



Operating instructions



Power and Energy Solutions
External energy storage units



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1 General information

1.1 Structure of the safety notes

1.1.1 Meaning of signal words

The following table shows the grading and meaning of the signal words for safety notes:

Signal word	Meaning	Consequences if disregarded
⚠ DANGER	Imminent hazard	Severe or fatal injuries
⚠ WARNING	Possible dangerous situation	Severe or fatal injuries
⚠ CAUTION	Possible 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.	

1.1.2 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.

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

1.1.3 Structure of embedded safety notes

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

This is the formal structure of an embedded safety note:

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

1.2 Decimal separator in numerical values

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

Example: 30.5 kg

1.3 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.

1.4 Other applicable documentation

This documentation supplements the listed documents and limits the instructions for use in accordance with the following information. Use this documentation only together with the following documentation:

- "MOVIDRIVE® modular" operating instructions
- "MOVIDRIVE® modular" product manual
- "EKD-003 discharge unit" operating instructions
- "MOVIKIT® Power and Energy Solutions PowerMode/EnergyMode" manual

1.5 Product names and trademarks

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

1.6 Copyright notice

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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 external energy storage unit stores energy and makes it available to the connected drive DC link when needed. The external energy storage unit is intended for installation in electrical systems or machines. The external energy storage unit is intended for operation with MDP92A, MDE90A, and MDC92A devices of the MOVIDRIVE® modular inverter series.

If the product is installed in electrical systems or machinery, startup is prohibited until it has been verified that the machine complies with local laws and regulations.

The standards given in the declaration of conformity apply 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.

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

Options and accessories from SEW-EURODRIVE may only be used in combination with products from SEW-EURODRIVE.

2.5 Transport

Inspect the shipment for damage as soon as you receive the delivery. Inform the shipping company immediately about any damage. If the product is damaged, it must not be assembled, installed or started up.

Observe the following notes when transporting the device:

- Ensure that the product is not subject to mechanical impact.

If necessary, use suitable, sufficiently dimensioned handling equipment.

Observe the information on climatic conditions in chapter "Technical data" of the documentation.

Make sure that the energy storage units are discharged before transportation.

Make sure that the energy storage units are short-circuited during transportation.

2.6 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" in the documentation.

2.6.1 Restrictions of use

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

- Use in potentially explosive atmospheres
- Use in areas exposed to harmful oils, acids, gases, vapors, dust, and radiation
- Operation in applications with impermissibly high mechanical vibration and shock loads in excess of the regulations stipulated in EN 61800-5-1
- Use at an elevation of more than 3800 m above sea level

The product can be used at altitudes above 1000 m above sea level up to 3800 m above sea level under the following conditions:

- The reduction of the nominal output current and/or the line voltage is considered according to the data in chapter "Technical data" in the documentation.
- 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 (in accordance with EN 61800-5-1 and EN 60204-1) is required, then implement this outside the product at altitudes of more than 2000 m above sea level.

2.7 Electrical installation

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

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

2.7.1 Required preventive measure

Make sure that the product is properly connected to the ground connection and equipotential bonding is realized in the system.

2.8 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.

2.9 Startup/operation

Do not deactivate monitoring and protection devices even for a trial run.

You must switch off the device if in doubt whenever changes occur in relation to normal operation (e.g. increased temperatures, noises, vibrations). Identify the cause and contact SEW-EURODRIVE if necessary.

Where required, systems in which these devices are installed must be equipped with additional monitoring and protection devices in accordance with the respective applicable safety regulations, e.g. the law governing technical equipment, accident prevention regulations, etc.

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.

Observe the safety notes in chapters "Startup" and "Operation" in this documentation.

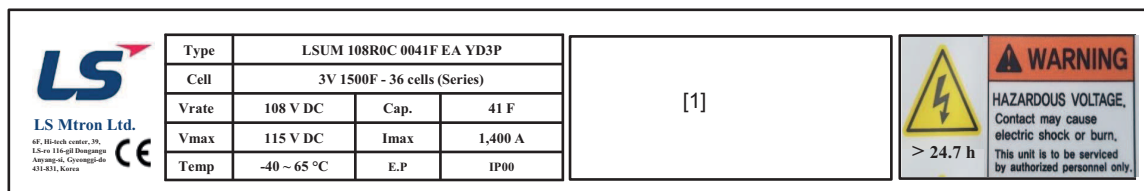
Risk of burns due to arcing: Do not disconnect power connections during operation. Do not connect power connections during operation.

3 Device structure

3.1 External energy storage units from LS Materials

3.1.1 Nameplate

The nameplate is presented as an example.



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[1] Serial number and barcode

3.1.2 Type designation

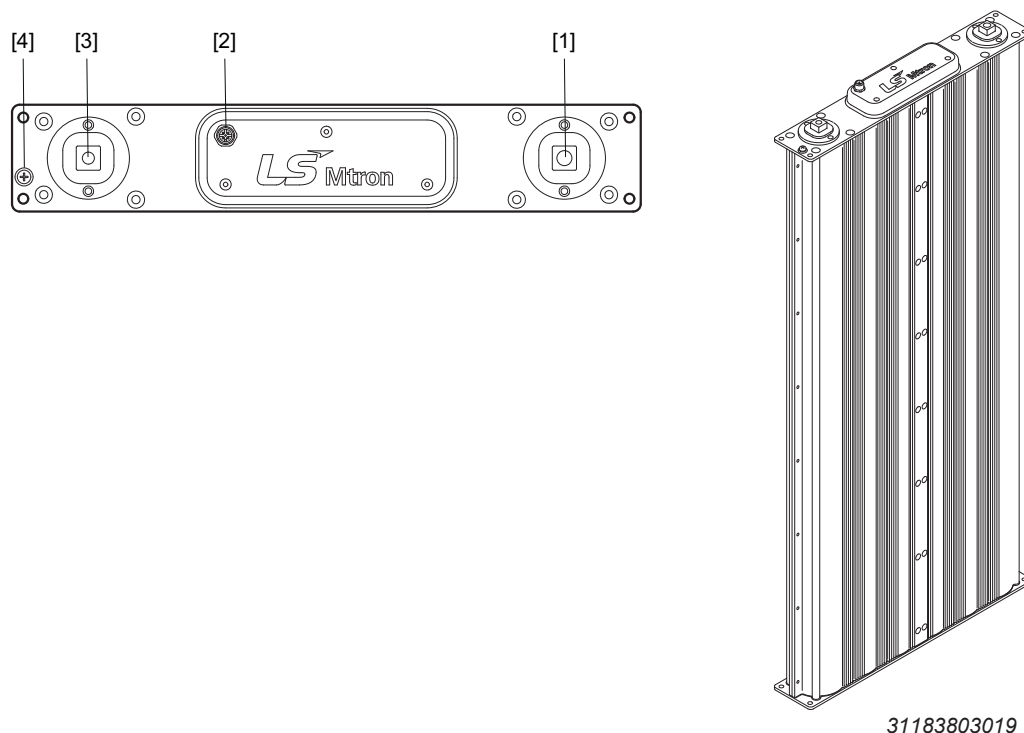
The type designation of the external energy storage units LSUM 108R0C 0083F EA YD3P from LS Materials provides the following data:

LS	LS Materials
U	Ultra-capacitor
M	Module
108R0	Nominal voltage, manufacturer = 108 V ¹⁾
C0083F	Nominal capacitance = 83 F
EA	Electrolyte acetonitrile
YD3P	Flat module with mounted plastic housing

1) Contrary to the manufacturer's specification, the storage units are designed with a nominal voltage of 100 V.

3.1.3 Storage unit

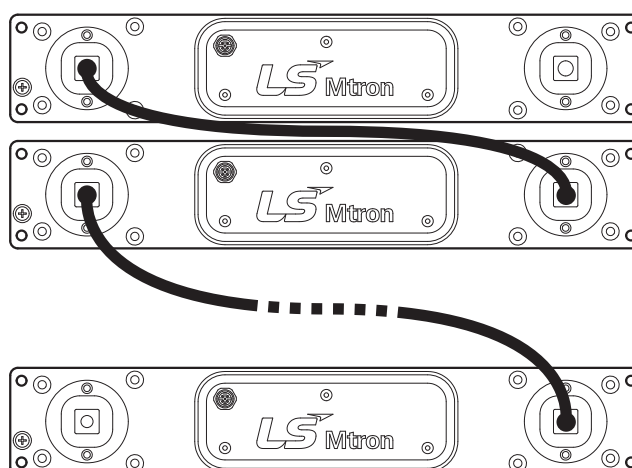
A storage unit corresponds to an energy module and is shown in the following figure:



- [1] Connection screw negative pole (M10)
- [2] Signal connector 5-pin
- [3] Connection screw positive pole (M8)
- [4] PE connection (M6)

3.1.4 Storage bundle

A storage bundle consists of a variable number of energy modules and is shown in the following figure:



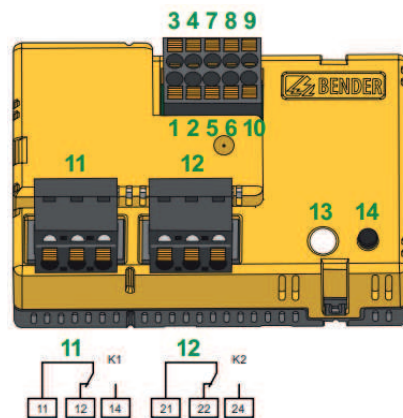
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3.1.5 Ventilation

We recommend installing the external energy storage units from LS Materials in a control cabinet. They can be installed in a control cabinet with the inverter or in a separate control cabinet. Ensure sufficient ventilation during installation to guarantee the specified service life of the external energy storage units. For more information, refer to chapter "Installing external energy storage units from LS Materials" (→ 21).

