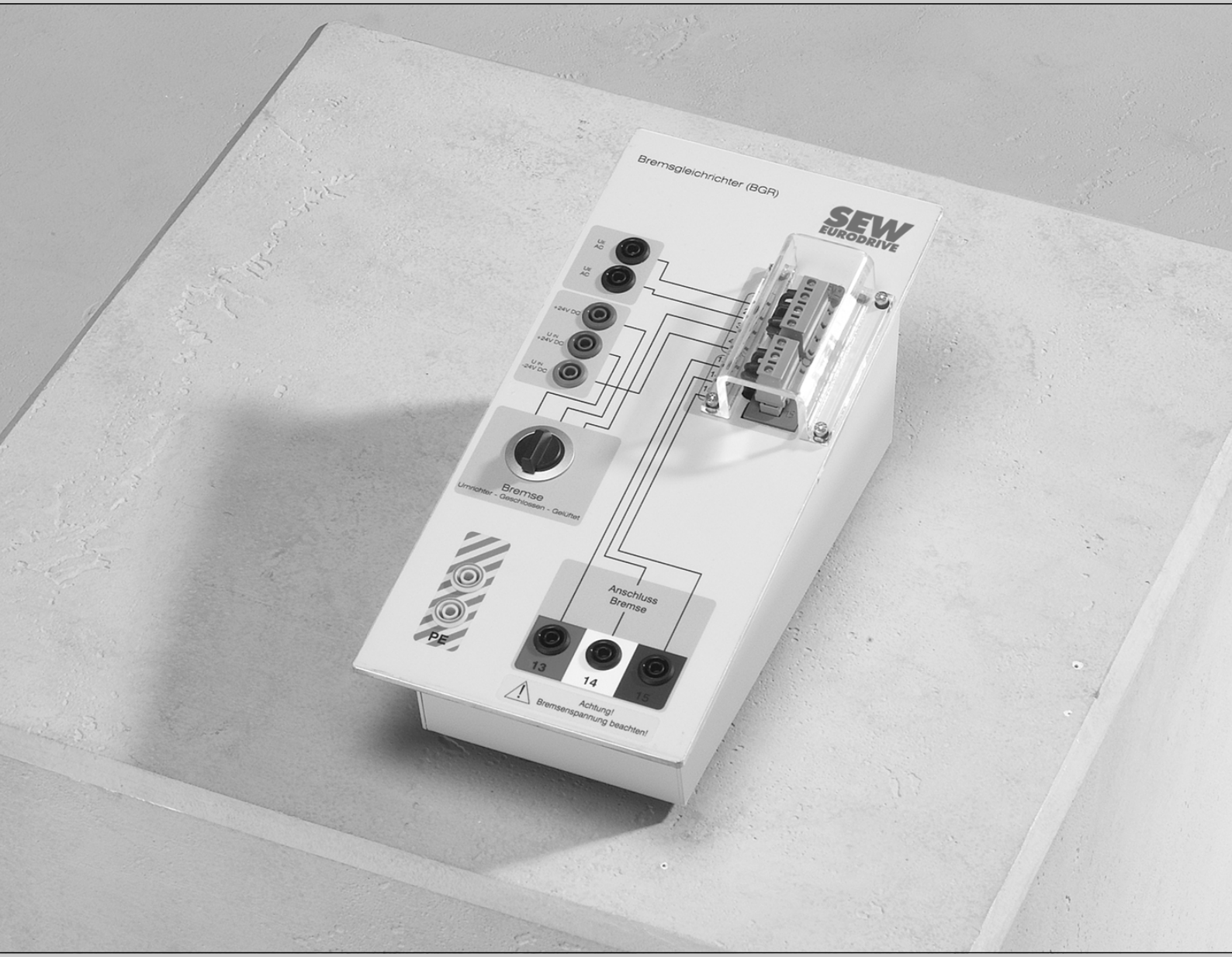
SEW EURODRIVE

Operating Instructions



Didactics – Electromechanics

Brake Control Module (BMK)

Edition 12/2018

28519876/EN

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1 General information

1.1 About this documentation

The current version of the documentation is the original.

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

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

1.2 Structure of the safety notes

1.2.1 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.	

1.2.2 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

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Hazard symbol	Meaning
	Warning of dangerous electrical voltage
	Warning of hot surfaces

1.2.3 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.

1.3 Decimal separator in numerical values

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

Example: 30.5 kg

1.4 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.

1.5 Other applicable documentation

Observe the corresponding documentation for all further components.

1.6 Product names and trademarks

The brands and product names in this documentation are trademarks or registered trademarks of their respective titleholders.

