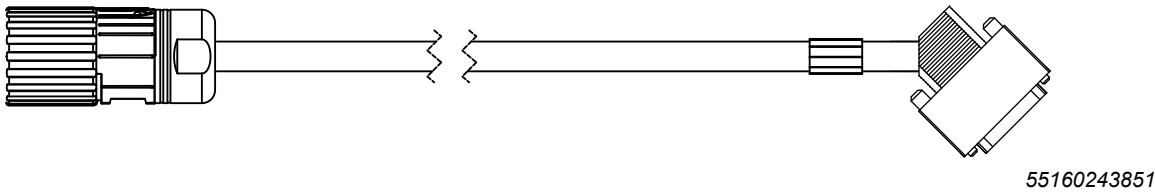
Design and cable cross section	Part number	Installation type	Encoder
5 × 2 × 0.25 (AWG 24) 2 × 0.5 (AWG 21)	28111451	Fixed installation	AL3H, AL3Y
5 × 2 × 0.25 (AWG 24) 2 × 0.5 (AWG 21)	28111478	Cable carrier installation	AL3H, AL3Y

Pin assignment for AL3H

Encoder connection				Encoder evaluation		
Connector view	Contact	Signal	Cable/ Core color	Signal	Contact	Connector view
M23 female 	1	Clock +	Brown (BN)	Clock +	1	M23 male
	2	Clock -	White (WH)	Clock -	2	
	3	cos +	Red (RD)	cos +	3	
	4	cos -	Blue (BU)	cos -	4	
	5	sin +	Yellow (YE)	sin +	5	
	6	sin -	Green (GN)	sin -	6	
	7	Data -	Violet (VT)	Data -	7	
	8	Data +	Black (BK)	Data +	8	
	9	Temp +	Gray-pink (GYPK)	Temp +	9	
	10	Temp -	Red-blue (RDBU)	Temp -	10	
	11	GND	Pink (PK)	GND	11	
	12	V _B	Gray (GY)	V _B	12	

7.3.4 AL3H encoder – M23 to D-Sub15

Figure



Types

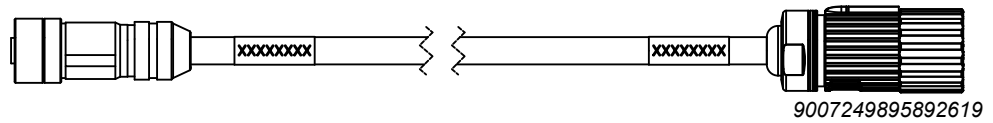
Design and cable cross section	Part number	Installation type	Encoder
5 × 2 × 0.25 (AWG 24) 2 × 0.5 (AWG 21)	13621998	Fixed installation	AL3H
5 × 2 × 0.25 (AWG 24) 2 × 0.5 (AWG 21)	18195393	Cable carrier installation	AL3H

Pin assignment for AL3H

Encoder connection				Encoder evaluation		
Connector view	Contact	Signal	Cable/ Core color	Signal	Contact	Connector view
M23 female 	1	Clock +	Brown (BN)	Clock +	3	D-sub15 male
	2	Clock -	White (WH)	Clock -	11	
	3	cos +	Red (RD)	cos +	1	
	4	cos -	Blue (BU)	cos -	9	
	5	sin +	Yellow (YE)	sin +	2	
	6	sin -	Green (GN)	sin -	10	
	7	Data -	Violet (VT)	Data -	12	
	8	Data +	Black (BK)	Data +	4	
	11	GND	Pink (PK)	GND	8	
	12	V _B	Gray (GY)	V _B	15	
	9	–	Do not connect	Temp+	5	
	10	–		Temp -	6	
	–	–		–	7	
	–	–		–	13	
	–	–		–	14	

7.3.5 AL3Y encoder – M12, 12-pin to M23

Figure



Types

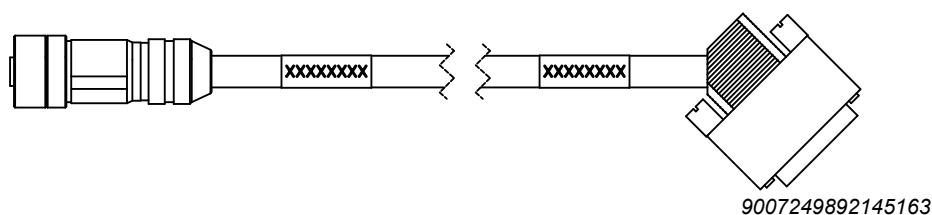
Design and cable cross section	Part number	Installation type	Encoder
5 × 2 × 0.25 (AWG 24)	28182448	Fixed installation	AL3Y
5 × 2 × 0.25 (AWG 24)	28182456	Cable carrier installation	AL3Y

Pin assignment for AL3Y

Encoder connection				Encoder evaluation		
Connector view	Contact	Signal	Cable/ Core color	Signal	Contact	Connector view
M12, female, A-coded	1	cos +	Red (RD)	cos +	6	M23, male, 0°-coded
	2	cos -	Blue (BU)	cos -	5	
	3	Clock +	Brown (BN)	Clock +	1	
	4	Clock -	White (WH)	Clock -	2	
	5	Data -	Violet (VT)	Data -	7	
	6	Data +	Black (BK)	Data +	8	
	7	GND	Pink (PK)	GND	11	
	8	V _B	Gray (GY)	V _B	12	
	9	sin -	Green (GN)	sin -	3	
	10	sin +	Yellow (YE)	sin +	4	
	11	–	Do not connect	–	9	
	12	–		–	10	

7.3.6 AL3Y encoder – M12, 12-pin to D-Sub15

Figure



Types

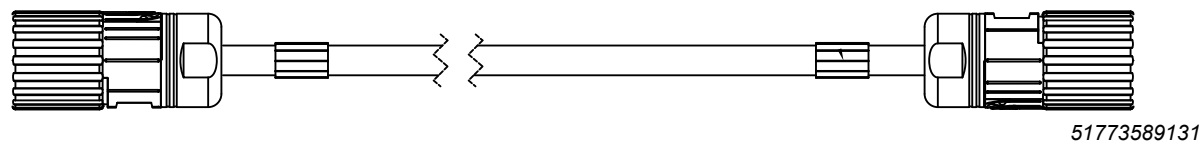
Design and cable cross section	Part number	Installation type	Encoder
5 × 2 × 0.25 (AWG 24)	28182413	Fixed installation	AL3Y
5 × 2 × 0.25 (AWG 24)	28182421	Cable carrier installation	AL3Y