3.1.6 Modular residual current device (MRCD)

For safety reasons, the energy storage system must be equipped with a modular residual current device. In doing so, only use devices that have been parameterized for this purpose by SEW-EURODRIVE.



No.	Terminal	Meaning
1	24 V	Supply voltage U_s
2	GND	
3	D1	Contact feedback
4	DG	
5	T/R	Connection external test/reset
6	GND	
7	A	RS-485 interface
8	B	
9	X1	Terminals for cable bridge for connection of the integrated terminating resistor of the RS-485 interface
10	X2	
11	11, 12, 14	Relay K1 (prewarning)
12	21, 22, 24	Relay K2 (alarm)
13	–	LED: operation "ON" and "Alarm"
14	–	Test and reset button "T"

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Source: Operating instructions for the MRCDB300 series, Bender, Version 08/2021, Page 19

4 Installation

Discharge the energy storage units before conducting any work on the energy storage systems.



⚠ WARNING

Electric shock from charged energy storage units. The energy storage units are still charged after the device has been switched off.

Severe or fatal injuries.

- Discharge the energy storage units before conducting any work on the device.
- Only electrically skilled persons may discharge and short-circuit the energy storage unit.

For more information, refer to the documentation "MOVI-DPS® discharge unit".

4.1 Accessories

The following accessories are available for the external energy storage units:



INFORMATION

The scope of delivery does not include accessories, such as installation and mounting material or connection cables.

	Part number
Locking plate ESS	28131800
OAI45C input module (analog)	28211987
ODI81C input module (digital)	28211936
OPV81C terminal module	28211847
OCC11C bus coupler CAN (SBus)	28212029
OCE12C bus coupler EtherCAT® (SBusPLUS)	25664484
MOVI-DPS® discharge unit size 1	13574949
EKD-003 discharge unit	28265610
Short-circuit connector	28149874

4.2 Protection and disconnection

Provide the external energy storage units with fusing according to the project planning prepared by SEW-EURODRIVE. To synchronize the energy storage units with the DC link, you will need one DC contactor in each of the positive and negative cables. An SEW-EURODRIVE controller with a license for a MOVIKIT® PowerMode or Energy-Mode module is required to control these components. The use of this MOVIKIT® module is a prerequisite for safe operation of the system. Additionally install a modular residual current device (MRCD).

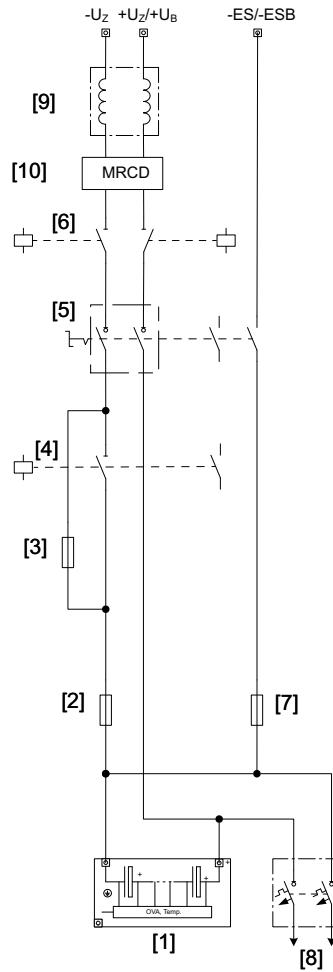
If necessary, install a choke in the DC link. Observe the specifications in the "MOVIDRIVE® modular" product manual.

The following diagram shows an overview of the components that are required to set up a storage system. You will receive details about these components as part of the project planning process, which is carried out by SEW-EURODRIVE on a customer-specific basis.

INFORMATION



As part of the project planning, SEW-EURODRIVE provides a list of components for the fuse concept that is required for your application. If different components are used – even if these are technically adequate – SEW-EURODRIVE does not accept any liability and cannot guarantee for correct device properties or functions.

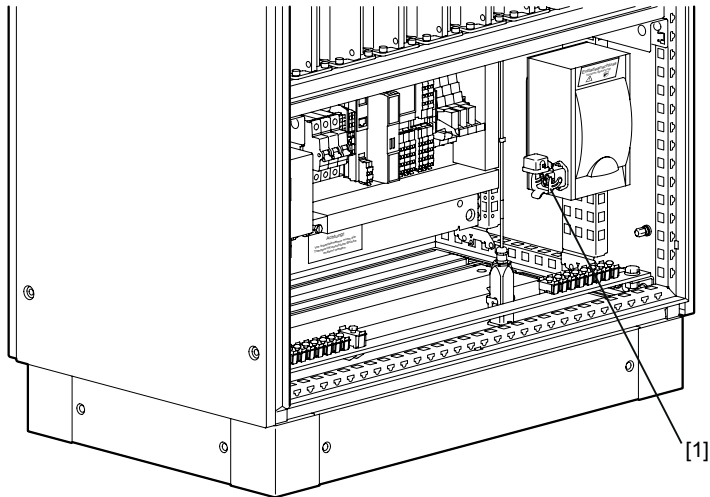


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- | | |
|----------------------------|--------------------------------------|
| [1] Energy storage modules | [6] Synchronization contactors |
| [2] Main fuse | [7] Measuring channel fuse |
| [3] Subfuse | [8] Discharge fuse |
| [4] Bypass contactor | [9] Choke |
| [5] Disconnection switch | [10] Modular residual current device |

4.3 Connecting the discharge unit

SEW-EURODRIVE offers entire energy storage systems with integrated DSK energy modules that are factory-equipped with the connection shown for a discharge unit (discharge connection socket).



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[1] Connection of the discharge unit

If you are assembling a storage system yourself from individual components, you will also need to provide a discharge connection socket. This ensures that the storage unit can be discharged in the event of a service procedure.

Protect a connecting facility for a discharge unit with a DC voltage fuse. Use a miniature circuit breaker with characteristic C or a full range fuse in utilization category gR for this purpose. In both cases, the following specification must be adhered to:

- Minimum rated voltage: DC 880 V
- Maximum rated current: 16 A
- Minimum breaking capacity 10 kA

In addition, you will need the components listed in the table. Provide a facility for mechanical attachment of the discharge connection socket in the control cabinet. An example of this is illustrated in the solution shown above for the SEW-EURODRIVE energy storage systems.

Required accessories	Part number
Short-circuit and ground-fault proof cable (NS-GAFÖU) from storage unit to fuse protection necessary	
Housing including cap with gasket	09200030306 (Harting)
Socket insert	09120023152 (Harting)
3 crimp contacts	09320006205 ROHS (Harting)
3 conductors with a cross section of 2.5 mm² in customer-specific length for positive wire, negative wire, and PE from the fuse to the discharge socket	
Short circuit connector	28149874

After the discharge is completed, plug the short-circuit connector into the discharge connection socket. The short-circuit connector makes safe service work possible by preventing new voltage from building up. The short-circuit connector is red, which allows you to see at a glance if the short circuit is present.

4.4 Mechanical installation

4.4.1 Selecting the installation location

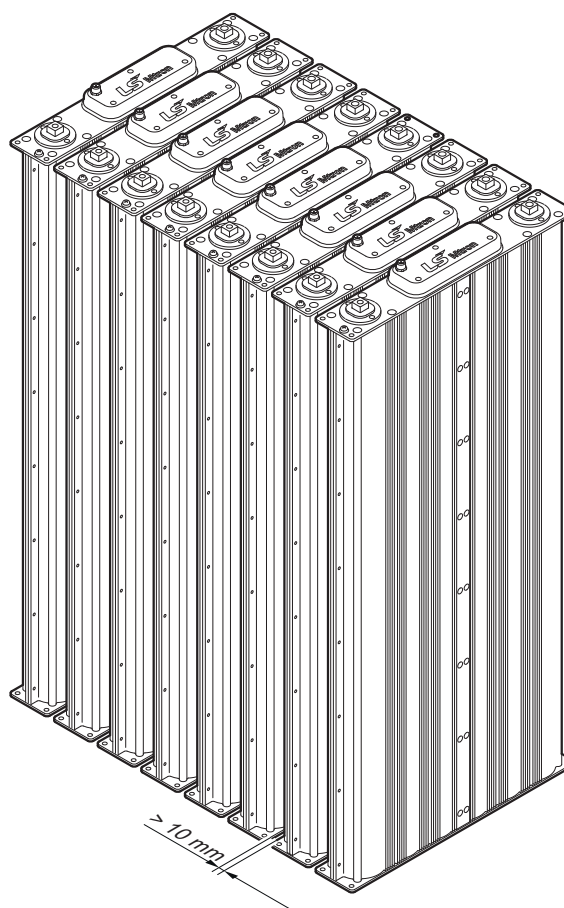
The external energy storage units are either connected to an MDP92A power supply module or an MDE90A DC/DC converter module. The distance between the energy storage units and the MDP92A/MDE90A must not exceed 30 m. This is based on the assumption that the connection cable between the energy storage units and MDP92A/MDE90A is a copper cable with a cross section of 35 mm². If you are unable to comply with this specification, consult SEW-EURODRIVE.

4.4.2 Installing external energy storage units from LS Materials

We recommend installing the external energy storage units from LS Materials in a control cabinet. They can be installed in a control cabinet with the inverters or in a separate control cabinet.

Ensure sufficient ventilation of the energy modules during installation to guarantee the projected service life of the external energy storage units, see the following figure.

We recommend installing the external energy storage units from LS Materials in a vertical position, see the following figure. Contact SEW-EURODRIVE in case of deviating installation requirements.



