EWELLIX

EWELLIX Linear Modules

CLSM

User Manual

We pioneer motion

SCHAEFFLER

Contents

1 About the manual

This manual is part of the product and contains important information. Read the manual thoroughly prior to use and ensure that the instructions are strictly observed.

1.1 Information in this user manual

This manual provides important information on how to work with the device safely and efficiently.

The manual is part of the device, must always be kept in the device's direct proximity and should be available for personnel to read at any time. All personnel working with the device must read and understand this manual before starting any work. Strict compliance with all specified safety notes and instructions is a basic requirement for safety at work.

Moreover, the accident prevention guidelines and general safety regulations applicable at the place of use of the device must also be complied with.

All information and instructions in this manual have been compiled in accordance with applicable standards and regulations, the present status of technology, and our many years of knowledge and experience.

Validity

The instructions in this manual apply to EWELLIX linear modules CLSM with the following identification:

- manufacturer: Schaeffler
- product name: EWELLIX linear module CLSM
- type designation: CLSM
- year of manufacture: from 2016
- CE marking: according to technical documentation

1.2 Symbols

Safety precautions are identified by symbols and signal words as shown. The signal words indicate the severity of the hazard and the chance it could occur. Follow these safety precautions and act cautiously in order to avoid accidents, personal injury and damage to property.

The warning and hazard symbols are defined in accordance with ANSI Z535.6-2011.

1 Warning and hazard symbols

Signs and descriptions	
⚠ DANGER	In case of non-compliance, death or serious injury will occur.
⚠ WARNING	In case of non-compliance, death or serious injury may occur.
⚠ CAUTION	In case of non-compliance, minor or moderate injury may occur.
NOTICE	In case of non-compliance, damage or malfunctions in the product or the adjacent construction may occur.

1.3 Signs

The warning, prohibition, and mandatory signs are defined in accordance with DIN EN ISO 7010 or DIN 4844-2.

2 Warning, prohibition, and mandatory signs

Signs and descriptions	
	General warning
	Electrical voltage warning
	Magnetic field warning
	Observe the manual
	Wear protective gloves
	Wear safety shoes
	General mandatory sign
	Ground before use

1.4 Availability

A current version of this manual is available at:
https://www.schaeffler.de/std/2222

Ensure that this manual is always complete and legible and is available to all persons engaged in transporting, fitting, dismantling, commissioning, operating, or maintaining the product.

Keep the manual in a safe place for immediate reference.

1.5 Legal notices

The information in this manual reflects the status at the time of publication.

Unauthorized modifications to or improper use of the product are not permitted. Schaeffler accepts no liability in these cases.

1.6 Limitation of liability

All information and notes in this manual were compiled with due consideration given to applicable standards and regulations, the present state of technology and our years of knowledge and experience.

The manufacturer is not liable for any damage resulting from:

- disregarding this manual
- unintended use
- employment of untrained personnel
- unauthorized conversions
- technical changes
- manipulation or removal of the screws on the drive
- use of unapproved spare parts.

Where the device has been customized, the actual product delivered may be different from what is described in this manual. In this case, ask Schaeffler for any additional instructions or safety precautions relevant to these devices.

We reserve the right to make technical modifications to the device to improve usability.

1.7 Copyright

This manual is protected by copyright and may be used exclusively by Schaeffler customers for internal purposes.

Distribution of this manual to third parties, reproduction of any kind, including excerpts, as well as the use or disclosure of its content without the written consent of the manufacturer is not permitted, except for internal purposes.

Any copyright violation may become the subject of a future claim for damages.

1.8 Warranty terms

The applicable and valid warranty terms are included in the terms and conditions of sale, as contained in the Schaeffler sales contract that governs this sale.

1.9 Customer service

Schaeffler Customer Service is available at any time to assist with technical information and inquiries. The responsible contact person can be reached by telephone, e-mail, or via the Internet, see manufacturer's address on the back cover. Our employees are also always interested in receiving new information and practical experience. This information and experience helps us improve our products.

1.10 Images

The images in this manual may be schematic representations and may differ from the delivered device.

2 General safety regulations

This section provides an overview of all essential safety aspects for optimum personal protection as well as safe and trouble-free operation. Failure to observe this manual and the safety instructions contained herein may result in significant hazards and potentially lead to serious injury or death.

The safety program from Schaeffler details authorized users and the responsibility of individual users. The product was designed and built in accordance with the latest technical standards and accepted safety regulations. EU conformity is documented within the technical documentation.

2.1 Intended use

Use the product exclusively for the intended use described in this manual. Use the product only for lifting or transporting loads.

Installation in industrial engineering and construction engineering applications is permitted:

- Use the product exclusively for positioning loads that do not emit emissions, do not damage the axis, and do not overload it.
- The product is designed for horizontal installation as a single axis or in combination with axes, e.g., as a cross table or gantry system. Contact Schaeffler if vertical installation is planned.

Observe the permissible operating data, operating limits, and ambient conditions.

Any use beyond the intended use or differing from the use described above is considered improper use.

Any claims resulting from damage due to improper use are excluded.

2.2 Non-intended Use

Any use outside the intended purpose may lead to hazardous situations.

Therefore:

- Strictly observe all safety instructions and information provided in this manual.
- Do not expose the product to weather conditions, strong UV radiation, corrosive or explosive air media, or other aggressive media.
- Do not modify, convert, or change the structural design or individual components of the linear module.
- Use the product exclusively within the technical application limits and operating limits described in this manual.
- Do not use the device for transporting persons or animals.

2.3 Responsibility of the owner and processor

The device is intended for use in private and commercial applications by the owner or processor.

The processor is the contractual partner of the reseller or the manufacturer. The processor installs the device in a complete system (application).

The owner or processor of the system is subject to the requirements of the Occupational Health and Environmental Act.

In addition to the safety instructions in this manual, the owner or processor must observe the following in relation to these safety regulations, accident prevention guidelines, and environmental protection regulations applicable at the system's installation site:

- Familiarize themselves with the applicable occupational health and safety regulations and, by means of a risk assessment, identify any additional hazards arising from the specific working conditions at the device's place of use. Implement the hazard assessment in the form of work instructions for operating the device.
- Confirm that the work instructions created for the system, including the device, comply with current legal requirements, and adapt the instructions accordingly
- Clearly define and assign responsibilities for installation, operation, maintenance, and cleaning.
- Ensure that all personnel handling the device have read and understood this manual..
- Provide personnel with the required protective equipment.
- Train personnel regularly and inform them about the dangers.

In addition, the owner or processors must ensure that the device is in proper working condition. They must do the following:

- Ensure that the maintenance intervals described in this manual are observed.
- Have all safety devices checked regularly to ensure their correct operation and completeness.