1.7 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 Target group

The product is intended for persons in training facilities that are equipped with the appropriate furnishings in classrooms and laboratories. Furnishings are, for example, experimental stands, laboratory benches, energy cells, control panels and control consoles as well as control cabinets with pick-up positions for electrical energy.

The focus is on the transfer of knowledge to non-specialists. Before using the products, non-specialists must be instructed about the safety-relevant aspects described in this document.

Specialist for mechanical work

Any mechanical work on the products must be carried out by a qualified specialist. Specialists in the context of this documentation are persons familiar with the design, mechanical installation, troubleshooting, and maintenance of the product who possess the following qualifications:

- Qualification in the field of mechanical engineering in accordance with the national regulations.
- They are familiar with this documentation.

Specialist for electrotechnical work

Any electrical work on the products must be carried out by adequately qualified electricians. Qualified electricians in the context of this documentation are persons familiar with electrical installation, startup, troubleshooting, and maintenance of the product who possess the following qualifications:

- Qualification in the field of electrical engineering in accordance with the national regulations.
- They are familiar with this documentation.

Additional qualification

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 units, systems, and circuits in accordance with the standards of safety technology.

Instructed persons

All work in the areas of transportation, storage, operation and waste disposal must be carried out by persons who are trained appropriately. The purpose of the instruction is that the persons are capable of performing the required tasks and work steps in a safe and correct manner.

2.3 Designated use

The product is designed for training purposes only. Operating the product in private, craft, trade or for industrial purposes is not permitted. The product is not intended for installation in electrical plants or machines. The product is not intended for use in applications (such as lifting applications).

The product can be used to operate AC asynchronous motors and synchronous servomotors with squirrel-cage rotor.

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Startup (i.e. start of regular operation) is permitted with adherence to EMC guideline only.

Technical data and information on the connection conditions are provided on the nameplate and in the documentation. Comply with the data and conditions.

2.4 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:

- Before transportation, cover the connections with the supplied protection caps.
- Place the product only on the base plate during transport.
- Ensure that the product is not subject to mechanical impact.

If necessary, use suitable, sufficiently dimensioned handling equipment.

2.5 Setup and installation

Ensure that the product is installed and cooled according to the regulations in the documentation.

The product is suited for operation on laboratory benches and on tables. Use standard laboratory or training equipment where the products can be placed properly and safely without posing any risk to the learners.

Protect the product from strong mechanical strain. The product and its mounting parts must never protrude into the path of persons or vehicles. Ensure that components are not deformed and insulation spaces are not changed, particularly during transportation and handling. Electric components must not be mechanically damaged or destroyed.

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 4000 m above sea level

2.6 Electrical connection

Familiarize yourself with the applicable national accident prevention regulations before working on the product.

Perform electrical installation according to the pertinent regulations (e.g. cable cross-sections, fusing, protective conductor connection).

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

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

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Ground connections are required as preventive measures.

2.7 Startup and operation

Before startup, make sure that the 4 mm sockets, buttons, and switches are intact.

It might be necessary to equip locations where such devices are used 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.

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

Cover unused connections with the supplied protection caps during operation.

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

When the device is switched on, dangerous voltages are present at all power connections as well as at any connected cables and terminals. This also applies even when the product is inhibited and the motor is at standstill.

Electric shock due to moving the device while voltage is applied. Do not move the product while voltage is applied.

Do not separate the connection to the product during operation. This may result in dangerous electric arcs damaging the product.

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

10 minutes.

Observe the corresponding information signs on the product.

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

Mechanical blocking or internal protective functions of the product can cause a motor standstill. Eliminating the cause of the problem or performing a reset may result in the drive restarting automatically. If, for safety reasons, this is not permitted for the drive-controlled machine, first disconnect the product from the supply system and then start troubleshooting.

2.8 Inspection and maintenance

Only perform maintenance and repair work once the product has been secured and disconnected from the power supply. Ensure a de-energized state of the product before you start working on it. Ensure a de-energized state for the entire time you work on the product.

Repair work may only be carried out by SEW-EURODRIVE.