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SEW-EURODRIVE provides support for installation and ventilation of the external energy storage units in connection with storage configuration.

Attaching the energy storage units

The external energy storage units are mechanically attached using 4 × M6 screws each on the upper and lower housing flange.

1. Refer to the dimension drawing in chapter "Dimension drawing" (→  50) for information on the distances of the bores on the housing flanges.
2. On the fastening surface, drill the holes at the appropriate places.
3. Fasten the external energy storage units using M6 screws of suitable length.

Minimum distances between the energy modules

The minimum distance between the individual modules of the external energy storage units is 10 mm.

Depending on the application, it might be necessary to increase the convection between the modules by using fans.

Shielding against interference

To shield against interfering radiation or fields, the locking plate (part number 28131800) must be mounted on the black plastic housing at the top of the DLC module.

There are two self-adhesive surfaces on the back of this plate. All you have to do is remove the protective film and push the component in place, applying good pressure. The correct placement is indicated by the shape of the plate and is self-explanatory.

4.5 Electrical installation

4.5.1 Protective measures against electrical hazards



⚠ WARNING

Electric shock when disconnecting or connecting live storage unit connections.

Severe or fatal injuries.

- Switch off all supply voltages.
- Make sure that the devices of the system are de-energized.
- Never connect or disconnect the storage unit connections while they are energized.
- Never disconnect the storage unit connections if you do not know the actual state of charge of the storage bundle.
- Discharge the storage bundle to below 2 V.
- Short-circuit the storage bundle before disconnecting it from the device.

Line protection



NOTICE

Danger of short circuit from missing line protection

Destruction of the connection cable

- Ensure that the connection cables and fuses are dimensioned according to the project planning prepared by SEW-EURODRIVE.



⚠ WARNING

Electric shock due to high leakage current. A leakage current of > 3.5 mA may be generated in the energy storage system during operation.

Severe or fatal injuries.

- ✓ To avoid dangerous currents, observe the following information pursuant to standard EN 61800-5-1:
- Supply system cable < 10 mm²:
 - Route a second PE conductor with the cable cross section of the supply system cable in parallel to the protective earth via separate terminals or use a copper PE conductor with a cable cross section of 10 mm².
- Supply system cable 10 mm² to 16 mm²:
 - Route a copper PE conductor with the cable cross section of the supply system cable.
- Supply system cable 16 mm² to 35 mm²:
 - Route a copper PE conductor with a cable cross section of 16 mm².
- Supply system cable > 35 mm²:
 - Route a copper PE conductor with half the cross section of the supply system cable.

4.5.2 Installing external energy storage units from LS Materials

For a complete and safe installation of an energy storage system, project planning must be carried out by SEW-EURODRIVE. As a result of the project planning, you will receive a list of the required components. In order to wire these components correctly, it is necessary to purchase an EPLAN from SEW-EURODRIVE. The installation must be performed according to the specifications of SEW-EURODRIVE. Note that failure to do so may result in limitations regarding the warranty and safety.

⚠ WARNING



Electric shock due to faulty ground connection or faulty protective bonding.

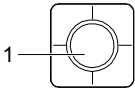
Severe or fatal injuries.

- Make sure you install the ground connection and protective bonding correctly.

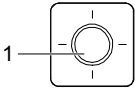
Each energy storage module must be grounded at the earth connection using the shortest route. No retaining screw must be screwed into the grounding hole.

Power connection

ES–

Function		
Power connection of the storage unit		
Connection type		
M10 thread		
Wiring diagram		
		
Assignment		
No.	Name	Function
1	ES–	Energy storage (-)

ES+

Function		
Power connection of the storage unit		
Connection type		
M8 thread		
Wiring diagram		
		
Assignment		
No.	Name	Function
1	ES+	Energy storage (+)

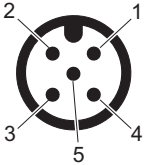
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Wiring of power connections

A suitable conductor with double insulation, for example Single 600-O 1 × 35 mm² VDE U_{0/U} 600/1000 V, must be used for wiring the power connections. Note that project planning of the fuse concept, which is implemented by SEW-EURODRIVE, includes a specific cross section of the power connections. The cross section specified in the project planning results report must be observed. The cross section is normally 35 mm².

Observe the regulations for using a ferrite sleeve in the "MOVIDRIVE® modular" operating instructions.

Monitoring the energy module

Function		
Connection for monitoring the operating state of a storage unit from LS Materials		
Connection type		
M12, 5-pin, female		
Wiring diagram		
		
No.	Name	Function
1	Pt100.11	Temperature sensor pin 1
2	Pt100.21	Temperature sensor pin 2
3	K1.2	Relay contact (NO) < 100 mA
4	K1.1	Relay contact (NO) < 100 mA
5	Pt100.22	Temperature sensor pin 3

Connection cables

To monitor an energy module's operating state, you must connect each individual model to an I/O module via a connection cable. Use one of the cables listed in the table below or a technically equivalent one as the connection cable.

Note that the following cables cannot be ordered from SEW-EURODRIVE. You can order them from Phoenix Contact using the specified part number.

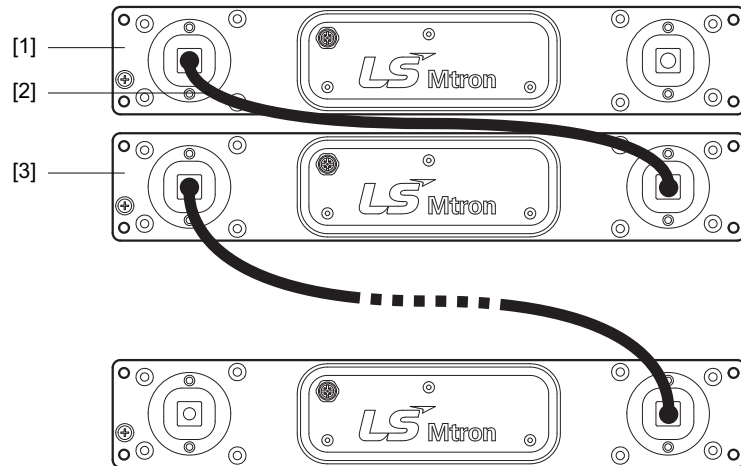
Cable	Length/installation type
Custom lengths: 1.5 m: Part number: 1415686 (Phoenix Contact) 3 m: Part number: 1415687 (Phoenix Contact) 5 m: Part number: 1415688 (Phoenix Contact) 10 m: Part number: 1415689 (Phoenix Contact) Variable: 1697124 (Phoenix Contact)  M12 female ↔ open end	Set length 

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Series connection

Required materials

- Connection screw M10×16 (included in the scope of delivery)
- Connection screw M8×16 (included in the scope of delivery)
- Connection cable with ring cable lugs



31278728203

- [1] Storage unit 1
[2] Connection cable with ring cable lugs
[3] Storage unit 2

Procedure

- ✓ Make sure that there is no oxidation on the surface of the ES- and ES+ connections of the storage units.
- 1. Connect the storage units from LS Materials to the grounding of the control cabinet via the PE bore.
- 2. Place the ring cable lug of the connection cable [2] onto the ES+ connection of storage unit 1 [1].
- 3. Fasten the ring cable lug using the M8×16 connection screw included in the delivery. Use a tightening torque of 20 Nm.
- 4. Place the other ring cable lug onto the ES- connection of storage unit 2 [3].
- 5. Fasten the ring cable lug using the M10×16 connection screw included in the delivery. Use a tightening torque of 30 Nm.
- 6. Glue the locking plate to the plastic housing of the signal contact using double-sided adhesive tape.
- 7. Connect the cabling of the signal interface according to the following specifications.

NOTICE

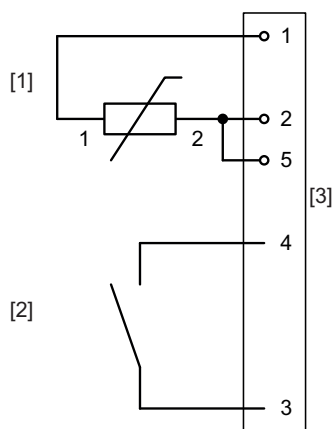
Mechanical load on connections too high

The modules may be damaged if the mechanical load on the connections is too high.

- Use cables for the power connections.

Signal evaluation via I/O modules

To evaluate the monitoring signals of the external energy storage units from LS Materials, the conductors of the cables must be connected to the I/O modules. The assignment of the open conductors is as follows:



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- [1] 3-wire temperature measurement with Pt100
- [2] Overvoltage signal (OVA), relay contact (NO) < 100 mA
- [3] 5-pin connector, M12

Color assignment of the pins:

Pin	Color
Pin 1	Brown (BN)
Pin 2	White (WH)
Pin 3	Blue (BU)
Pin 4	Black (BK)
Pin 5	Gray (GY)

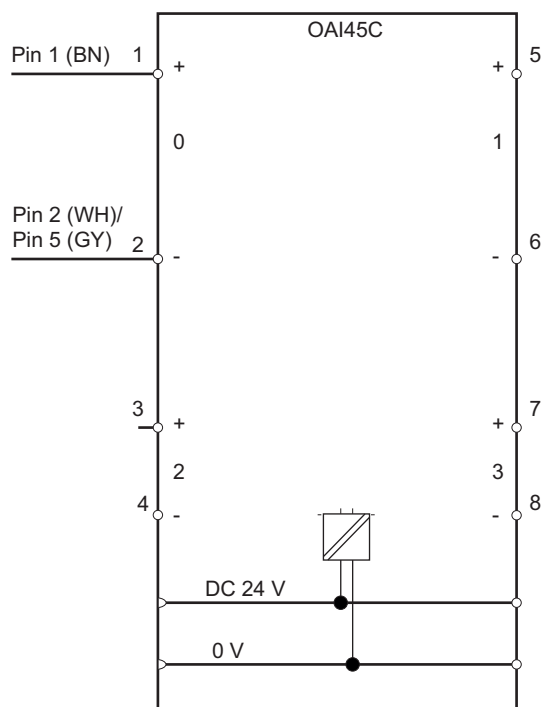


INFORMATION

Note that the color codes shown apply only when using one of the Phoenix Contact cable types that are listed earlier in this chapter. If you use a different cable, different assignments may apply.