Pin assignment for AL3Y

Encoder connection				Encoder evaluation		
Connector view	Contact	Signal	Cable/ Core color	Signal	Contact	Connector view
M12, female, A-coded 	1	cos +	Red (RD)	cos +	10	D-sub15 male
	2	cos -	Blue (BU)	cos -	2	
	3	Clock +	Brown (BN)	Clock +	3	
	4	Clock -	White (WH)	Clock -	11	
	5	Data -	Violet (VT)	Data -	12	
	6	Data +	Black (BK)	Data +	4	
	7	GND	Pink (PK)	GND	8	
	8	V _B	Gray (GY)	V _B	13	
	9	sin -	Green (GN)	sin -	1	
	10	sin +	Yellow (YE)	sin +	9	
	11	–	Do not connect	–	5	
	12	–		–	6	
	–	–		–	7	
	–	–		–	14	
	–	–		–	15	

7.3.7 AL3Y encoder – M23 to M23

Figure



Types

Design and cable cross section	Part number	Installation type	Encoder
5 × 2 × 0.25 (AWG 24) 2 × 0.5 (AWG 21)	28111451	Fixed installation	AL3H, AL3Y
5 × 2 × 0.25 (AWG 24) 2 × 0.5 (AWG 21)	28111478	Cable carrier installation	AL3H, AL3Y

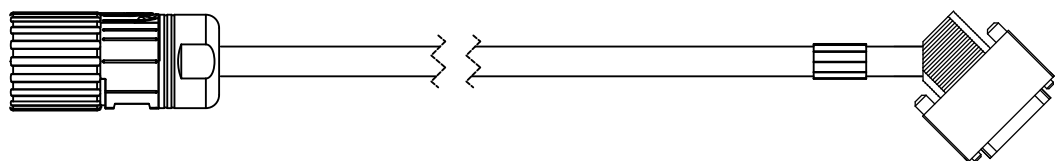
Pin assignment for AL3Y

Encoder connection				Encoder evaluation		
Connector view	Contact	Signal	Cable/ Core color	Signal	Contact	Connector view
M23 female	1	Clock +	Brown (BN)	Clock +	1	M23 male
	2	Clock -	White (WH)	Clock -	2	
	3	cos +	Red (RD)	cos +	3	
	4	cos -	Blue (BU)	cos -	4	
	5	sin +	Yellow (YE)	sin +	5	
	6	sin -	Green (GN)	sin -	6	
	7	Data -	Violet (VT)	Data -	7	
	8	Data +	Black (BK)	Data +	8	
	9	Temp +	Gray-pink (GYPK)	Temp +	9	
	10	Temp -	Red-blue (RDBU)	Temp -	10	
	11	GND	Pink (PK)	GND	11	
	12	V _B	Gray (GY)	V _B	12	

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7.3.8 AL3Y encoder – M23 to D-Sub15

Figure



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Types

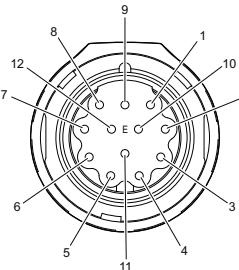
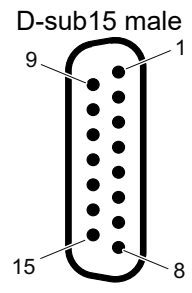
Design and cable cross section	Part number	Installation type	Encoder
6 × 2 × 0.25 (AWG 24) 2 × 0.5 (AWG 21)	18120814	Fixed installation	AL3Y
6 × 2 × 0.25 (AWG 24) 2 × 0.5 (AWG 21)	28183622	Cable carrier installation	AL3Y

Pin assignment for AL3Y – fixed

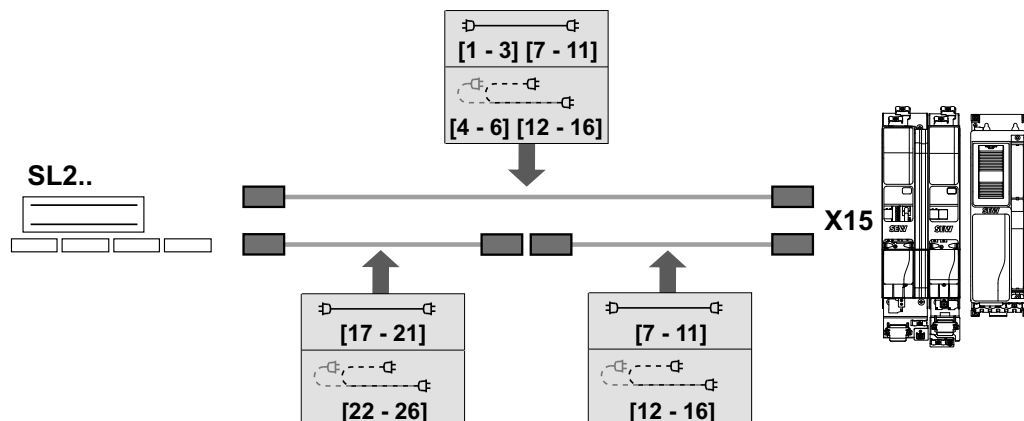
Encoder connection				Encoder evaluation		
Connector view	Contact	Signal	Cable/ Core color	Signal	Contact	Connector view
M23 female, 0°-coded	1	Data -	Brown (BN)	Clock -	3	D-sub15 male
	2	Data +	White (WH)	Clock +	11	
	3	cos +	Red (RD)	cos +	1	
	4	cos -	Blue (BU)	cos -	9	
	5	sin +	Yellow (YE)	sin +	2	
	6	sin -	Green (GN)	sin -	10	
	7	Clock -	Violet (VT)	Data -	12	
	8	Clock +	Black (BK)	Data +	4	
	11	GND	Gray-pink + pink (GY-PK+PK)	GND	8	
	12	V _B	Red-blue + gray (RD-BU+GY)	V _B	13	
	9	–	Do not connect	–	5	
	10	–		–	6	
	–	–		–	7	
	–	–		–	14	
	–	–		–	15	

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Pin assignment for AL3Y – cable carrier