2.4 Personnel requirements

Operator duties:

- Ensure that only qualified and authorized personnel carry out the activities described in these instructions.
- Ensure that personal protective equipment is used.

Only persons who can be expected to reliably perform their tasks are permitted. Persons whose ability to react is impaired, e.g., due to drugs, alcohol, or medication, are not permitted.

2.4.1 Qualifications

For the various areas of activity described in this manual, the following qualifications are required:

Operator

The operator has been instructed by the customer on the assigned tasks and possible hazards in the event of improper conduct.

Qualified personnel

Qualified personnel meet the following criteria:

- Product knowledge, e.g. by receiving training on how to use the product
- are fully familiar with the contents of this manual and, in particular, with all of the safety instructions
- are familiar with the relevant country-specific regulations

Qualified personnel, on the basis of their technical training, knowledge, and experience as well as familiarity with the applicable standards and regulations, are capable of performing the work assigned to them and of independently recognizing and avoiding potential hazards.

Electrically skilled person

An electrically skilled person, on the basis of their technical training, knowledge, and experience as well as familiarity with the applicable standards and regulations, is capable of performing work on electrical systems and of independently recognizing and avoiding potential hazards.

The electrically skilled person is trained for the specific place of use and is familiar with the applicable standards and regulations.

2.5 Protective equipment

For certain work on the product, suitable protective equipment must be worn. Personal protective equipment consists of:

3 Required personal protective equipment

Personal protective equipment	Mandatory signs in accordance with DIN EN ISO 7010
Protective gloves	
Safety shoes	

2.6 Hazards

The following safety instructions apply to the installation, commissioning, operation, maintenance, and repair of the linear module.

The manufacturer has minimized the effects of existing residual hazards through design measures and protective measures. Observe the residual hazards and the possible countermeasures described to eliminate them.

Observe the safety instructions listed here and the warning notices throughout this manual to reduce the risk of personal injury and property damage, and to avoid hazardous situations.

Danger to life from electric current

Touching conductive parts poses an immediate danger to life. Damage to insulation or individual components may pose a danger to life.

- Ensure that cables are not pinched or damaged.
- Check that the supply voltage corresponds to the rated value on the product label.

Danger to life due to residual voltage and unexpected activation

Residual voltage in the system may result in danger to life or product damage.

- Shut down the machine and disconnect it from the power supply.
- Before starting work, ensure that the DC link of the power output module is fully discharged.
- Prevent unauthorized or unintentional activation of the supply voltage (e.g., lock and label switching devices).

Property damage due to voltage spikes

Connecting or disconnecting plug connectors and socket connectors under voltage may result in property damage due to voltage spikes. The voltage rise occurs due to residual energy in the servo amplifier. Therefore:

- Do not connect or disconnect the plug connectors and socket connectors of the motor and encoder while energized.
- Disconnect the motor connector only after switching off the power output module of the servo amplifier and after the DC link has discharged to below 40 V.
- Refer to the documentation of the servo amplifier used for the discharge time and take the connected load into account. As a general rule, wait 5 min.

Danger to life due to strong magnetic fields

The CLSM-150-L..A linear module is fitted with strong permanent magnets.

Strong permanent magnets pose an immediate danger to persons with implants and may damage data storage devices or attract other ferromagnetic objects.

- Maintain a safety distance of at least 1.5 m for persons with pacemakers or other implants.
- Maintain this distance regardless of the installation condition and operating condition, as well as during transport and storage.
- Leave the warning labels on the actuator and ensure they are clearly visible on the end application.
- Keep magnetizable data storage media at a distance of at least 20 cm.
- Exercise particular caution during installation in the end application and when working near the actuator.
- Secure ferrous tools and objects and keep them away from the effective range of the magnets.

Risk of injury due to uncontrolled movement and missing brake

There is a risk of injury due to uncontrolled movement of the carriage during commutation and in the absence of a brake.

- Expect a short movement of the carriage when switching on, as the standard motor is commutated via an incremental encoder. Keep the hazard area clear.
- Ensure that any possible commutation movement does not endanger persons or damage the machine.
- Note that the standard version is not equipped with a separate brake. In the event of a power failure or measuring system failure, the carriage may move uncontrollably to its end position.
- Check whether the integrated end-position dampers can be reached. If not, install suitable end-position dampers on the end machine.
- For applications with a vertical axis, consult Schaeffler.

Risk of injury due to hot surfaces

During continuous operation, the motor and consequently the surface may become hot. Hot surfaces on the linear module can cause burns and must not be touched.

- Use personal protective equipment.

Risk of injury due to crushing

When driving against fixed objects, the applied force may result in injury.

- Ensure that no persons are present in the danger zone during the stroke.
- Ensure that no objects or body parts are trapped, injured, or severed between the top side of the carriage and the end plates.

Risk of injury due to potential hazards

The machine may be unable to perform its intended function due to a malfunction. Accidents or injuries may result. Possible causes include the following dependencies:

- human error
- malfunction of safety devices
- unauthorized personnel
- variations in the processed material or workpiece
- failure of one or more components
- external influences (e.g., shocks, vibrations, electromagnetic magnetic fields)
- errors or defects in the design
- power supply failure
- inability of the operator to gain control of the machine

2.7 Safety regulations

The following safety regulations must be observed when working with the product. You can find further information on dangers and specific instructions in other chapters, including those entitled Installation, Commissioning, Operation, and Maintenance.

2.7.1 Safety equipment

The actuators are not equipped with an on/off switch. If shutdown is required, e.g., in an emergency, the actuators must be disconnected from the power supply. Only this measure ensures that the actuators are completely de-energized.

Applications in which the actuators are installed must provide an emergency-stop switch or isolation from the mains supply at all poles.

Protective devices must comply with the laws and regulations of the respective country in which the linear module is operated.

2.7.2 Modifications to the device

To avoid hazardous situations and to ensure optimal performance, do not make any changes or modifications to the device that have not been specifically authorized by Schaeffler.

2.7.3 Spare parts

The product is not intended for repair work by the user. Any warranty or service claims will be rendered invalid immediately, without prior notice, if any screws on the device have been tampered with.

Safety risk due to incorrect spare parts

Incorrect or faulty spare parts can compromise safety and lead to damage, malfunctions, or complete failure. Observe the following:

- Only use original spare parts from the manufacturer.
- Only use the listed accessories from verified manufacturers.
- Spare parts in or on the device may only be replaced by the manufacturer. The device must be dismantled and sent to the manufacturer.

If the device cannot be repaired on site by authorized personnel, it must be removed from the application and sent to the manufacturer.

2.7.4 Work on electrical devices

Work on the electrical system may only be carried out by professional electricians.

Wiring, opening, and closing of electrical connections may only be performed when the system is disconnected from the power supply and in a voltage-free state.

2.7.5 Transport and storage

The product may only be transported and stored in its original packaging and under the permissible ambient conditions, see *Technical data*.