The open conductors are connected to the I/O modules according to the following figure:

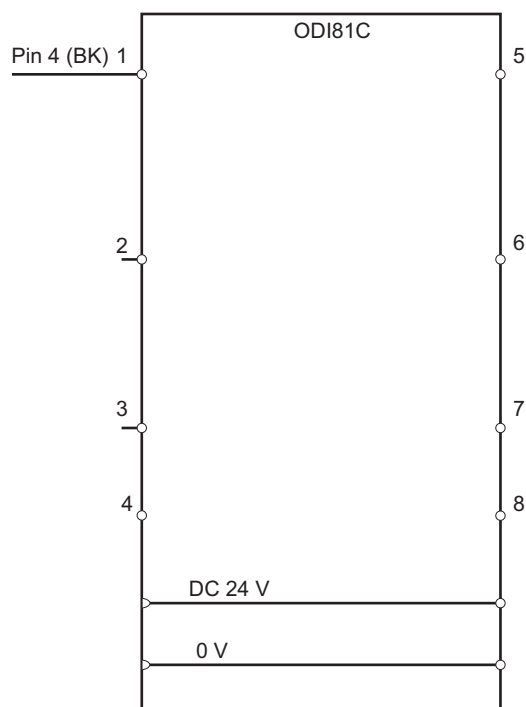
Connecting the temperature signal to the OAI45C I/O module



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The temperature can be sensed via the OAI45C input terminal and the Pt100 temperature sensor installed in the DLC module. Up to 4 overtemperature signals can be evaluated with the OAI45C module (channel 0-3).

Connecting the overvoltage signal to the ODI81C I/O module

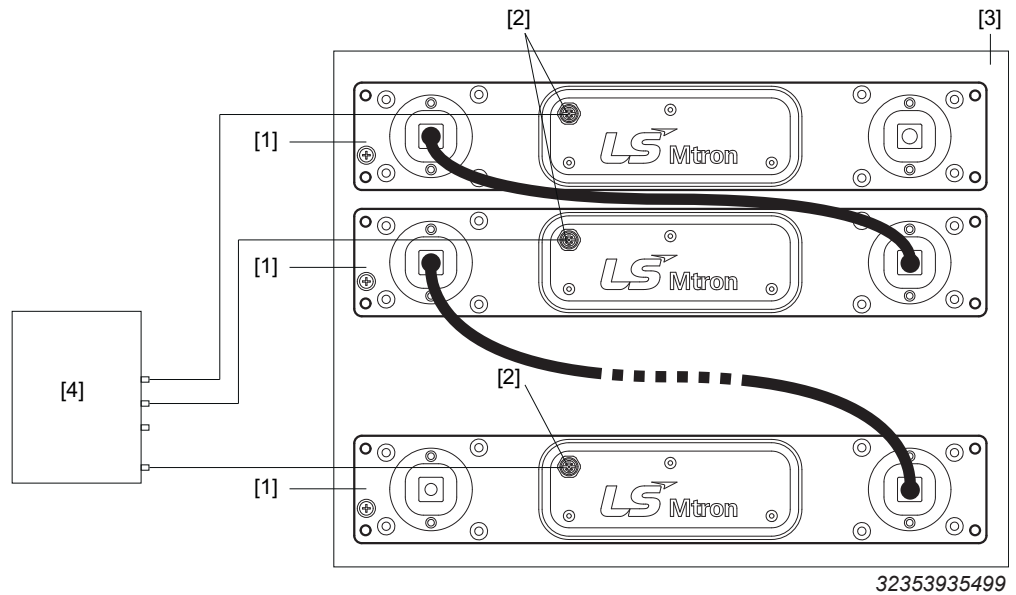


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Up to 8 overvoltage signals can be evaluated with one DI module (pins 1-8).

Pin 3 (BU) must be connected to a +24 V voltage supply. For this purpose, either a distributor terminal can be used within the I/O modules (OPV81C) or a direct connection can be established to the +24 V supply voltage of the control cabinet.

The wiring of several energy modules is shown in the following figure:



- [1] LS Materials storage unit
- [2] M12 signal connector, 5-pin, A-coded
- [3] LS Materials storage bundle
- [4] I/O modules

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5 Startup



⚠ WARNING

Fire hazard from absent fault response.

Severe or fatal injuries.

- Make sure that the diagnostic signals supplied by the energy storage system can be evaluated at all times. Use the "Storage Monitoring" function of the MOVIKIT® software modules for this purpose.

5.1 Storage unit monitoring

Due to the technology used, double-layer capacitors are able to release very large amounts of energy in a very short time. For this reason, monitoring of the storage units is particularly important. Faults such as overvoltage and overtemperature can be detected via the factory-installed diagnostic interface. In addition, occurring fault currents can be detected by the modular residual current device (MRCD) to be provided.

In order to be able to report any errors that occur and to initiate hazard prevention measures, corresponding settings must be implemented in the MOVIKIT® PowerMode/EnergyMode software module during the startup phase. In addition, the higher-level controller may need to be programmed accordingly. For more information, refer to the MOVIKIT® PowerMode and EnergyMode manuals.

6 Operation

6.1 Useful life

The storage units are subject to aging due to environmental effects and operating conditions. This leads to a decrease in the useful capacitance and an increase in the equivalent series resistance of the storage units.

This means that the storage units have a limited useful life. The end of the useful life is defined as the point in time when one or both of the following cases occur:

- The capacitance of the energy modules is reduced by 20%.
- The equivalent series resistance of the storage modules has increased by 100%.

INFORMATION



During project planning, the external energy storage units must be dimensioned in such a way that they meet the requirements even at the end of their useful life. Therefore, have project planning carried out by SEW-EURODRIVE that is specific for the application. This also enables an estimation of the useful life.



⚠ WARNING

Fire hazard from absent fault response.

Severe or fatal injuries.

- After the useful life has been reached, the memory modules must be replaced. Otherwise, in the event of a fault, it can no longer be ensured under all conditions that the fuse will trip.

6.2 Disconnecting energy storage units



⚠ WARNING

Electric shock when disconnecting or connecting live storage unit connections.

Severe or fatal injuries.

- Switch off all supply voltages.
- Make sure that the devices of the system are de-energized.
- Never connect or disconnect the storage unit connections while they are energized.
- Never disconnect the storage unit connections if you do not know the actual state of charge of the storage bundle.
- Discharge the storage bundle to below 2 V.
- Short-circuit the storage bundle before disconnecting it from the device.

Disconnect the energy storage unit only after discharging it to less than 2 volts. Due to the physical properties of the storage cells used, the energy storage units can re-establish voltage after discharging. Therefore, short-circuit the discharged energy storage units. Observe the specifications in chapter "Discharging energy storage units before service work" (→ 45) for this purpose.

6.3 Disconnecting the system from the grid



⚠ WARNING

Ineffective disconnection from the grid due to charged storage units.

Severe or fatal injuries.

- Disconnect all supply voltages.
- Make sure that the devices of the system are de-energized.
- Discharge the energy storage units using a braking resistor or a discharge unit from SEW-EURODRIVE.
- Short-circuit the energy storage units after discharging.

Disconnecting the system from the grid does not necessarily lead to a safe state. Before conducting any work, discharge and short-circuit the energy storage units on the system. Observe the specifications in chapter "Discharging energy storage units before service work" (→ 45) for this purpose.

6.4 Modular residual current device

The energy storage system must be equipped with a modular residual current device (MRCD). For details about this, refer to chapter "Modular residual current device (MRCD)" (→ 15).

6.4.1 Functional test of the modular residual current device

Test the functionality of the modular residual current device on a regular basis. The required test intervals for compliance with the requirements of DGUV V3 are to be set individually depending on the respective hazard assessment.

The MOVIKIT® PowerMode and EnergyMode software modules automatically test the functionality every time the energy storage unit is synchronized and switched on. If the storage unit is not disconnected and switched on again for a predefined period of 1 to 365 days, the system issues a warning. In such a case, actively initiate the test by disconnecting the storage unit and switching it on again.

You can set the predefined period via the MOVIKIT® software module. The default setting is 180 days. Alternatively, you can also initiate the test manually on the MRCD. To do so, press the test button "T" for 5 to 10 seconds. Independently of the regular tests, also perform the test after maintenance and repair work has been carried out.

6.4.2 Required settings

The MOVIKIT® PowerMode or EnergyMode software module continuously processes the signals of the modular residual current device. A warning or an error is output depending on the strength of the fault current. An error will also trigger the disconnection of the energy storage unit. To ensure this monitoring function, adjust the corresponding settings in the MOVIKIT® software modules as well as in the higher-level controller.

6.4.3 Procedure in the event of a short circuit or ground fault

If a short circuit or ground fault occurs in the system, after discharging, short-circuit the energy storage unit according to the regulations in chapter "Discharging energy storage units before service work". Identify and then eliminate the cause of the fault.

Check all components for damage and wear before continuing operation. This also includes fuses and contactors.

6.4.4 System states of the modular residual current device

You can identify the current state of the modular residual current device via a combined red/green LED on the MRCD. The following table below shows the meaning of the states. Refer to the manufacturer's documentation for more information.