Encoder connection				Encoder evaluation		
Connector view	Contact	Signal	Cable/ Core color	Signal	Contact	Connector view
M23 female, 0°- coded 	1	Clock +	Brown (BN)	Clock +	3	D-sub15 male 
	2	Clock -	White (WH)	Clock -	11	
	3	cos +	Red (RD)	cos +	1	
	4	cos -	Blue (BU)	cos -	9	
	5	sin +	Yellow (YE)	sin +	2	
	6	sin -	Green (GN)	sin -	10	
	7	Data -	Violet (VT)	Data -	12	
	8	Data +	Black (BK)	Data +	4	
	11	GND	Pink (PK)	GND	8	
	12	V _B	Gray (GY)	V _B	13	
	9	—	Do not connect	—	5	
	10	—		—	6	
	—	—		—	7	
	—	—		—	14	
	—	—		—	15	

7.4 Overview of the power cables



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No.	Part number	Cross section in mm ²	Installation type	Motor connection	Motor side	Inverter side
[1]	05904579	4 × 1.5 mm ² (AWG 16) 3 × 1 mm ² (AWG 18)	Fixed installation	SB71/SB81	M32	open
[2]	05904587	4 × 2.5 mm ² (AWG 14) 3 × 1 mm ² (AWG 18)	Fixed installation	SB72/SB82	M32	open
[3]	05904595	4 × 4 mm ² (AWG 12) 3 × 1 mm ² (AWG 18)	Fixed installation	SB74/SB84	M32	open
[4]	05906318	4 × 1.5 mm ² (AWG 16) 3 × 1 mm ² (AWG 18)	Cable carrier installation	SB71/SB81	M32	open
[5]	05906326	4 × 2.5 mm ² (AWG 14) 3 × 1 mm ² (AWG 18)	Cable carrier installation	SB72/SB82	M32	open
[6]	05904846	4 × 4 mm ² (AWG 12) 3 × 1 mm ² (AWG 18)	Cable carrier installation	SB74/SB84	M32	open
[7]	01991892	4 × 1.5 mm ² (AWG 16) 3 × 1 mm ² (AWG 18)	Fixed installation	SB51/SB61	Connector	open
[8]	01991914	4 × 2.5 mm ² (AWG 14) 3 × 1 mm ² (AWG 18)	Fixed installation	SB52/SB62	Connector	open
[9]	01991930	4 × 4 mm ² (AWG 12) 3 × 1 mm ² (AWG 18)	Fixed installation	SB54/SB64	Connector	open
[10]	01991957	4 × 6 mm ² (AWG 10) 3 × 1.5 mm ² (AWG 16)	Fixed installation	SB56/SB66	Connector	open
[11]	01991973	4 × 10 mm ² (AWG 8) 3 × 1.5 mm ² (AWG 16)	Fixed installation	SB59/SB69	Connector	open
[12]	01991906	4 × 1.5 mm ² (AWG 16) 3 × 1 mm ² (AWG 18)	Cable carrier installation	SB51/SB61	Connector	open
[13]	01991922	4 × 2.5 mm ² (AWG 12) 3 × 1 mm ² (AWG 18)	Cable carrier installation	SB52/SB62	Connector	open
[14]	01991949	4 × 4 mm ² (AWG 12) 3 × 1 mm ² (AWG 18)	Cable carrier installation	SB54/SB64	Connector	open
[15]	01991965	4 × 6 mm ² (AWG 10) 3 × 1.5 mm ² (AWG 16)	Cable carrier installation	SB56/SB66	Connector	open
[16]	01991981	4 × 10 mm ² (AWG 8) 3 × 1.5 mm ² (AWG 16)	Cable carrier installation	SB59/SB69	Connector	open
[17]	0199199X	4 × 1.5 mm ² (AWG 16) 3 × 1 mm ² (AWG 18)	Fixed installation	SB51/SB61	Connector	Connector
[18]	01992015	4 × 2.5 mm ² (AWG 14) 3 × 1 mm ² (AWG 18)	Fixed installation	SB52/SB62	Connector	Connector
[19]	01992031	4 × 4 mm ² (AWG 12) 3 × 1 mm ² (AWG 18)	Fixed installation	SB54/SB64	Connector	Connector
[20]	01992058	4 × 6 mm ² (AWG 10) 3 × 1.5 mm ² (AWG 16)	Fixed installation	SB56/SB66	Connector	Connector
[21]	01992074	4 × 10 mm ² (AWG 8) 3 × 1.5 mm ² (AWG 16)	Fixed installation	SB59/SB69	Connector	Connector

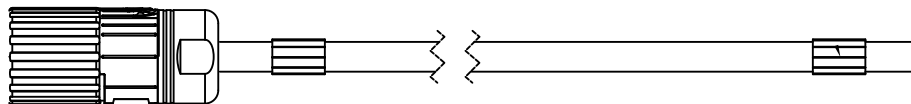
33352070/EN – 11/2025

No.	Part number	Cross section in mm ²	Installation type	Motor connection	Motor side	Inverter side
[22]	01992007	4 × 1.5 mm ² (AWG 16) 3 × 1 mm ² (AWG 18)	Cable carrier installation	SB51/SB61	Connector	Connector
[23]	01992023	4 × 2.5 mm ² (AWG 14) 3 × 1 mm ² (AWG 18)	Cable carrier installation	SB52/SB62	C148U	C148U
[24]	0199204X	4 × 4 mm ² (AWG 12) 3 × 1 mm ² (AWG 18)	Cable carrier installation	SB54/SB64	C148U	C148U
[25]	01992066	4 × 6 mm ² (AWG 10) 3 × 1.5 mm ² (AWG 16)	Cable carrier installation	SB56/SB66	C148U	C148U
[26]	01992082	4 × 10 mm ² (AWG 8) 3 × 1.5 mm ² (AWG 16)	Cable carrier installation	SB59/SB69	C148U	C148U