Observe the following safety regulations during transport:

- Ensure that the transport lock has been fitted.
- The linear module may only be lifted at the base section.
- When lifting, always support the entire base. Otherwise, the module may bend under its own weight, which may result in reduced accuracy.
- Only use lifting devices and equipment with sufficient load carrying capacity.

2.8 Manufacturer’s declaration of EMC compliance

An EMC declaration of conformity for the device can be provided upon request.

3 Scope of delivery

The linear module is delivered as a unit, packaged either in a cardboard box or on pallets.

The scope of delivery comprises:

- linear module
- User manual

3.1 Check for damage during transit

1. Check the product immediately upon delivery for any damage during transit.
2. Do not accept delivery, or only accept it with reservation, if transport damage is found.
3. Record the extent of damage on the transport documents or the carrier's delivery note.
4. Report any damage during transit promptly as a complaint to the carrier.

Report any damage as soon as it is discovered. Claims for damages can only be made within the applicable claim period stipulated by the transport company.

3.2 Check for defects

1. Check the product immediately upon delivery for any visible defects.
2. Check the product for completeness immediately upon delivery.
3. Report any defects promptly to the distributor of the product.
4. Do not put damaged products into operation.

4 Product description

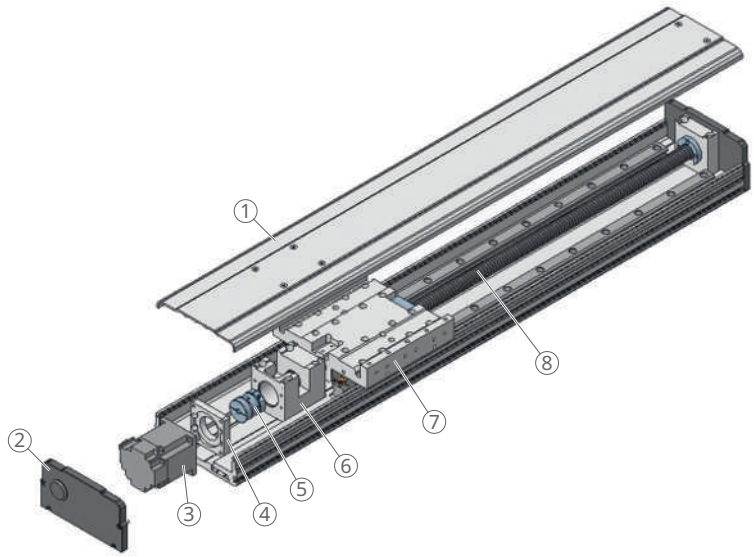
The device is a mechanical actuator for applications in factory automation and medical technology. The actuator moves only on the carriage.

Type with ball screw drive

The ball screw drive in the linear module is driven by the motor. The coupling transmits the force between the motor and the ball screw drive. Through the rotational movement of the ball screw drive, the carriage moves forward and backward according to the direction of rotation of the motor.

The linear modules CLSM-150-B..A, CLSM-150-B..P, and CLSM-150-B..S use the same mechanism.

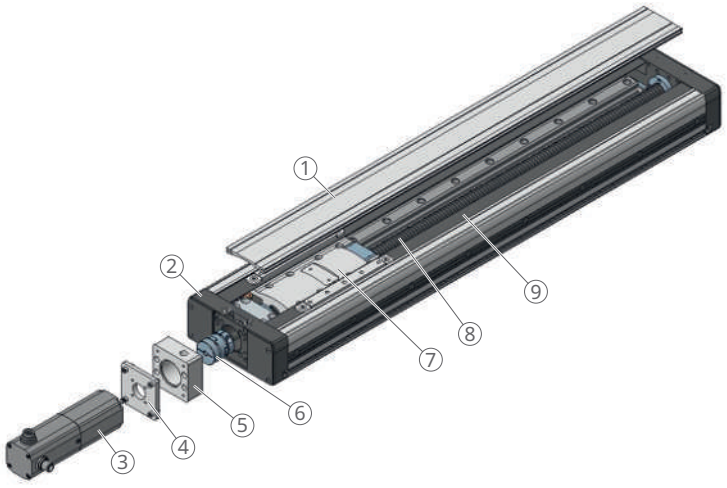
1 Linear module CLSM-150-B..A with ball screw drive



001DB56D

1	Upper cover	2	End plate
3	Motor (optional)	4	Motor adapter
5	Coupling	6	Coupling housing
7	Carriage	8	Ball screw drive

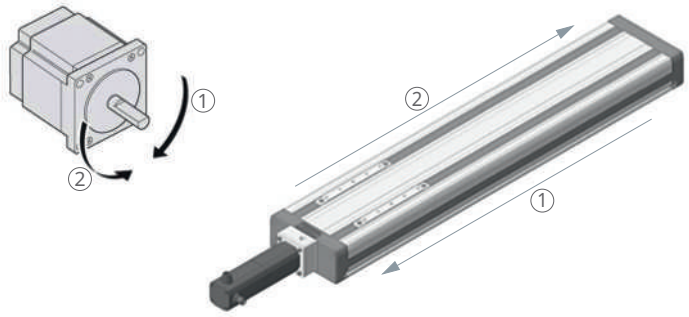
2 Linear module CLSM-150-B..P with ball screw drive



001DB58D

1	Upper cover	2	End plate
3	Motor (optional)	4	Motor adapter
5	Coupling housing	6	Coupling
7	Carriage	8	Ball screw drive
9	PU strip		

3 Direction of motor during operation



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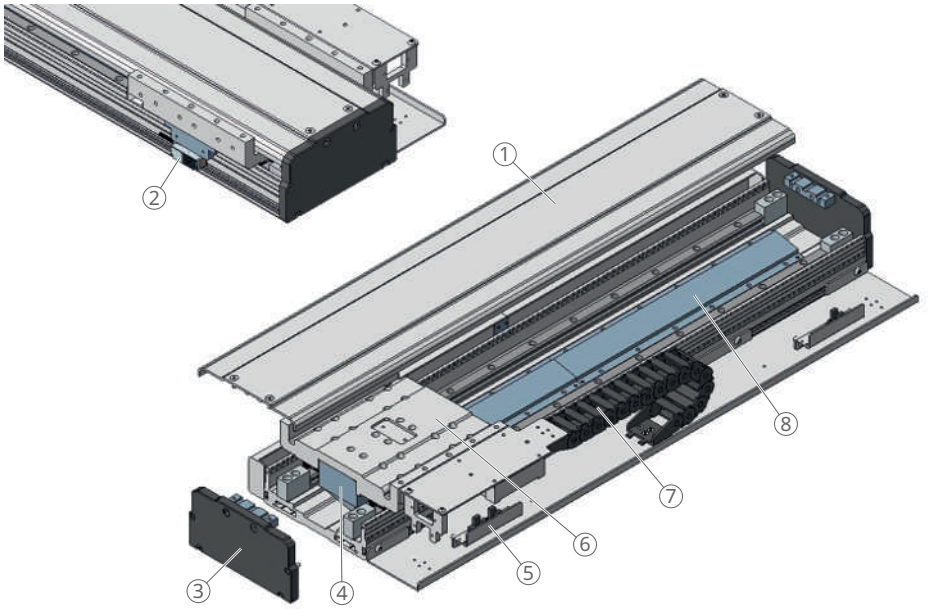
1	Clockwise	2	Counterclockwise

Type with linear motor

The carriage in the linear module is moved by a linear motor. When supplied with power via the cable, the linear motor is magnetized and can move the stator of the linear motor. The carriage is attached to the linear motor and moves forward and backward.