The LED indicates the system state by means of colours and lighting/flashing. The changeover contacts of the relay outputs K1 and K2 have defined switching positions for each system state.

System state	GREEN LED ON	RED LED Alarm	Notes	Relay K1	Relay K2
Device switched off	off	off	Device is de-energised, no monitoring, no monitoring function.	de-energised	de-energised
Normal operating state	lights	off	The device is supplied with the specified voltage and monitors the primary circuit. No residual current flows which would lead to tripping.	energised	energised
Prewarning	lights	flashes briefly	The device is supplied with the specified voltage and monitors the primary circuit. A fault current flows which exceeds the set limit of the prewarning.	de-energised	energised
Alarm state	off	lights	The device is supplied with the specified voltage and monitors the primary circuit. A fault current flows which exceeds the set limit of the alarm.	de-energised	de-energised
Device error	off	flashes slowly	The device is supplied with the specified voltage and monitors the primary circuit. An error is detected by the periodic self tests.	de-energised	de-energised

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Source: Operating instructions for the MRCDB300 series, Bender, Version 08/2021, Page 51

6.5 Procedure in the event of a fuse tripping

If a fuse in the energy storage system has been tripped, do not replace the fuse while the storage unit is charged. Disconnect the system from the grid and discharge the energy storage unit. Only electrically skilled persons are permitted to discharge the energy storage unit and install the short circuit connector. For further information, refer to the documentation in the "EKD-003 discharge unit" operating instructions.

If the main fuse must be replaced after it has been tripped, also check the subfuse.

If a fuse has been tripped, check all current-carrying parts and replace these parts in the event of damage. If an overload occurs with other disconnecting components, e.g. contactor, thermal circuit breaker, etc., replace the entire component.

INFORMATION



Only use the fuses configured by SEW-EURODRIVE.

7 Service

7.1 Inspection/maintenance

Never open the device. Only SEW-EURODRIVE may perform repairs.

The device is maintenance-free. SEW-EURODRIVE does not stipulate any regular inspection work. However, it is recommended that you check the following components regularly:

- Connection cables:
If cables become damaged or fatigued, replace them immediately.
- Cooling fins (if available):
Remove any deposits to ensure sufficient cooling.
- Fans (if available):
Check whether the fans function properly.

7.2 SEW-EURODRIVE Service

If you are unable to rectify a fault, contact SEW-EURODRIVE Service. For addresses, refer to www.sew-eurodrive.com.

When contacting SEW-EURODRIVE Service, always specify the following information so that our service personnel can assist you more effectively:

- Information on the nameplate (e.g. type designation, serial number, part number, product key, purchase order number)
- Brief description of the application
- Error message on the status display
- Type of fault
- Accompanying circumstances
- Unusual events preceding the problems

7.3 Points to observe before service work



⚠ WARNING

Electric shock due to ineffective DC disconnection in the event of storage faults in the energy storage system

Severe or fatal injuries.

- ✓ The service work is performed on or outside the system.
- Discharge and short-circuit the energy storage unit before performing any service work.

For this purpose, refer to chapter "Discharging energy storage units before service work" (→ 45).

If there is a storage unit fault, the energy storage unit cannot be disconnected from the rest of the application in an electrically safe manner by merely opening the DC disconnection switch.

The energy storage system optionally contains a disconnection switch that enables an intact energy storage unit to disconnect from the rest of the application. If service work is not being performed on the energy storage system itself, it is sufficient if you disconnect the energy storage unit from the application via the DC disconnection switch for the duration of the work. In such a case, you do not have to discharge the energy storage unit.

If one of the errors shown in the following table occurs, the energy storage unit must be discharged and short-circuited even for service work outside the energy storage system. SEW-EURODRIVE recommends always discharging the energy storage unit if in doubt.

Error code	Error code hex	Error code dec
144.193	0x90c1	37057
144.194	0x90c2	37058
144.195	0x90C3	37059
144.197	0x90c5	37061
144.199	0x90c7	37063
144.201	0x90c9	37065
144.202	0x90ca	37066
144.203	0x90cb	37067
144.204	0x90cc	37068
144.205	0x90cd	37069
144.206	0x90ce	37070
144.207	0x90cf	37071
144.209	0x90D1	37073
144.210	0x90D2	37074
144.211	0x90D3	37075
144.212	0x90D4	37076
144.213	0x90D5	37077
144.214	0x90D6	37078

Error code	Error code hex	Error code dec
144.216	0x90D8	37080
145.32	0x9120	37152
145.33	0x9121	37153
145.37	0x9125	37157
145.64	0x9140	37184
145.65	0x9141	37185

7.4 Procedure in the event of an error

Every SEW-EURODRIVE energy storage system must be monitored by a MOVIKIT® PowerMode or EnergyMode software module. The "Error codes – MOVIKIT® software modules" manual contains a list of all possible errors that may occur in an energy storage system. If an error occurs, observe the following procedure:

1. Refer to the "Error codes – MOVIKIT® software modules" manual for the meaning and possible corrective measures of the present error.
2. Can the error be rectified with corrective measures from the manual, or is a component replacement required?
3. If the error indicates a defective DSK module, refer to chapter "Replacing a DSK module".

7.5 Replacing the DSK module

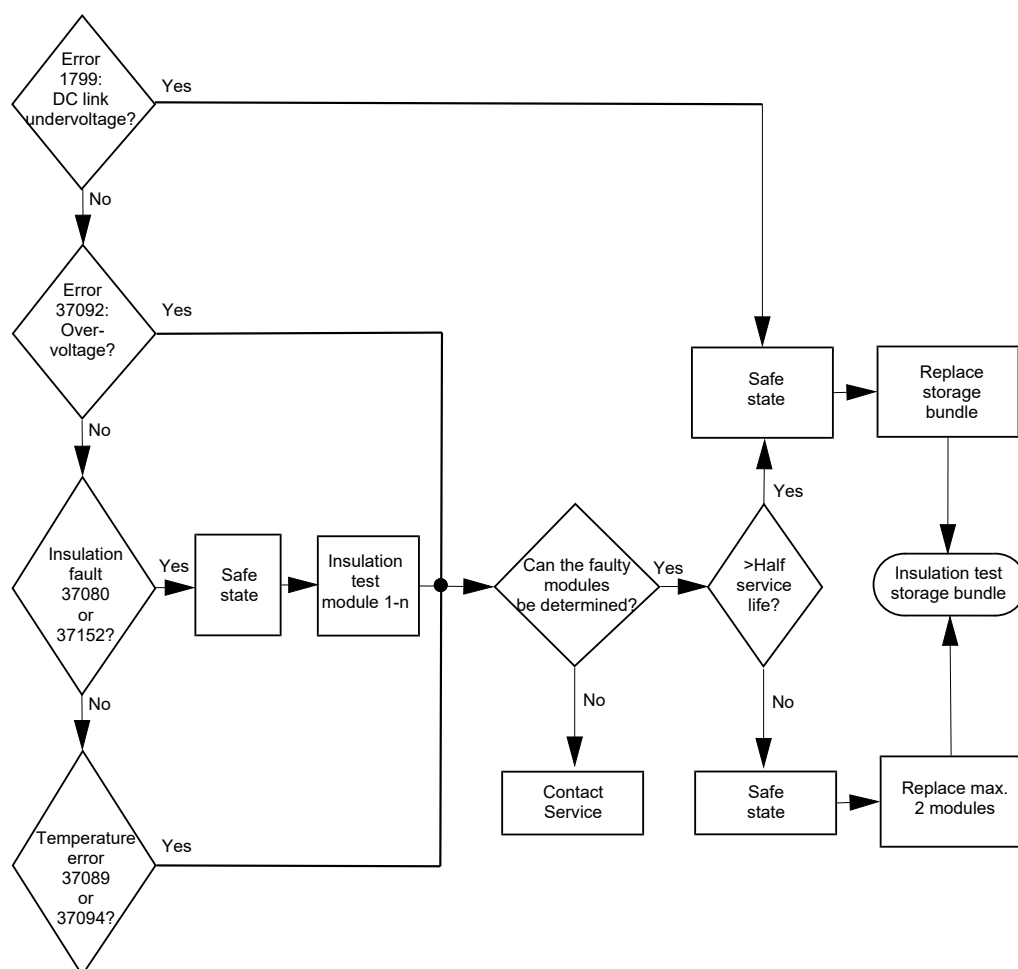


⚠ WARNING

Electric shock due to improper use.

Severe or fatal injuries.

- For safety reasons, DSK modules may be replaced only by trained personnel. Contact SEW-EURODRIVE Service.
- During the warranty period, the replacement of DSK modules may be performed only by SEW-EURODRIVE Service.



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If one of the errors shown in the flow diagram above is present, you must replace a DSK module. First, determine whether a DSK module needs to be replaced. The procedure you have to follow depends on the present error. Several errors can also be present at the same time.

If an overvoltage fault or a temperature error is present, the error message of the MOVIKIT® module indicates which module needs to be replaced. If external influences, such as an excessive ambient temperature, can be excluded as the cause of the fault, replace at least the affected module.

If an insulation fault is present, the error message does not indicate which module triggered the fault. For this reason, you must perform a manual insulation resistance test on site to determine which module triggered the fault, see chapter "Insulation resistance test" (→ 42).

At the end of its useful life, the energy storage unit can no longer provide sufficient power for the application. As a result, a voltage dip occurs at the DC link. This is indicated by the display of error 1799 "Undervoltage at the A-side or B-side". In this case, replace the entire storage bundle.

Set the energy storage system to the safe state before replacing modules or performing an insulation resistance test, see chapter "Discharging energy storage units before service work" (→ 45).