7.5 Power cable design

7.5.1 Power cable SL2-050 – SM1 (M23) to open end

Figure

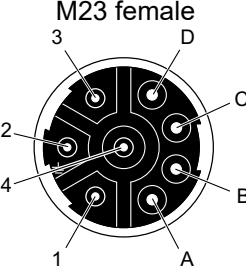


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Types

Design and cable cross section	Part number	Installation type	Motor
4 × 1.5 mm ² (AWG 16) 3 × 1 mm ² (AWG 18)	05906318	Cable carrier installation	SL2-050
4 × 2.5 mm ² (AWG 14) 3 × 1 mm ² (AWG 18)	05906326	Cable carrier installation	SL2-050
4 × 4 mm ² (AWG 12) 3 × 1 mm ² (AWG 18)	05904846	Cable carrier installation	SL2-050
4 × 1.5 mm ² (AWG 16) 3 × 1 mm ² (AWG 18)	05904579	Fixed	SL2-050
4 × 2.5 mm ² (AWG 14) 3 × 1 mm ² (AWG 18)	05904587	Fixed	SL2-050
4 × 4 mm ² (AWG 12) 3 × 1 mm ² (AWG 18)	05904595	Fixed	SL2-050

Pin assignment

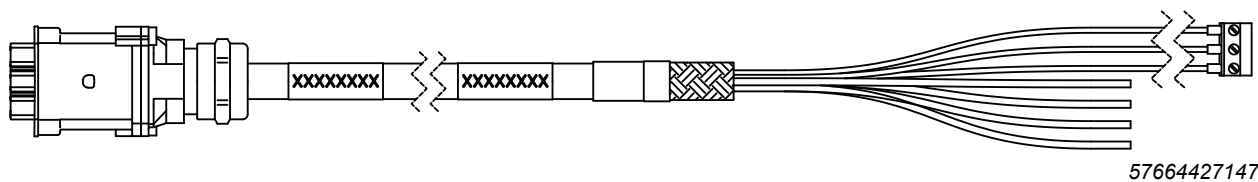
Motor side				Inverter side		
Connector view	Contact	Signal	Cable/ Core color	Signal	As- sembly	Description
	1	U	Black with white lettering U, V, W (BK)	U	Not pre- fabrica- ted	Motor phase U con- nection
	4	V		V	Not pre- fabrica- ted	Motor phase V con- nection
	3	W		W	Not pre- fabrica- ted	Motor phase W con- nection
	2	PE	Green/yellow (GN/YE)	TF1/KTY+/ PK	Not pre- fabrica- ted	Protective earth con- nection
	A	TF1/KTY+/ PK	Black 1 (BK)	TF2/KTY-/ PK	Not pre- fabrica- ted	Connection A
	B	TF2/KTY-/ PK	Black 2 (BK)	N.c.	Not pre- fabrica- ted	Connection B
	C	N.c.	Black 3 (BK)	N.c.	Not pre- fabrica- ted	Connection C
	D	N.c.	–	TF1/KTY+/ PK	Not pre- fabrica- ted	Connection D

Replacement connector, customer side

Type	Number of cores and core cross section	Part number
SB71/SB81	4 × 1.5 mm ² (AWG 16) 3 × 1 mm ² (AWG 18)	01989197
SB72/SB82	4 × 2.5 mm ² (AWG 14) 3 × 1 mm ² (AWG 18)	01989197
SB74/SB84	4 × 4 mm ² (AWG 12) 3 × 1 mm ² (AWG 18)	01991639

7.5.2 Power cables SL2-100 and SL2-150 – C148U to open end

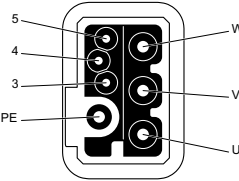
Figure



Types

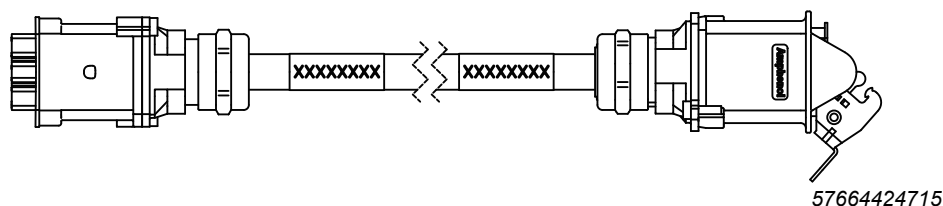
Design and cable cross section	Part number	Installation type	Motor
4 × 1.5 mm ² (AWG 16) 3 × 1 mm ² (AWG 18)	01991906	Cable carrier installation	SL2-100 and SL2-150
4 × 2.5 mm ² (AWG 14) 3 × 1 mm ² (AWG 18)	01991922	Cable carrier installation	SL2-100 and SL2-150
4 × 4 mm ² (AWG 12) 3 × 1 mm ² (AWG 18)	01991949	Cable carrier installation	SL2-100 and SL2-150
4 × 6 mm ² (AWG 10) 3 × 1.5 mm ² (AWG 16)	01991965	Cable carrier installation	SL2-100 and SL2-150
4 × 10 mm ² (AWG 8) 3 × 1.5 mm ² (AWG 16)	01991981	Cable carrier installation	SL2-100 and SL2-150
4 × 1.5 mm ² (AWG 16) 3 × 1 mm ² (AWG 18)	01991892	Fixed	SL2-100 and SL2-150
4 × 2.5 mm ² (AWG 14) 3 × 1 mm ² (AWG 18)	01991914	Fixed	SL2-100 and SL2-150
4 × 4 mm ² (AWG 12) 3 × 1 mm ² (AWG 18)	01991930	Fixed	SL2-100 and SL2-150
4 × 6 mm ² (AWG 10) 3 × 1.5 mm ² (AWG 16)	01991957	Fixed	SL2-100 and SL2-150
4 × 10 mm ² (AWG 8) 3 × 1.5 mm ² (AWG 16)	01991973	Fixed	SL2-100 and SL2-150

Pin assignment

Motor side				Inverter side		
Connector view	Contact	Signal	Cable/ Core color	Signal	As- sembly	Description
 C148U female	U1	U	Black with white lettering U, V, W (BK)	U	Not pre- fabrica- ted	Motor phase U con- nection
	V1	V		V	Not pre- fabrica- ted	Motor phase V con- nection
	W1	W		W	Not pre- fabrica- ted	Motor phase W con- nection
	PE	PE	Green/yellow (GN/YE)	PE	Not pre- fabrica- ted	Protective earth con- nection
	3	n.c	Black 1 (BK)	n.c	Not pre- fabrica- ted	Connection A
	4	TF1/KTY+/ PK	Black 2 (BK)	TF1/KTY+/ PK	Not pre- fabrica- ted	Connection B
	5	TF1/KTY-/ PK	Black 3 (BK)	TF1/KTY-/ PK	Not pre- fabrica- ted	Connection C