4 Linear module CLSM-150-L..A with linear actuator



1	Upper cover	2	Encoder (RSF Elektronik MS15MK)
3	End plate	4	Linear motor
5	Sensor bracket with optical sensor Omron EE-SX674	6	Carriage
7	Cable and cable chain	8	Linear motor stator

4.1 Sensors

The linear module can be equipped with sensors.

An Omron EE-SX674 optical sensor is available as a limit switch.

5 Transport and storage

NOTICE

Damage due to improper transport

Improper transport may result in significant property damage.

- Proceed with caution when unloading the packaged goods, during delivery, and during transport to the destination.
- Observe the symbols and instructions on the packaging.
- Do not remove the product from the packaging until immediately before installation.
- Observe the ambient conditions for return transport to the manufacturer.

5.1 Transport

Observe the safety regulations for transport.

Requirements for packaging

Each individual packaged part must be packed appropriately for the anticipated transport conditions. Only environmentally friendly materials may be used for the packaging.

The packaging is intended to protect the individual components from transport damage, corrosion, and other types of damage until assembly.

1. Do not destroy the packaging and only remove it shortly before assembly.
2. Keep the packaging in case the product needs to be returned to the manufacturer ➤18|5.3.

Packaging material consists of valuable raw materials, most of which can be effectively recycled and reused.

If the packaging is to be disposed of following intact delivery, the following instructions must be observed and complied with:

3. Dispose of packaging material in an environmentally responsible manner.
4. Observe the locally applicable disposal regulations.

5.2 Storage

Observe the safety regulations for the storage.

1. Store the product in its original packaging and avoid mechanical shocks.
2. If the storage period is ≥ 3 months, regularly check the general condition of all packaging components.
3. Follow any additional storage instructions detailed on the packaging.

5.3 Return to the manufacturer

Proceed as follows for return transport:

1. Dismantle the device if necessary.
2. Pack the device in its original packaging.
3. Observe the safety instructions for transport and storage.
4. Send to the manufacturer. The address is provided on the back of this operating manual.

6 Installation

Observe the technical data in accordance with the operating conditions.

Comply with all safety regulations.

Authorized personnel

- Assembly and commissioning may only be carried out by qualified technical personnel.
- Work on the electrical system may only be carried out by trained, electrically skilled persons.

Safety instructions

⚠ CAUTION

Risk of injury and property damage

There is a risk of injury and property damage during operation due to improper installation.

- ▸ During installation, do not subject the actuator to lateral impacts or torsional forces.
- ▸ Never loosen or remove screws on the linear module during operation.
- ▸ Remove the transport lock only after complete installation.

6.1 Installing the adapter kit

Use the adapter kit for installing motors with an axial shaft on the product.

1. Attach the motor to the completed motor adapter.

The rated power of the motors must not exceed the permissible value. Schaeffler recommends the following servo-motors.

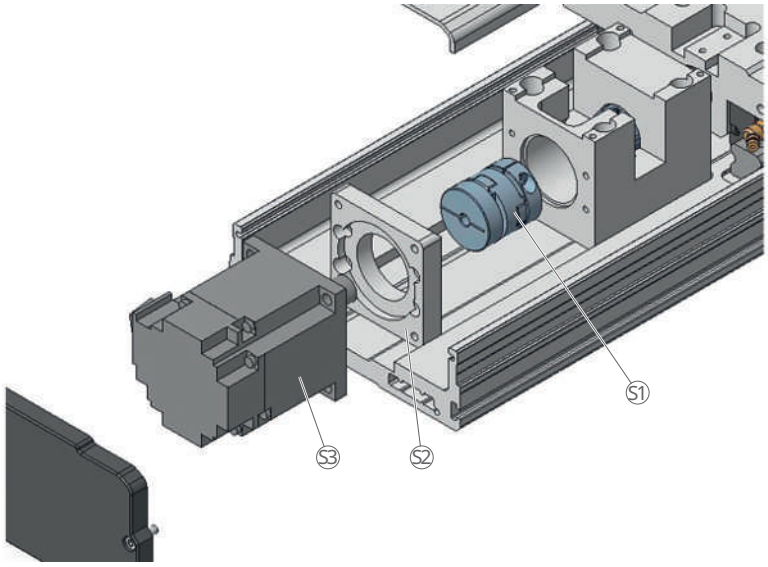
Do not disassemble the linear module in order to ensure safe and proper operation.

4 Performance overview of the linear module

Component		CLSM-92-T	CLSM-92-B	CLSM-150-B..A	CLSM-150-B..P	CLSM-150-B..S	CLSM-150-P..A	CLSM-150-L..A
Screw drive, type		Trapezoidal	Ball	Ball	Ball	Ball		
Screw pitch		14×03	12×05 12×10 12×20	20×05 20×10 20×20	20×05 20×10 20×20	20×05 20×10 20×20		
Motor, designation		1FK7015	1FK7022	1F7034	1FK7044	–	1FK7015 1FK7022 1F7034 1FK7044	SGLFW-35A 120AP
Motor, torque	Nm	0.035	0.085	1.6	4	–		
Motor, speed	min^{-1}	6000	6000	6000	4500	–		

Tightening torques

5 Adapter kit for linear module



S1	Coupling	S2	Motor adapter
S3	Motor		

5 Tightening torques for coupling, motor adapter, motor

Designation	S1		S2		S3	
	Bolt size	M_A Nm	Bolt size	M_A Nm	Bolt size	M_A Nm
CLSM-92-T	M3×12	1.5	M4×20	4.0	M4×15	4.0
CLSM-92-B	M3×12	1.5	M4×20	4.0	M4×15	4.0
CLSM-150-B..A	M4×14	4.0	M4×15	4.0	M5×15	8.0
CLSM-150-B..P	M4×14	4.0	M4×15	4.0	M5×15	8.0
CLSM-150-B..S	–	–	–	–	–	–
CLSM-150-P..A	–	–	–	–	–	–
CLSM-150-L..A	–	–	–	–	–	–