7.5.1 Replacing an individual DSK module or the entire storage bundle?

Due to technological reasons, you must determine in advance whether the entire storage bundle must be replaced whenever a DSK module is replaced. This depends on the age of the storage bundle. If more than half of the projected service life has already elapsed, you must replace the entire storage bundle. If less than half of the projected service life has elapsed, replace a maximum of 2 individual DSK modules. For the projected service life, refer to the result report from the PES simulator. As a rule, the projected service life is 10 years.

If one module has already been replaced during a previous service call, you may replace one further module. If two modules have already been replaced in the past, replace the entire storage bundle.

INFORMATION



Any number of modules can be replaced within the first 8 weeks after startup. These are not included in the calculation for further service calls.

7.5.2 Tools required

Before replacing the DSK modules, ensure that the following tools are available:

- EKD-003 discharge unit (part number: 28265610)
- EKD universal adapter cable UKE11A (part number: 28157214)
- Short-circuit connector (part number: 28149874)
- Multimeter (voltage measurement, CAT III 1000 V/CAT IV 600 V in accordance with IEC 61010-1)
- Two-pole voltage tester in accordance with DIN EN 61243-3
- Multi-function installation tester or high voltage tester for performing an insulation resistance test in accordance with EN 60204-1 and a protective earth connection test in accordance with EN 61800-5-1
- Torque wrench
 - M8 (wrench size 13, tightening torque: 20 Nm)
 - M10 (wrench size 17, tightening torque: 30 Nm)
- Insulated single-core cable (e.g. H07V-K), M8 and M10 forked cable lugs attached to cable ends
 - Cross section: $\geq 2.5 \text{ mm}^2$
 - Length: approx. 1 m
- Standard service tool kit (hexagon socket, open-end wrench, VDE screwdriver set)
- Double-sided adhesive tape

7.5.3 Procedure

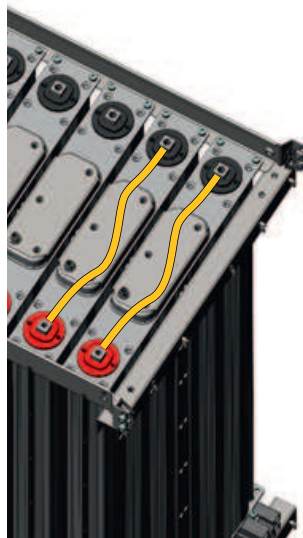
To replace DSK modules, proceed as follows.

Short-circuiting modules

Short-circuit all modules of the storage bundle, even if not all modules are to be replaced. The short-circuited poles ensure that the voltage positions are the same when a new energy module is installed and that there are no asymmetries.

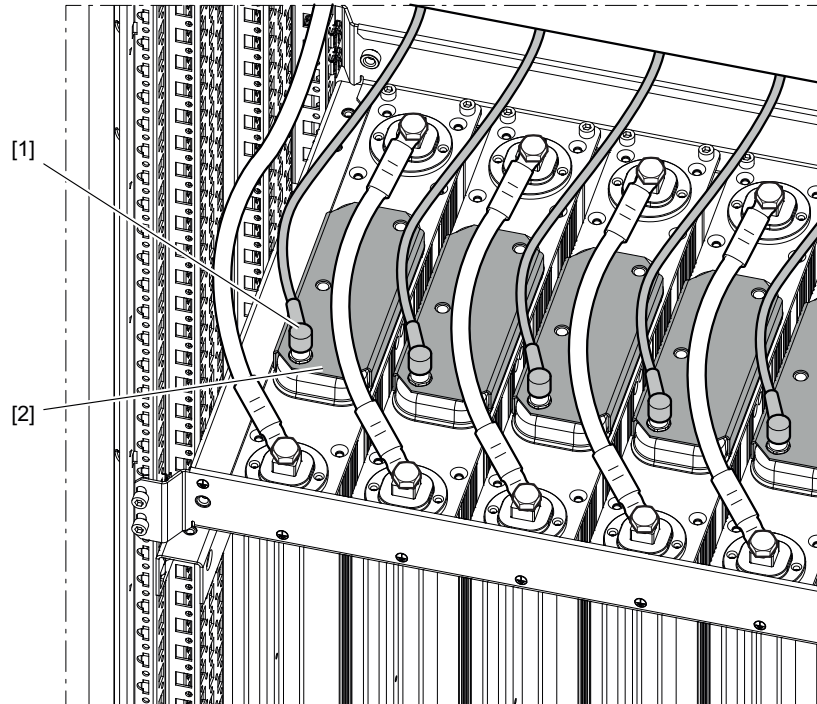
Proceed as follows:

- ✓ You have set the system to a safe state according to the specifications in chapter "Discharging energy storage units before service work".
- 1. Disconnect the electrical connections on module 1.
- 2. Short-circuit module 1 using the insulated single-core cable mentioned above.
- 3. Disconnect the electrical connection on the negative pole of module 2.
- 4. Short-circuit module 2 using the original connection lead between module 1 and 2.
- 5. Perform steps 3 and 4 for all remaining modules of the storage bundle.



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Removing the locking plates



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1. Unscrew the M12 connector [1] of the communication cable on the modules you want to replace.
2. The locking plate [2] is fastened with double-sided adhesive tape. Remove the locking plate and set it aside.
 - ⇒ The locking plate will be required for the replacement module.

Removing the defective module

1. Remove the defective module.

Installing the new module

Insert the new module.

Mark the replaced module with a label or similar. Attach it to the mounting rail. Note the date of the module replacement on it and transfer the number of the module from the removed module, e.g. "C4".

As the new module is delivered with a short-circuit jumper, it has 0 V like all of the other modules in the control cabinet. This means that no asymmetrical voltage distribution can form during startup.

Reconnecting the modules

1. Reuse the locking plate (part number: 28131800) from the removed module for the new one. Use double-sided adhesive tape for fastening.
2. Remove the short-circuit jumpers.

3. Reinstall the connection leads between the modules (35 mm² cable from the negative pole to the positive pole of the next module). At this point, do not connect anything at the DSK+ connection of the first module and at the DSK- connection of the last module.
4. Proceed with an insulation resistance test as described below.

Tightening torques

Connection point	Thread	Tightening torque
DSK+	M8	20 Nm
DSK-	M10	30 Nm

Insulation resistance test

Perform an insulation resistance test of the entire storage bundle in the following cases:

- If errors 37080 and 37152 occur
- After each replacement of DSK modules, before restarting

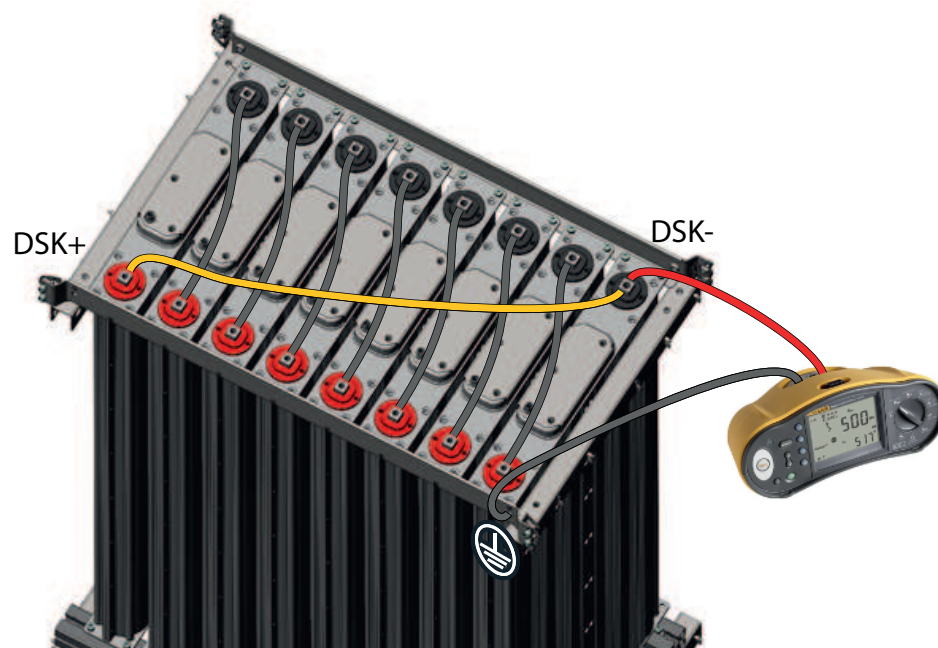
Insulation resistance test of entire storage bundle

Required tools:

- Measuring device for the insulation resistance test
- Insulated single-core cable (e.g. H07V-K), cable ends with M8 and M10 forked cable lugs:
 - Cross section: $\geq 2.5 \text{ mm}^2$
 - Length: approx. 1 m
- Wrench SW 13
- Wrench SW 17

Preparation:

1. Disconnect the DC link connections from the storage bundle (DSK+ on the first module and DSK- on the last module installed).
2. Unscrew all signal monitoring cables.
3. Short-circuit the DSK storage bundle with the prepared insulated single-core cable (yellow cable between DSK+ on module 1 and DSK- on module 8).
4. Perform the insulation resistance test properly and record the measurement result in a test protocol.
5. Select the largest possible value of the test device used.
 - ⇒ Test voltage = at least 500 V, better 1 kV or 2 kV



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Measuring points	
DSK+/-	PE connection mounting rail

The insulation resistance test is considered as passed if a resistance value of $\geq 1 \text{ MOhm}$ or no conductive connection is displayed at a test voltage of at least 500 V.

If you measured a measured value less than 1 MOhm during the insulation resistance test of the entire storage bundle, you must measure each module individually. In this case, skip the following steps 6 and 7. Only perform step 5 and then continue with chapter "Insulation resistance test of a single DSK module" (→ 44).