7.5.3 Power cables SL2-100 and SL2-150 – C148U to C148U

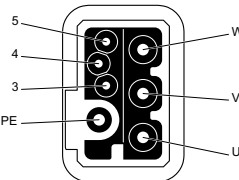
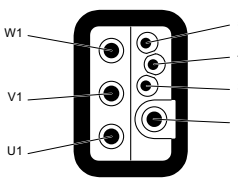
Figure



Types

Design and cable cross section	Part number	Installation type	Motor
4 × 1.5 mm ² (AWG 16) 3 × 1 mm ² (AWG 18)	01992007	Cable carrier installation	SL2-100 and SL2-150
4 × 2.5 mm ² (AWG 14) 3 × 1 mm ² (AWG 18)	01992023	Cable carrier installation	SL2-100 and SL2-150
4 × 4 mm ² (AWG 12) 3 × 1 mm ² (AWG 18)	0199204X	Cable carrier installation	SL2-100 and SL2-150
4 × 6 mm ² (AWG 10) 3 × 1.5 mm ² (AWG 16)	01992066	Cable carrier installation	SL2-100 and SL2-150
4 × 10 mm ² (AWG 8) 3 × 1.5 mm ² (AWG 16)	01992082	Cable carrier installation	SL2-100 and SL2-150
4 × 1.5 mm ² (AWG 16) 3 × 1 mm ² (AWG 18)	0199199X	Fixed	SL2-100 and SL2-150
4 × 2.5 mm ² (AWG 14) 3 × 1 mm ² (AWG 18)	01992015	Fixed	SL2-100 and SL2-150
4 × 4 mm ² (AWG 12) 3 × 1 mm ² (AWG 18)	01992031	Fixed	SL2-100 and SL2-150
4 × 6 mm ² (AWG 10) 3 × 1.5 mm ² (AWG 16)	01992058	Fixed	SL2-100 and SL2-150
4 × 10 mm ² (AWG 8) 3 × 1.5 mm ² (AWG 16)	01992074	Fixed	SL2-100 and SL2-150

Pin assignment

Motor side				Inverter side		
Connector view	Contact	Signal	Cable/ Core color	Signal	Contact	Connector view
C148U female 	U1	U	Black with white lettering U, V, W (BK)	U	U1	C148U male 
	V1	V		V	V1	
	W1	W		W	W1	
	PE	PE	Green/yellow (GN/YE)	PE	PE	
	3	n.c	Black 1 (BK)	n.c	3	
	4	TF1/KTY+/ PK	Black 2 (BK)	TF1/KTY+/ PK	4	
	5	TF1/KTY-/ PK	Black 3 (BK)	TF1/KTY-/ PK	5	

Replacement connector, customer side

Type	Number of cores and core cross section	Part number
SB51/SB61	4 × 1.5 mm ² (AWG 16) 3 × 1 mm ² (AWG 18)	1991426
SB52/SB62	4 × 2.5 mm ² (AWG 14) 3 × 1 mm ² (AWG 18)	1991434
SB54/SB64	4 × 4 mm ² (AWG 12) 3 × 1 mm ² (AWG 18)	1991442
SB56/SB66	4 × 6 mm ² (AWG 10) 3 × 1.5 mm ² (AWG 16)	1991450
SB59/SB69	4 × 10 mm ² (AWG 8) 3 × 1.5 mm ² (AWG 16)	1991469

8 Startup

8.1 Before you start

Ensure the following before startup:

- Operate the motors only with a frequency inverter.
- Observe the operating instructions of the frequency inverter.
- Prior to startup, configure the SEW-EURODRIVE frequency inverter using the suitable engineering software.
- In the case of inverter supplied motors, observe the wiring instructions issued by the inverter manufacturer.
- The drive must be undamaged and not blocked.
- All connections, especially the PE, have been made correctly.
- All protection covers are installed correctly.
- All motor protection devices are activated.
- Use switch contacts in utilization category DC-3 according to EN 60947-4-1 for switching the brake with DC 24 V.
- There are no other sources of danger.
- The primary moves along the entire travel distance easily, without collisions and free from mechanical contact between the primary and secondary.
- In hoist applications with a built-in brake, the brake must work correctly.
- Never work inside the travel range when the machine is switched on.
- Ensure free axis travel.
- Check the end positions.
- Before switching on, check the linear encoder.
- Limit the maximum current on the inverter.
- Set the velocity limits at the inverter to small values.

Note that the same startup procedure applies to SL2-Basic, SL2-Advance System, and SL2-Power System.

8.2 Sequence of the commutation run in a horizontal application

In contrast to rotary servomotors, there is initially no mechanical connection between the encoder system, the primary, and the secondary in linear motors.

This connection must be established during startup. The linear motor can then be controlled correctly by the inverter.

This process is referred to as a commutation search or commutation run.

The commutation run is performed depending on the encoder system used:

- Once during "encoder adjustment" for absolute encoder systems.
- After each startup or reset for incremental encoder systems.

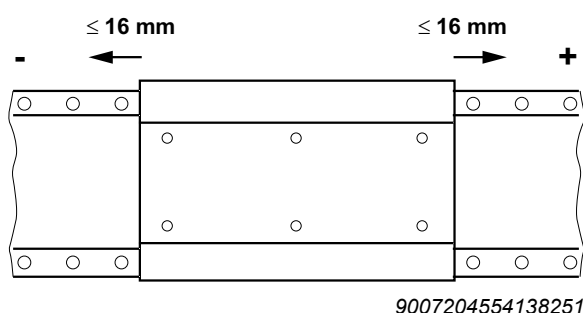
The following section describes a standard commutation run. The commutation run must be performed on the inverter using the engineering software.

INFORMATION



If the standard commutation run is not possible or recommended in your application, other types of commutation runs are available upon request.

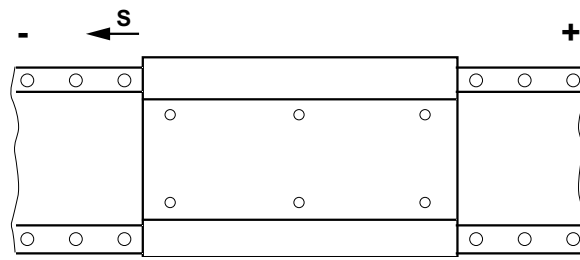
1. The linear motor is pulled to a random position in positive or negative direction (0 mm to max. 16 mm from the current position). The linear motor stops here for about one second.