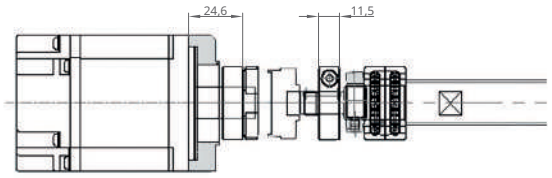
6 Tightening torques for cover, end plate, sensor bracket

Designation	Upper cover		End plate		Sensor bracket	
	Bolt size	M_A Nm	Bolt size	M_A Nm	Bolt size	M_A Nm
CLSM-92-T	M4×8	3.0	M4×20	4.0	–	–
CLSM-92-B	M4×8	3.0	M4×20	4.0	–	–
CLSM-150-B..A	M4×6	3.0	M4×20	4.0	M5×8	2.0
CLSM-150-B..P	M4×30	4.0	M4×20	4.0	M5×8	2.0
CLSM-150-B..S	–	–	–	–	–	–
CLSM-150-P..A	–	–	–	–	–	–
CLSM-150-L..A	–	–	–	–	–	–

Installing the coupling

2. Install the coupling on the motor shaft and on the journal of the screw drive of the linear module.
3. Align the coupling

6 Aligning the coupling



4. Tighten the screws to the tightening torque M_A.

6.2 Installing the linear module

✓ The mounting surface of the application must be level and must support the weight and loads across the entire housing surface.

✓ Check the dimensions of the mounting holes for the screws of the linear module against the drawings in the data sheet.

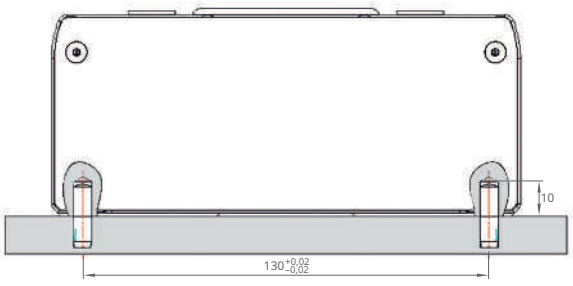
✓ During installation, protect the linear module from lateral impacts and torsional forces.

1. Ensure that the mounting surface of the application meets the required conditions.
2. If necessary, install the motor on the linear module
3. Secure the elements of the application between which the linear module is installed.
4. Secure the base plate with pins Ø6 H7. Drilling depth: 10 mm.
5. Fasten the linear module to the application. Use M6 socket head cap screws of appropriate length. Drilling depth: 12 mm.

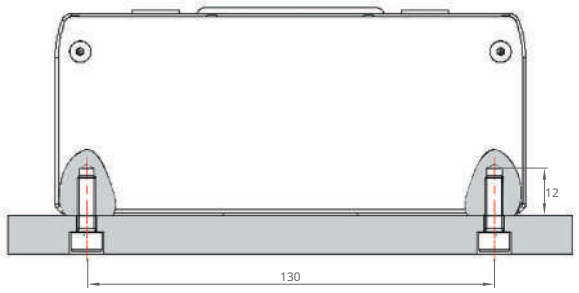
› The linear module is securely connected to the application.

6. Remove the transport lock. At least 50 % of the fastening screws of the base section must be tightened before removing the transport lock.
7. Secure the screws against unintentional loosening.
8. Ensure that the linear module is free of obstructions across the entire stroke area. Consider performing collision tests on the application.
9. If necessary, attach prohibition signs and warning signs for the application on the linear module.

7 Securing the base plate with pins



8 Fastening the base plate



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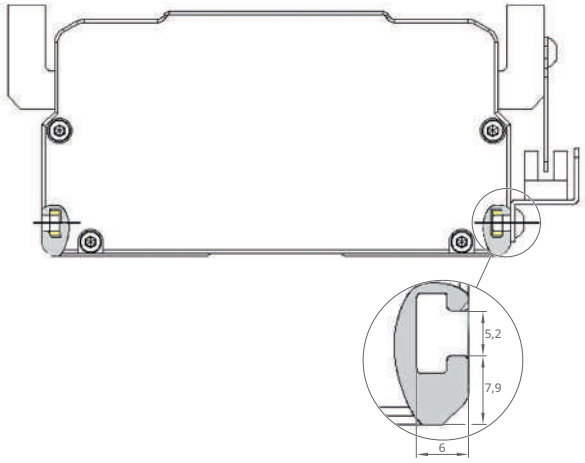
6.3 Installing the sensor

The sensor is installed in the slots of the linear module.

1. Remove the end plates.
2. Insert the sensor bracket into the T-slot.
3. Secure the sensor bracket with the fastening screws.

9 T-slot



7 Commissioning

Observe the technical data in accordance with the operating conditions.

Comply with all safety regulations.

Authorized personnel

- Assembly and commissioning may only be carried out by qualified technical personnel.
- Work on the electrical system may only be carried out by trained, electrically skilled persons.

A professional electrician must carry out and document the following inspections and measurements before initial startup:

1. Visual inspection of the condition.
2. Check operating and safety functions.
3. Measure leakage currents.
4. Measure insulation resistance.

Further information on inspections and measurements is provided in the chapter *Maintenance*.

8 Operation

This chapter is aimed at owners and operating authorities. It provides all information required for the safe and proper operation of the lifting columns under normal operating conditions.

Observe the technical data in accordance with the operating conditions.

Comply with all safety regulations.

8.1 Safety instructions

⚠ WARNING

Risk of serious injury from remaining in the stroke area of the device

There is a risk of serious injury due to crushing within the operating area of the device.

- Ensure that no persons remain in the stroke area of the device during operation.
- Switch off the device immediately if unusual noises or changes in operation occur.
- Do not interfere with the elements connected to the device while the device is in operation.

⚠ WARNING

Risk of injury and property damage due to component failure

Falling working loads due to failure of components, e.g., belt breakage, screw breakage, or loss of input torque.

- Provide additional safety functions to protect the working area.
- Release the safety brake only if uncontrolled movement of the carriage is not possible. Secure the carriage against movement and clear the hazard area, especially in vertical applications.
- Inspect the actuator regularly for signs of wear or excessive wear.

NOTICE

Risk of equipment damage due to static or dynamic overload

Risk of damage to or failure of the device

- Do not overload the device, i.e., do not operate it outside the permissible operating data.
- Do not exceed the rated load.
- Do not tamper with connected components while the device is in operation.

NOTICE

Ingress of liquids and dust

The device may become damaged if liquids or dust penetrate the actuator during extension or retraction.

- Keep foreign particles away from the device during operation.

8.2 Switching on

The device has no operating element of its own. The device is operated via a separate operating element. Observe the user manual for the operating element.