End the insulation resistance test:

- Remove the short circuit between DSK+ on module 1 and DSK- on module 8 on the storage bundle (yellow cable).
- Establish the DC link connection on the storage bundle (between DSK+ on module 1 and DSK- on module 8). Observe the correct sequence of the cables and the tightening torques from the following table:

Sequence of the cables	
1	Connection pole
2	Storage unit connection 35 mm ²
3	Discharge unit connection 2.5 mm ²
4	Washer
5	Lock washer
6	Screw

Connection point	Thread	Tightening torque
DSK+	M8	20 Nm
DSK-	M10	30 Nm

*Insulation resistance test of a single DSK module***Preparation:**

1. Disconnect the DC link connections to the adjacent modules (DSK+ and DSK-).
2. Unscrew all signal monitoring cables.
3. Short-circuit the DSK module that you want to test between DSK+ and DSK-.
4. Perform the insulation resistance test properly and record the measurement result in a test protocol.
5. Select the largest possible value of the test device used.
 - ⇒ Test voltage = at least 500 V, better 1 kV or 2 kV



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Measuring points

DSK+/-

PE connection mounting rail

The insulation resistance test is considered as passed if a resistance value of $\geq 1 \text{ MOhm}$ or no conductive connection is displayed at a test voltage of at least 500 V.

Several defective energy modules can also be present in a storage bundle. Replace them.

End the insulation resistance test:

6. Remove the short circuit between DSK+ and DSK-.
7. Restore the DC link connections between the individual DSK modules. Observe the tightening torques specified in the following table:

Connection point	Thread	Tightening torque
DSK+	M8	20 Nm
DSK-	M10	30 Nm

8. Establish the DC link connection on the storage bundle (between DSK+ on module 1 and DSK- on module 8). Observe the correct sequence of the cables and the tightening torques from the following table:

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Sequence of the cables		
1	Connection pole	
2	Storage unit connection 35 mm ²	
3	Discharge unit connection 2.5 mm ²	
4	Washer	
5	Lock washer	
6	Screw	

Connection point	Thread	Tightening torque
DSK+	M8	20 Nm
DSK-	M10	30 Nm

9. Screw on all signal monitoring cables.

7.6 Discharging energy storage units before service work



⚠ WARNING

Electric shock from charged energy storage units. The energy storage units are still charged after the device has been switched off.

Severe or fatal injuries.

- Discharge the energy storage units before conducting any work on the device.
- Only electrically skilled persons may discharge and short-circuit the energy storage unit.

For more information, refer to the documentation "MOVI-DPS® discharge unit".

If you connect the energy storage unit to a Power and Energy Solutions system that is connected to an AC grid, simply disconnecting the system from the grid does not result in a de-energized state of the DC link. Due to a connected and charged energy storage unit, dangerous voltages are still present on the DC link even after disconnection from the AC grid.

Before you perform any service work, you must set the system to a safe state. To do so, proceed as follows:

7.6.1 Discharging using the discharge unit

- ✓ To connect the discharge unit and short-circuit connector, a discharge connection socket and a discharge fuse must be installed (see chapter "Connecting the discharge unit" (→ 19)).
1. Discharge the storage bundle using a discharge unit from SEW-EURODRIVE. Observe the operating instructions of the discharge unit.
 2. After discharging, short-circuit the device by inserting the short-circuit connector into the discharge connection socket. To ensure the short circuit, the discharge fuse must always be set to ON.
 3. Remove the short-circuit connector before restarting.

7.6.2 Discharging using the braking resistor

As an alternative to discharging using a discharge unit, you can discharge the storage bundle via a braking resistor. For additional information, refer to the "MOVIDRIVE® modular" product manual.

1. Discharge the storage bundle according to the specifications in the "MOVIDRIVE® modular" product manual.
2. Immediately after discharge, switch off the power supply for all devices present in the system.
3. Check the voltage of the storage bundle and its voltages of both poles by measuring each against PE. If the result of all voltages to be measured is $< 2 \text{ V}$, the storage bundle is discharged.
4. Short-circuit the storage bundle immediately after discharge. To do so, plug the short-circuit connector into the discharge connection socket. To ensure the short circuit, the discharge fuse must always be set to ON.
5. Remove the short-circuit connector before restarting.

Alternatively, you can create the short circuit with an insulated wire (minimum cross section 1.5 mm^2).

7.7 Activation after service work

After service work is completed, a visual inspection as well as a safety check in accordance with EN 60204-1 must be carried out and recorded before restarting.

✓ You have finished the service work.

1. Remove the short-circuit connector.
2. Set the discharge fuse to OFF.
3. Connect the grid and the controller again.
4. Re-connect the storage bundle using the "DC synchronization" function of the MOVIKIT® PowerMode/EnergyMode software module.

7.8 Shutdown



⚠ WARNING

Electric shock from charged energy storage units. The energy storage units are still charged after the device has been switched off.

Severe or fatal injuries.

- Discharge the energy storage units before conducting any work on the device.
- Only electrically skilled persons may discharge and short-circuit the energy storage unit.

For more information, refer to the documentation "MOVI-DPS® Discharge Unit".

The procedure for temporary shutdown of the energy storage system is described in the chapters "Discharging energy storage units before service work" (→ 45) and "Activation after service work" (→ 46).

✓ For permanent shutdown for the purpose of disassembly, proceed as follows:

1. Implement the specifications in chapter "Discharging energy storage units before service work" (→ 45).
2. Short-circuit each energy module individually using an insulated wire with a minimum cross-section of 1.5 mm².
⇒ Disassembly of the energy modules is now possible.
3. Continuously maintain the short circuit.

7.9 Storage

Note the following information when shutting down or storing the storage units:

- Place the storage units on a side without connectors during storage.
- Note that the useful life of the storage units is also affected during storage. For further information, refer to chapter "Useful life" (→ 32).
- During storage, make sure that the permissible storage temperature for the storage units is observed. The permissible storage temperature can be found in chapter "Basic device" (→ 48).
- Make sure that the storage units are short-circuited during storage.

7.10 Waste disposal

Observe the applicable national regulations.

Dispose of the following materials separately in accordance with the country-specific regulations in force, such as:

- Electronics scrap (printed circuit boards)
- Plastic
- Sheet metal
- Copper
- Aluminum



This product falls within the scope of the European WEEE Directive 2012/19/EU on waste electrical and electronic equipment.

Under no circumstances may electrical and electronic equipment be placed in regular household waste. The product must be disposed of properly in accordance with the currently applicable statutory regulations of the respective EU Member State, Norway, Liechtenstein, and Iceland.

The aim of this is to ease the burden on natural resources and to protect the environment and human health from hazardous substances by bringing them to recycling.

8 Technical data

8.1 Markings

Mark	Definition
	The CE mark indicates compliance with the following European directives: • Low Voltage Directive 2014/35/EU • EMC Directive 2014/30/EU • Machinery Directive 2006/42/EC • Directive 2011/65/EU for limiting the use of certain hazardous substances in electrical and electronic equipment

8.2 General technical data

8.2.1 Basic unit

General	LSUM108R0C 0041F EA YD3P	LSUM108R0C 0083F EA YD3P
Climatic conditions	• Extended storage (in dry, closed rooms): EN 60204-1, temperature -40 °C to +70 °C non-condensing, no condensation • Transport (weatherproof): EN 60204-1, temperature -40 °C to +70 °C non-condensing, no condensation • Operation (stationary use in dry, closed rooms): EN 60204-1, temperature -25 °C to +40 °C non-condensing, no condensation	
Chemically active substances	• Extended storage (in dry, closed rooms): EN 60204-1, no corrosive gases, no salt mist • Transport (weatherproof): EN 60204-1, no corrosive gases, no salt mist, no sea water • Operation (stationary use in dry, closed rooms): EN 60204-1, no corrosive gases, no salt mist	
Mechanically active substances	• Extended storage (in dry, closed rooms): EN 60204-1, no conductive dust • Transport (weatherproof): EN 60204-1, no conductive dust • Operation (stationary use in dry, closed rooms): EN 60204-1, no conductive dust	
Installation altitude	• Up to $h \leq 2000$ m without restrictions • Use at a geographical altitude of more than 2000 m above sea level can lead to decreased performance capability. Consult SEW-EURODRIVE Service. • From 2000 m to max. 3800 m: To maintain protective separation and the air gaps and creepage distances in accordance with EN 61800-5-1, you have to connect an overvoltage protection device in order to reduce the overvoltages from category III to category II.	
Degree of protection	IP00	
Protection class	Protection class I	
Permissible vibration and impact load	according to EN 61800-5-1	

General	LSUM108R0C 0041F EA YD3P	LSUM108R0C 0083F EA YD3P
Number of cells	36	
Interference immunity	according to EN 61800-3	
Interference emission (when connected to a device of the Power and Energy Solutions series)	Limit value class C2 according to EN 61800-3	
Overvoltage category	III according to IEC 60664-1 (VDE 0110-1)	
Degree of pollution	II according to IEC 60664-1 (VDE 0110-1)	

8.3 Electrical data

General	LSUM108R0C 0041F EA YD3P	LSUM108R0C 0083F EA YD3P
Nominal voltage V_N	100 V	
Maximum operating voltage V_{max}	115 V	
Peak current I_{PK}	1400 A	2400 A
Short-circuit current I_{SC}	8900 A	10800 A
Nominal capacitance (as new) C_N	41.6 F	83 F
Capacitance tolerance	0% to 20%	
Capacitance at end of useful life	80% C_N	
DC equivalent series resistance (new condition) ESR_{DC}	12.1 mΩ	10 mΩ
DC equivalent series resistance at end of useful life	200% ESR_{DC}	
Maximum energy content (maximum storable energy) E_{max}	208 kW _s = 57.78 Wh	415 kW _s = 115.28 Wh
Usable energy content E (usable stored energy, 75% of E_{max})	156 kW _s = 43.34 Wh	311 kW _s = 86.46 Wh