2. The linear motor is moved $S = 32 \text{ mm}$ in positive direction for MOVIDRIVE®, $S = 64 \text{ mm}$ in positive direction for MOVIAXIS® and MOVI-C®. The linear motor stops here for about one second.



3. The linear motor is moved $S = 32 \text{ mm}$ in negative direction for MOVIDRIVE®, $S = 64 \text{ mm}$ in negative direction for MOVIAXIS® and MOVI-C®. The linear motor stops here for about one second.



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The inverter repeats the commutation process if the linear motor hits a hardware limit switch during the commutation run. The linear motor then moves to a new start position 32 mm further inward and repeats the commutation run.

After that, a slight clicking sound can be heard, and the linear motor switches from controlled to closed-loop operation.

8.3 Sequence of commutation run for vertical application

In contrast to rotary servomotors, there is initially no mechanical connection between the encoder system, the primary, and the secondary in linear motors.

This connection must be established during startup. The linear motor can then be controlled correctly by the inverter.

This process is referred to as a commutation search or commutation run.

The commutation run is performed depending on the encoder system used:

- Once during "encoder adjustment" for absolute encoder systems.
- After each startup or reset for incremental encoder systems.

The following section describes a vertical commutation run. The commutation run must be performed on the inverter using the engineering software.

INFORMATION



If the vertical commutation run is not possible or recommended in your application, other types of commutation runs are available upon request.

Prerequisites and specifications for the commutation run:

- The primary of the linear motor rests on the lower buffer.
- The positive direction of travel is upwards.

✓ Performing commutation:

1. Raise the primary of the linear motor by at least 64 mm using a suitable tool, e.g. an indoor crane.
2. Use the engineering software to start commutation.
3. The primary must move in positive direction. If the direction of travel is negative, you must check and correct the phase position and the encoder connection.
4. As soon as the motor moves upwards, you must decouple the primary from the crane.
5. During the commutation run, the primary moves first 64 mm in positive direction, then 64 mm in negative direction.
6. After commutation is completed, the offset angle is written to the corresponding parameter using the engineering software.

If you use an incremental encoder system, you must ensure that the linear motor always starts from a defined point and that commutation is started without movement.

8.4 Horizontal commutation of an AL.. encoder for the SL2 motor

Make sure of the following before performing commutation:

- The SL2 linear motor is operated with a MOVIDRIVE® inverter from SEW-EURODRIVE.
- The commutation of the encoder is performed using the MOVISUITE® engineering software from SEW-EURODRIVE.
- The personnel performing the work is familiar with the MOVISUITE® engineering software.
 - If the personnel is not familiar with the MOVISUITE® engineering software, the commutation of the encoder must not be performed. In this case, contact SEW-EURODRIVE.

To perform commutation, follow the following step-by-step instructions:

1. Select the drive train using the MOVISUITE® engineering software.
2. Manually position the carriage (the movable component) in the center of the travel section for a free run.
3. In the MOVISUITE® engineering software, set the "FCB 18 Rotor position identification" function to a digital input (e.g. DI 06) that can be activated for later execution with a wire jumper.
4. Make sure that the carriage can travel 100 mm in both directions from the center position without any obstacles.
5. Select the FCB18 "Rotor position identification" function in the MOVISUITE® engineering software.
6. Deactivate the output stage inhibit and activate the previously selected digital input.
 - ⇒ The inverter changes status from FCB02 to FCB18.
 - ⇒ The carriage moves by a maximum of 100 mm in positive and negative direction.
 - ⇒ Commutation is complete after about 50 s.
 - ⇒ The "Encoder adjustment" status changes to "completed".
7. To save the result of the commutation run, in the FCB18 "Rotor position identification" function, you must select "Write" from the drop-down list in the "Write control" menu item.
 - ⇒ The commutation data is saved.
8. Deactivate the FCB18 function.
9. Activate the output stage inhibit.
 - ⇒ The commutation run is complete.

9 Inspection/maintenance

9.1 Before you start

Ensure the following before inspection/maintenance:

- Disconnect the drive from the power supply before starting work.
- Secure the drive against unintended power-up.
- Never connect or disconnect connectors while they are energized.
- Do not touch the male contacts in the power connector.
- There are no other sources of danger.
- Let the unit cool down sufficiently before you start working on it.
- Ensure that work is carried out by trained specialists only.
- Use only genuine spare parts in accordance with the valid spare parts list.
- Repairs or modifications to the product may only be performed by trained specialists. Contact SEW-EURODRIVE Service when performing work on the unit.

Observe the safety notes in chapter "Danger due to magnetic fields" as well as the following points:

- Make sure that the primary is grounded according to regulations with the PE ground busbar in the control cabinet as the reference potential.

9.2 General maintenance work

Pay attention to noises that may indicate contamination, wear, or grinding of the motor.

Clean the motor area regularly.

The primaries and secondaries are maintenance-free. Repairing the primaries and secondaries is not permitted. Replace defective parts with original spare parts.

Remove any dirt, chips, or dust with a soft cloth.

Regularly check moving cables for external changes and wear.

9.3 Additional maintenance for Power version

Clean the air intake grilles on the fans.

10 Waste disposal

Dispose of the product and all parts separately in accordance with their material structure and the national regulations. Put the product through a recycling process or contact a specialist waste disposal company. If possible, divide the product into the following categories:

- Iron, steel or cast iron
- Stainless steel
- Magnets
- Aluminum
- Copper
- Electronic parts
- Plastics

The following materials are hazardous to health and the environment. These materials must be collected and disposed of separately:

- Oil and grease

Collect used oil and grease separately according to type. Ensure that the used oil is not mixed with solvent. Dispose of used oil and grease correctly.

- Screens
- Capacitors



Waste disposal according to WEEE Directive 2012/19/EU

This product and its accessories may fall within the scope of the country-specific application of the WEEE Directive. Dispose of the product and its accessories according to the national regulations of your country.

For further information, contact the responsible SEW-EURODRIVE branch or an authorized partner of SEW-EURODRIVE.

11 Malfunctions

11.1 Diagnostics and remedial measures

To diagnose and resolve malfunctions, refer to the error messages of the frequency inverter used and the corresponding documentation.