8.3 Switching off

The device has no operating element of its own. The device is operated via a separate operating element. Observe the user manual for the operating element.

8.4 Measures before use

Contamination may result in device damage.

1. Ensure that no persons or objects are located in the stroke area.
2. Before use, ensure that device components and the surrounding area are clean and not exposed to explosion hazards.
3. Keep the installation site free of liquids and dust.

8.5 Controlling the actuator

The device is not equipped with its own operating devices. Operation is performed via a separate operating device.

The actuator can be operated by control units, a PC, or a PLC.

- ▸ Before use, set parameters such as the home position, speed, and acceleration value.
- » A program issues the command to send signals to the motor of the actuator.

8.6 Emergency disengagement

The actuator has no built-in on/off switch and must be disconnected from the power supply. The device can only be de-energized by disconnecting it from the power supply.

The application in which the actuator is installed must be equipped with an emergency-stop switch or allow disconnection of the control unit from the mains supply at all poles.

In hazardous situations, all movements of the device must be stopped as quickly as possible and the power supply must be disconnected.

Procedure in hazardous situations

1. Press the emergency-stop switch immediately, if available, or interrupt the power supply to the actuator.
2. Evacuate all persons from the danger zone and initiate first aid measures.
3. If necessary, notify a doctor and the fire department.
4. Inform the responsible person on site.
5. Keep access routes clear for rescue vehicles.
6. Depending on the severity of the emergency, notify the relevant authorities if necessary.
7. Assign qualified personnel to rectify the fault.

⚠ DANGER

Risk of fatal injury due to improper restart

Risk of fatal injury to persons in the danger zone, risk of property damage

- ▸ Do not restart the device until all persons are outside the danger zone.
- ▸ Check the device and the application that uses the device before resuming operation.
- ▸ Ensure that all safety devices are installed and fully functional.

Before restarting:

1. Check the device and the application that uses the device, and ensure that all safety devices are installed and fully functional.

8.7 Shutting down

1. Disconnect the device from the power supply.
2. Ensure that the power supply cannot be switched on again unintentionally.
3. Cleaning the device
4. Carry out an evaluation using the checklist and retain the record.

9 Troubleshooting

The following chapter describes possible causes of device malfunctions and the measures required to restore operation.

If malfunctions occur frequently, shorten the maintenance intervals.

If a malfunction cannot be rectified with the measures described, contact Schaeffler Service.

Authorized personnel

- The measures described here may be carried out by the operator unless otherwise specified.
- Some tasks may only be performed by qualified personnel; this will be explicitly stated in the relevant fault description.
- Work on the electrical system may only be carried out by trained, electrically skilled persons.

Safety instructions

⚠ WARNING

Risk of injury and property damage due to improper troubleshooting

Improper troubleshooting may result in injury or property damage.

- ‣ Do not loosen any screws on the device.
- ‣ Do not open the device.
- ‣ If malfunctions cannot be resolved by following the instructions below, remove the lifting column and send it to Schaeffler for repair.

Procedure in the event of malfunctions

As a general rule:

1. In the event of malfunctions that may pose an immediate risk to persons or property, switch off the actuator immediately and secure it against being switched on again.

› The actuator is secured against being switched on again.

2. Determine the cause of the malfunction.
3. Depending on the type of malfunction: have the malfunction remedied by qualified personnel.
4. Inform the responsible persons on site about the malfunction.

Refer to the *Troubleshooting* table to determine who is authorized to remedy the malfunction.

7 Troubleshooting

Error	Possible cause	Remedy	To be carried out by
Actuator does not move	Obstacle in the stroke area of the device	▸ Remove all obstacles from the stroke area.	Operator
	Incorrect load	▸ Measure the static and dynamic load and compare it with the information on the product label. ▸ If the load is exceeded, replace the device.	Qualified personnel
	Service life of the actuator has been exceeded	▸ Check the performance diagram ▸ Contact Schaeffler Service	Qualified personnel
Load cannot be moved vertically	Obstacle in the stroke area of the actuator	▸ Remove all obstacles from the stroke area.	Operator
	Incorrect load	▸ Remove loads from the actuator.	Operator
	Motor, gear, or spindle nut defective	▸ Replace the device.	Qualified personnel
Markedly reduced speed	Obstacle in the stroke area of the actuator	▸ Remove all obstacles from the stroke area.	Operator
	Incorrect load	▸ Remove loads from the actuator.	Operator
	Motor, gear, or spindle nut defective	▸ Replace the device.	Qualified personnel
Significantly increased running noise	Obstacle in the stroke area of the actuator	▸ Remove all obstacles from the stroke area.	Operator
	Incorrect load	▸ Remove loads from the actuator.	Operator
	Motor, gear, or spindle nut defective	▸ Replace the device.	Qualified personnel

9.1 Startup after correcting a malfunction

Once the malfunction has been corrected:

- Before restarting, carry out the steps described in the Assembly and Commissioning sections.

10 Maintenance

Authorized personnel

- The measures described here may be carried out by the operator unless otherwise specified.
- Some tasks may only be carried out by qualified personnel; this will be explicitly stated in the description of the respective maintenance work.
- Work on the electrical system may only be carried out by trained, electrically skilled persons.

Safety instructions

DANGER

Improper maintenance

Risk of electric shock. Improper maintenance can result in serious injury, death, or damage.

- ▸ Work on electrical systems may only be carried out by professional electricians.

DANGER

Risk of fatal injury from unauthorized reconnection of the power supply

Risk of fatal injury to persons in the hazard area due to moving parts or electric shock if the power supply is switched on without authorization during work on the system and causes the system to restart.

- ▸ Before starting work, switch off the system and secure it against reconnection.

10.1 Maintenance plan

The following sections describe the maintenance work required for optimum and trouble-free operation.

If increased wear is detected during regular inspections, shorten the maintenance intervals according to the actual signs of wear.

If the lifting column is used outside the ambient conditions specified previously in this manual, check the components once a month for changes such as oxidation or deposits.

8 Maintenance plan

Maintenance interval	Maintenance work	Carried out by
Daily	▸ If necessary, remove dust and dirt.	Operator
	▸ Check the linear module for visible damage. ▸ Check the linear module for unusual noises or changes in performance.	Qualified personnel
Monthly	▸ Check that the connection of the linear module to the application is secure. ▸ Check all other parts and optionally connected components for secure fit. ✓ Storage period ≥3 months ▸ Check the general condition of all packaging components. ▸ If necessary, renew the preservation method	Qualified personnel

Maintenance interval	Maintenance work	Carried out by
Every 3 months	✓ Visual inspection of the linear module ‣ Check the grease quantity. ‣ Check the grease for contamination.	Qualified personnel
	✓ Visual inspection of the ball screw drive ‣ Check the grease quantity. ‣ Check the grease for contamination.	Qualified personnel
	✓ Visual inspection of the coupling ‣ Check for slippage during rotation. ‣ If necessary, tighten the coupling clamp screw.	Qualified personnel
Every 6 months	‣ Check optional accessories for visible damage	Qualified personnel
Every 12 months	‣ Carry out a visual inspection of labels and warning notices and replace if necessary.	Qualified personnel

10.2 Maintenance work

⚠ CAUTION

Moving parts

Hand injuries due to crushing

- Ensure that no persons are located in the stroke area of the device during operation.
- Observe the information on the product label.
- Never tamper with the elements that are connected to the device while the device is in operation.