INFORMATION



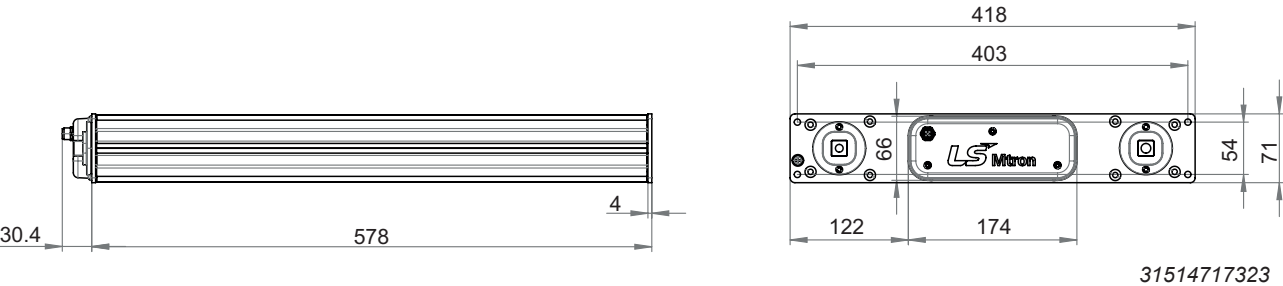
The data for nominal capacitance, nominal current, and equivalent series resistance is valid for new storage units. The aging process reduces the capacitance as well as the current. The equivalent series resistance increases accordingly.

8.4 Mechanical data

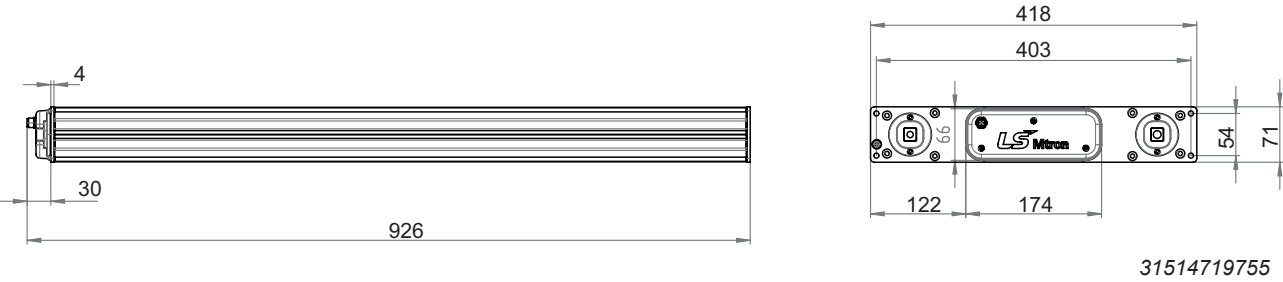
General	LSUM108R0C 0041F EA YD3P	LSUM108R0C 0083F EA YD3P
Mass	20.5 kg	33 kg
Dimensions W × H × D	See dimension drawing	

8.5 Dimension drawing

LSUM108R0C 0041F EA YD3P



LSUM108R0C 0083F EA YD3P



9 Contacting SEW-EURODRIVE

You can find the worldwide contact data and locations on the **SEW-EURODRIVE website** via the following link or the QR code shown below.

<https://www.sew-eurodrive.de/contacts-worldwide>



SEW
EURODRIVE



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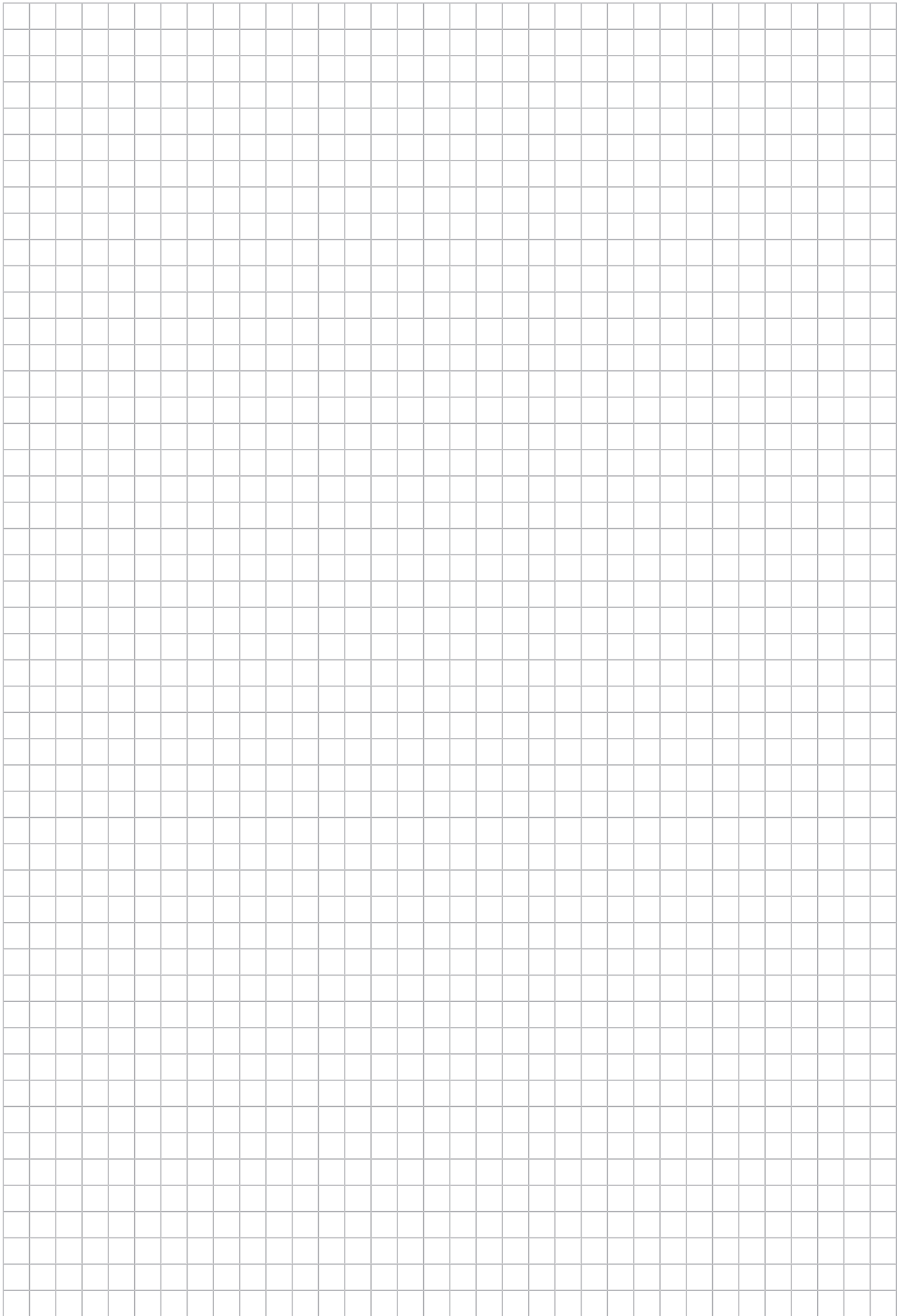
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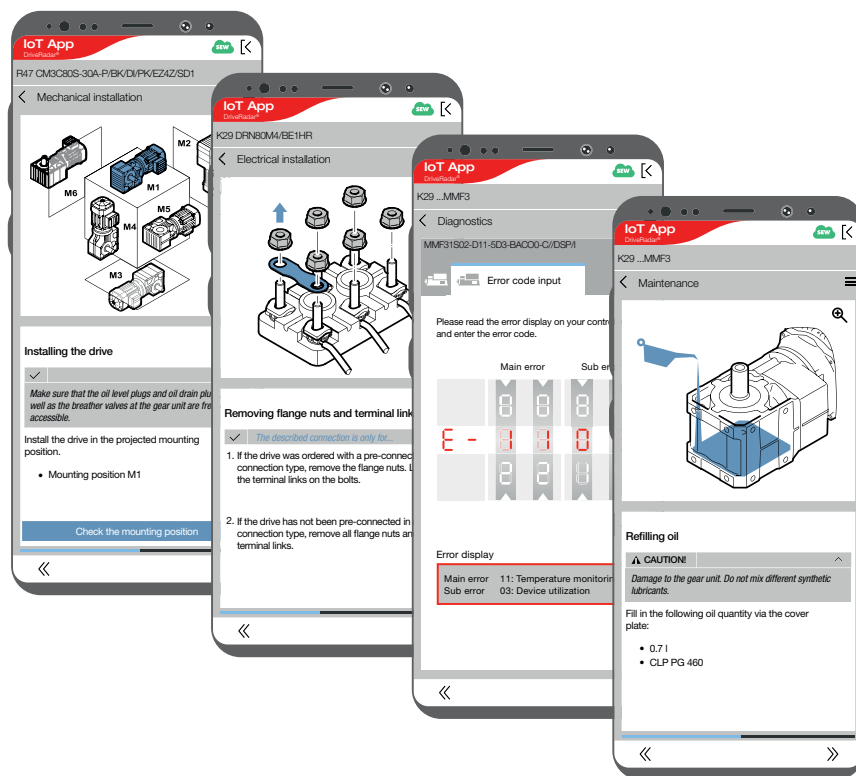
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