11.2 MOVI-C® malfunctions during operation

Fault	Possible cause	Measure
Encoder fault (E 14) or (E14) when the linear motor is moved manually	Encoder not mounted correctly	Check mounting using the encoder manufacturer's specifications: - Encoder air gap – measuring tape - Alignment encoder – measuring tape - For HIPERFACE® encoder: Check mounting direction so that cable output shows in the direction of the smaller absolute values (direction dot on the measuring tape if available). - Check the stiffness of the encoder mounting. The manufacturer's tolerances must be adhered to even under high accelerations.
	Encoder not wired correctly	Check pin assignment, operate HIPERFACE® encoder as sin/cos encoder for testing purposes
Linear motor does not start after removal of the controller inhibit	Motor cable interrupted	Check linear motor connection
Error E 09 subcode 3 "Absolute rotor position not available" for any drive function except FCB 18 or FCB 25	Motor is not commutated	First commutate motor with FCB 18 or FCB 25
Encoder fault the first moment the motor is supplied with power	Problems with EMC	For fault elimination, refer to the documentation of the inverter used. Check for correct shielding and equipotential bonding.
Uncontrolled movement of the linear motor	Problems with EMC	For fault elimination, refer to the documentation of the inverter used. Check for correct shielding and equipotential bonding.
	Motor is not calibrated	Start calibration process by activating FCB 18
	Defective area on linear scale	Push the linear motor a specified distance and compare the measured travel length with the travel length in the actual position. Adjust the encoder resolution in the startup encoder configuration, if necessary, and check the distance between read head and measuring tape.

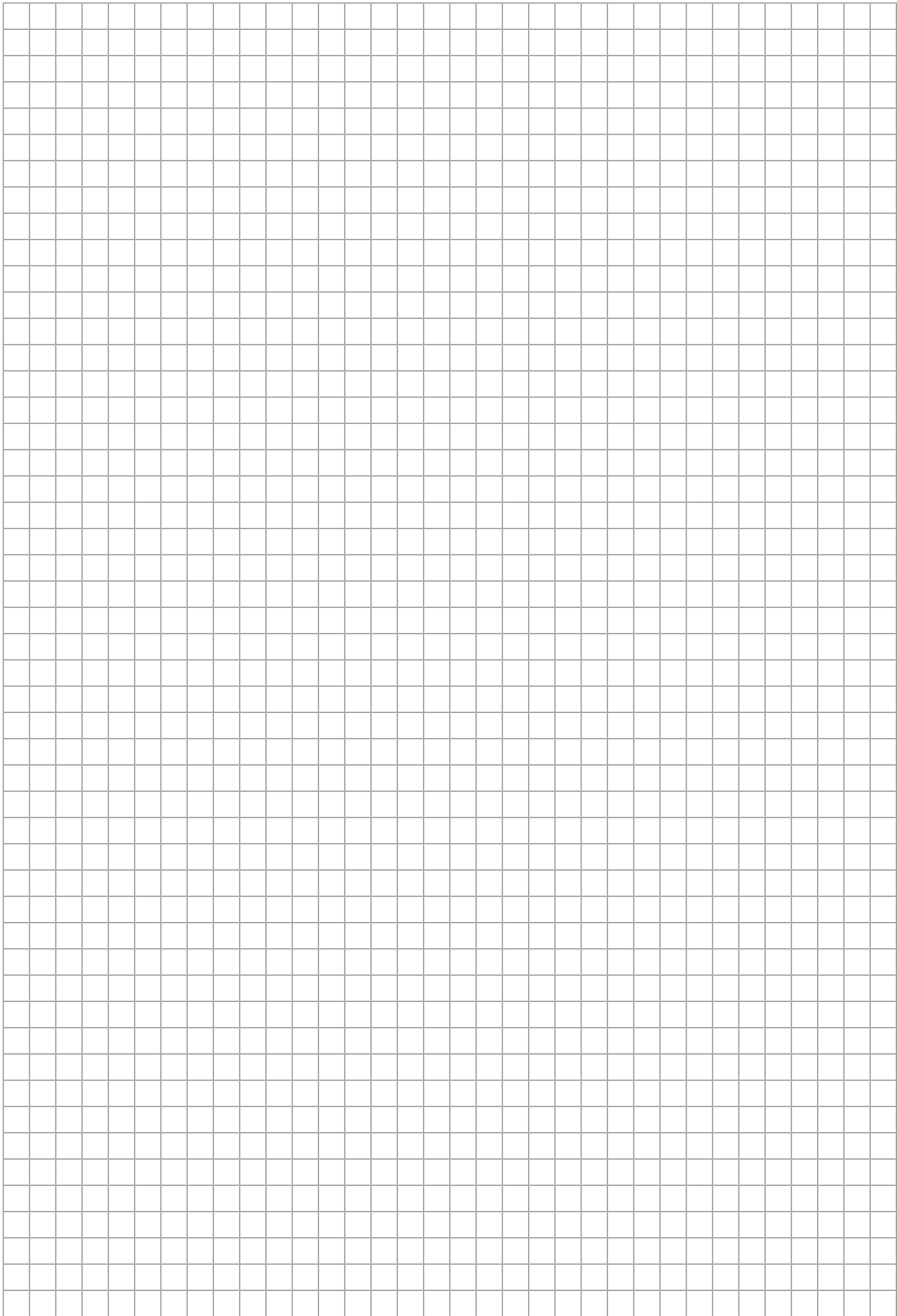
Fault	Possible cause	Measure
Linear motor hums or does not run smoothly	Failure on the encoder cable	For fault elimination, refer to the documentation of the inverter used. Check for correct shielding and equipotential bonding.
	Controller parameters not set correctly	Repeat startup of control loop
	Connection between encoder and primary lacks stiffness	Check the mechanical connection between the encoder and the primary for sufficient stiffness.
	Permitted operating temperature of the encoder exceeded	- Select a travel cycle in which the effective value of the output current is less than the nominal current of the motor. - Optimize heat dissipation on the primary - Decouple encoder thermally (mount with plastic adapter plate) - Use an encoder system with a higher permitted operating temperature.
Linear motor gets too hot	Overload	Select a travel cycle in which the effective value of the output current is less than the nominal current of the motor.
	Insufficient cooling	Improve cooling; if necessary, install a fan
	Air gap too large, resulting in power loss at the same current (see derating table in the catalog)	Adjust the air gap
	Ambient temperature too high	Select a travel cycle in which the effective value of the output current is less than the nominal current of the motor.
HIPERFACE®encoder fault	Failures on the encoder cable	If these faults occur during manual displacement, faults on the encoder cable or the cable of the temperature sensor are often the cause. For fault elimination, refer to the documentation of the inverter used. Check for correct shielding and equipotential bonding.
	Encoder not mounted correctly	Check mounting using the encoder manufacturer's specifications: - Air gap encoder – measuring tape - Alignment encoder – measuring tape - For HIPERFACE®encoder: Check mounting direction so that cable output shows in the direction of the smaller absolute values (direction dot on the measuring tape if available). - Check the stiffness of the encoder mounting. The manufacturer's tolerances must be adhered to even under high accelerations.