When lubricating the ball screw drive and the linear module, observe the specified grease quantity and quality of grease.

9 Grease quantity

Size of the carriage	Type		
	A, U, R	LA, LU, LR	SA, SU
	cm^3	cm^3	cm^3
15	0.4	–	0.3
20	0.7	0.9	0.6
25	1.4	1.8	1.1
30	2.2	2.9	1.8
35	2.2	2.9	1.8
45	4.7	6.1	–

10 Greases

Feature		Designation	
		LGEP 2	LGMT
Thickener		Li	Li
Base oil		Mineral oil	Mineral oil
Operating temperature	°C	–20 ... +110	–30 ... +120
Kinematic viscosity of base oil	mm^2/s	200	110
Consistency class (acc. to NLGI)		2	2
Temperature range, application range		EP grease	normal

11 Lubrication intervals

Carriage size	Normal operating conditions	Load operation v ≤ 1 m/s
	Fm ≤ 0.15 · C	Fm ≤ 0.3
	km	km
15	5000	1200
20	10000	1200
25	10000	2400
30	10000	2400
35	10000	2400
45	10000	2400

10.2.1 Cleaning

To be performed by the operator

If contaminated, clean the product immediately to prevent the buildup of residue.

NOTICE

Damage due to improper cleaning

Improper cleaning of the device may cause damage to the device.

- Do not use aggressive cleaning agents. Wash water, including chemical additives, must be pH-neutral.
- Only use cleaning agents specified by the manufacturer.
- Do not use steam cleaners or high-pressure cleaners.
- Other cleaning agents or cleaning devices may only be used with the manufacturer's approval.
- The actuator must not come into contact with liquids during operation.

✓ Device is protected against contact with liquids.

1. Manually clean the surface of the linear module and its immediate surroundings with a damp cloth.
2. Check for and remove any escaping grease.
3. If necessary, check for and remove any dust and foreign particles.

10.2.2 Checking for visible damage

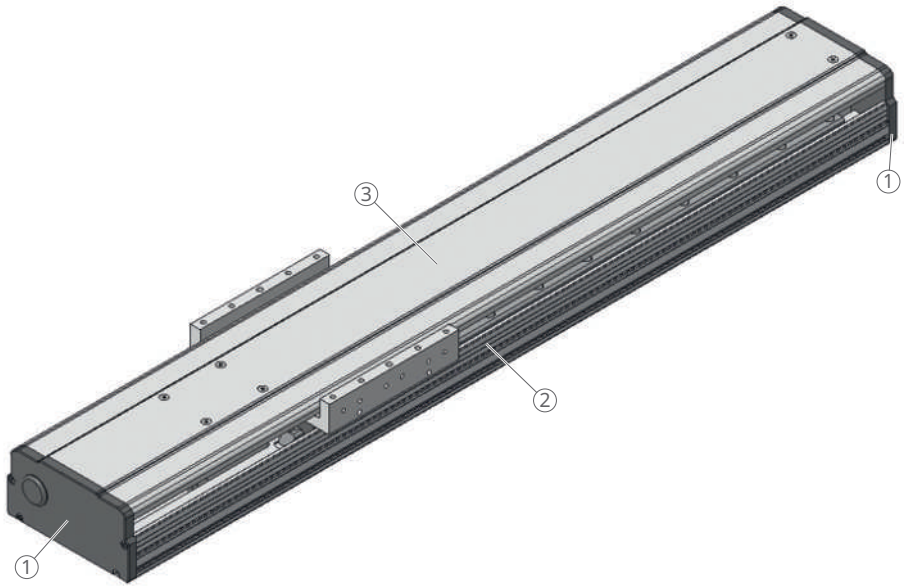
To be performed by qualified personnel.

1. Disconnect the device from the power supply.
2. Check end plates for cracks and gaps.
3. If necessary, check the motor adapter and coupling housing for proper installation as well as for cracks and gaps.
4. Check the profile for cracks, gaps, and broken parts.
5. Check the upper cover for scratches and indentations.
6. If necessary, check the cable chain for scratches and indentations.

» In the event of damage, inform the processor or the manufacturer of the linear module.

» If no damage is present and the processor or manufacturer has not raised any concerns, reconnect the device to the power supply.

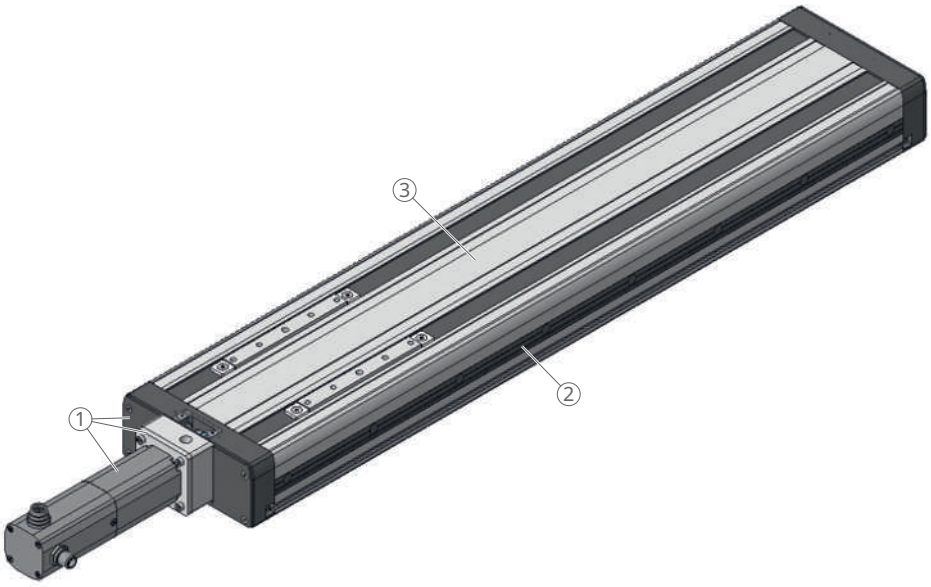
10 Components for visual condition inspection (CLSM-150-B..A)