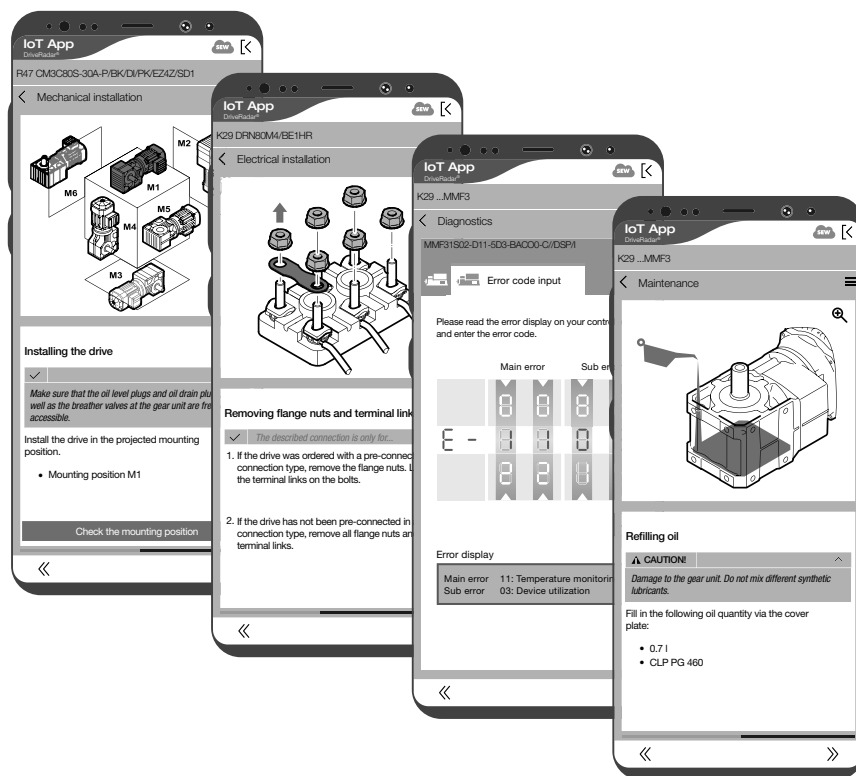
11.3 MOVI-C® malfunctions during operation

Fault	Possible cause	Measure
Linear motor does not start after removal of the controller inhibit	Motor cable interrupted	Check the connection of the linear motor.
Encoder fault in the first moment the motor is supplied with current	Problems with EMC	For fault elimination, refer to the documentation of the inverter used. Check for correct shielding and equipotential bonding.

Fault	Possible cause	Measure
Status message via display parameter "Encoder adjustment status" (8518.51) after completion of the commutation run not equal to "completed".	Status message "No encoder movement" ("1st movement" without "2nd movement"): A motor cable is interrupted; only an alternating field can be established, but no rotating field.	If the active component does not move, check the linear motor connection leads. If the active component moves, but the actual encoder position does not, check the encoder connection.
	Status message "Encoder movement in wrong direction" ("2nd movement"): The counting direction of the encoder does not match the phase sequence U, V, W of the motor.	Check whether the encoder counts positively in the direction in which the primary has moved. If this is not the case, replace the connections of the motor cables U and W or invert the direction of rotation of the encoder to the motor via the parameter "Encoder counting direction".
	Status message "Encoder movement too large" or "Encoder movement too small" ("2nd movement"): The resolution of the encoder system is incorrect or the encoder is defective.	Push the linear motor for a defined way on the track, and compare the measured travel length to the travel length shown in the actual position. Adjust the encoder resolution in the startup encoder configuration, if necessary, and check the distance between read head and measuring tape.
	Status message "Encoder movement too small" ("2nd movement"): Torque limit value reduced too far	Adjust the "Torque" application limit.
	Status message "Encoder movement too small" (3rd movement): Travel distances are not identical because the axis is mechanically sluggish.	Check the mechanical structure for sluggishness.
	Status message "Encoder movement too small" ("3rd movement"): The distances are not identical because the encoder is defective.	Replace the encoder.
	Status message "Encoder movement too small" (3rd movement): Torque limit value reduced too far	Adjust the "Torque" application limit.

Fault	Possible cause	Measure
Uncontrolled movement of the linear motor	Problems with EMC	For fault elimination, refer to the documentation of the inverter used. Check for correct shielding and equipotential bonding.
	Motor is not calibrated	Start calibration process by activating FCB 18
	Defective area on linear scale	Push the linear motor a specified distance and compare the measured travel length with the travel length in the actual position. Adjust the encoder resolution in the startup encoder configuration, if necessary, and check the distance between read head and measuring tape.
Linear motor hums or does not run smoothly	Failure on the encoder cable	Refer to the system manual. Check for correct shielding and equipotential bonding, and observe the note at the beginning of this chapter
	Controller parameters not set correctly	Repeat startup of control loop
	Connection between encoder and primary not sufficiently rigid	Check whether the mechanical connection between the encoder and the primary is sufficiently stiff.
	Permitted operating temperature of the encoder exceeded	• Select a travel cycle in which the effective value of the output current is less than the nominal current of the motor. • Optimize heat dissipation on the primary • Decouple encoder thermally (mounting with plastic adapter plate) • Use an encoder system with a higher permitted operating temperature.
N-monitoring/lag error during commutation run	Problems with EMC	Refer to the system manual. Check for correct shielding and equipotential bonding, and observe the note at the beginning of this chapter.





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