001DB69D

1	End plates	2	Profile
3	Upper cover		

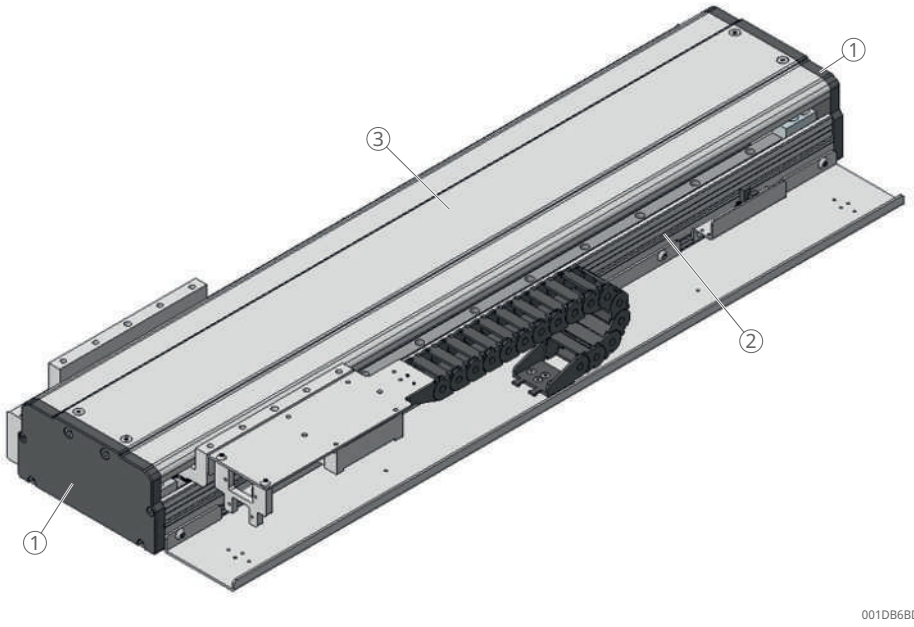
11 Components for visual condition inspection (CLSM-150-B..P)



001DB6AD

1	End plates, motor adapter, coupling housing	2	Profile
3	Upper cover		

12 Components for visual condition inspection (CLSM-150-L..A)



1	End plates	2	Profile
3	Upper cover		

10.3 Measures following completed maintenance

After completing the maintenance work, carry out the following steps before recommissioning the device:

1. Check all previously loosened screw connections for a secure fit.
2. Ensure that all tools, materials, and other equipment used have been removed from the work area.
3. Clean the work area and remove any spilled liquids, process media, or similar substances.
4. Ensure that all of the system's safety measures are working correctly.
5. Check functions against the product specifications.
6. Document the inspections in the maintenance log.

11 Dismounting

Comply with all safety regulations.

Authorized personnel

- Disassembly may only be carried out qualified technical personnel.
- Work on the electrical system may only be carried out by trained, electrically skilled persons.

Safety instructions

⚠ WARNING

Risk of severe injury from improper disassembly

Stored residual energy, sharp-edged components, pins, and corners on individual parts or on the required tools can cause severe injuries if disassembly is performed improperly.

- ▸ Ensure sufficient space for disassembly before starting work.
- ▸ Exercise caution when working with exposed, sharp-edged components.
- ▸ Ensure that the disassembly area is clean and tidy. Avoid loosely stacked components or parts and tools lying on the floor which may pose a hazard.
- ▸ Disassemble components properly in accordance with applicable local regulations.
- ▸ Secure components to prevent them from falling or tipping over.
- ▸ Contact Schaeffler with any questions or concerns.

Removing the linear module

1. Disconnect the device from the power supply.
2. Secure the elements of the application so that no loads act on the linear module.
3. Loosen and remove the fastening screws.
4. Separate the device from the elements of the application.
5. Clean the device
6. Carefully pack the device for shipping to the manufacturer.
7. Disassemble the device in accordance with locally applicable occupational safety and environmental protection regulations.

12 Disposal

If no return or disposal agreement is in place, disassembled components must be sent for recycling.

NOTICE

Improper disposal

environmental damage

- Electronic waste, electronic components, lubricants, and other additives are subject to hazardous waste regulations and may only be disposed of by authorized specialist companies.

Observe the local regulations for disposal.

Information on environmentally sound disposal can be obtained from local authorities or specialist companies.

1. Dispose of metal and plastic parts at an appropriate recycling facility.
2. Sort remaining components by material and dispose of them in accordance with locally applicable occupational safety and environmental protection regulations.

13 Technical data

For detailed and current information on equipment and operating data:

TPI299 | EWELLIX Linear Modules |
https://www.schaeffler.de/std/223F

For further information, contact Schaeffler.

13.1 Ambient conditions

Transport and storage

The product may only be transported and stored in its original packaging under the following ambient conditions:

- dry and dust-free environment, not outdoors
- protected from sunlight and UV radiation
- chemically non-aggressive environment
- temperature: −20 °C (−4 °F) to +40 °C (+104 °F)
- humidity: max. 95 %, non-condensing
- air pressure: 700 hPa to 1060 hPa
- no mechanical shocks

If additional storage instructions are printed on the packaging that exceed the requirements listed here, those instructions must also be observed.

Operation

The product may only be operated under the following ambient conditions:

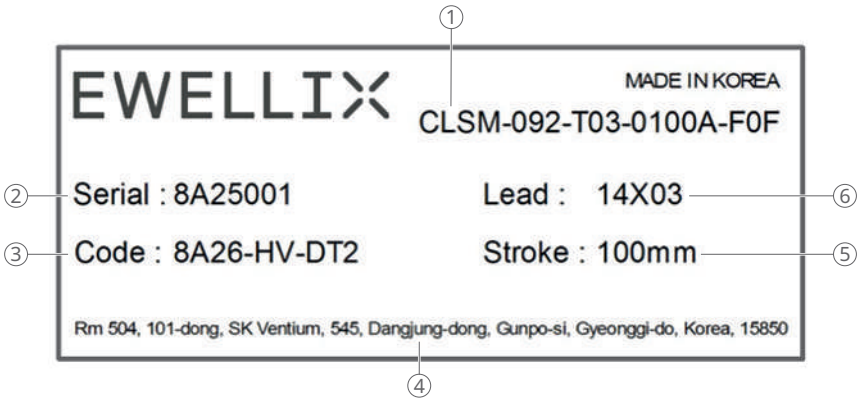
The surface temperature of the linear module must not exceed +70 °C. If this temperature is exceeded, the service life of the linear module will be reduced.

- indoor use only
- chemically non-aggressive environment
- non-explosive environment
- temperature: 0 °C (+32 °F) to +55 °C (+131 °F)
- humidity: max. 95 %, non-condensing
- air pressure: 700 hPa to 1060 hPa
- no strong radiation fields

13.2 Product label

The type plate contains the following Information:

13 Product label



1	Type key	2	Serial number
3	Code number	4	Address
5	Stroke	6	Lead

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