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3 Device structure

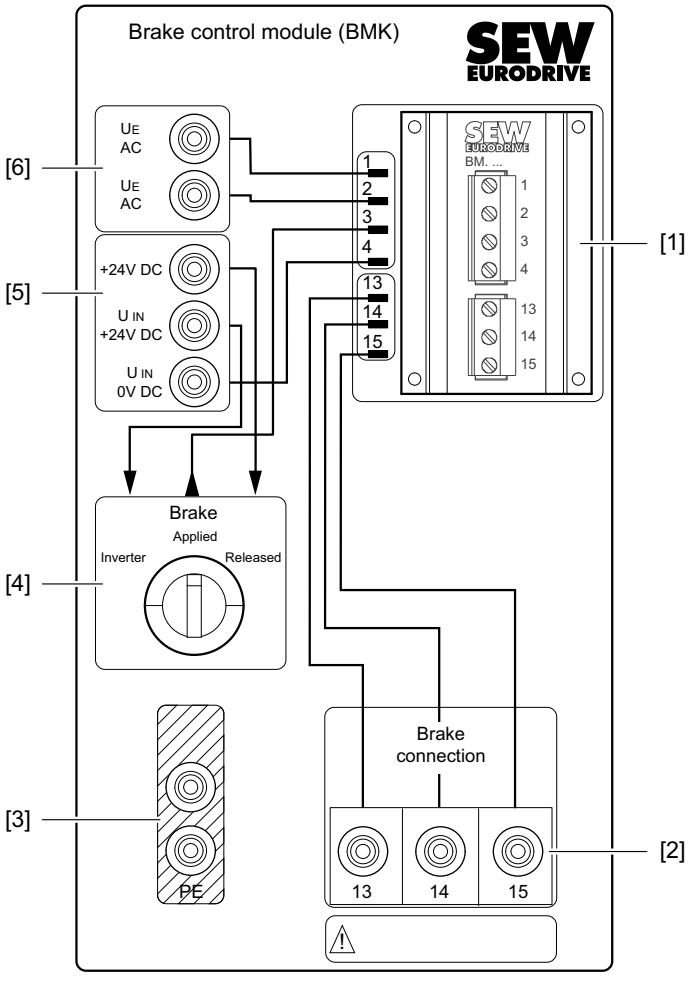
3.1 Scope of delivery

The following components are included in the delivery:

- Pasted and assembled front plate
- Housing
- Half-wave rectifier BMKB 1,5

  (half-wave rectifier with electronic switch mode, DC 24 V control input, cut-off in the DC circuit and a LED to indicate readiness for operation)
- Protection cover for brake control/brake rectifier

3.2 Basic unit



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[1] BMK brake control unit
[2] Brake connection
[3] PE: PE connection
[4] Selector switches
[5] Control voltage/control signal U_{IN} DC 24 V
[6] Voltage supply AC 150 to 500 V (depending on the brake voltage of the motor)

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4 Installation

4.1 Important information

INFORMATION

- Observe the documentation of components connected or mounted to the module (e.g. motor, inverter).
- Comply with all instructions referring to the technical data and the permissible conditions where the device is operated.

⚠ WARNING

Electric shock when disconnecting or connecting voltage-carrying plug connectors.

Severe or fatal injuries.

- Disconnect all supply voltages.
- Make sure that the device is de-energized.
- Never plug or unplug the plug connectors while they are energized.

⚠ CAUTION

Short circuit due to incorrectly set jumpers.

Damage to property and injury.

- Insert the jumpers only in the contact points provided for this purpose.

INFORMATION

Connect only suitable 2- and 3-wire brakes to the device output with appropriate brake coil voltage (brake voltage).

4.1.1 Brake connection

Only connect suitable brakes. Observe the brake voltage.

NOTICE

Damage or destruction of the brake resulting from incorrect voltage.

Damage to property.

- Do not connect the brake directly to a supply voltage. Always use a brake control unit or a brake rectifier.

4.1.2 Cable

Use the following cables:

- Standardized safety cables for use in classrooms or laboratories.
- 4 mm laboratory safety plug connectors with rigid insulating sleeve, suited for nominal voltages of up to 1000 V.
- Didactics connection cable from SEW-EURODRIVE.

The cable must not be longer than 3 m.

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4.1.3 PE line connection according to EN 61800-5-1

Earth-leakage currents of ≥ 3.5 mA can occur during normal operation. Observe the following for reliable PE connection:

- Supply system cable < 10 mm²:
  - Second PE conductor with the same cross section as the supply system cable routed parallel to the protective earth via separate terminals, or
  - Copper PE conductor with a cross section of 10 mm²
- Supply system cable 10 to 16 mm²:
  - Copper protective earth conductor with the same cross section as the supply system cable.
- Supply system cable 16 to 35 mm²:
  - Copper PE conductor with a cross section of 16 mm²
- Supply system cable > 35 mm²:
  - Copper PE conductor with half the cross section of the supply system cable.

4.1.4 Interference emission

Use shielded motor cables and brake cables for EMC compliant installation.

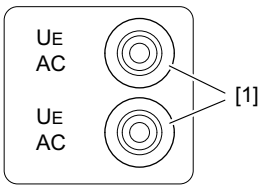
4.1.5 Cabling components

You can connect various didactics frequency inverter modules from SEW-EURODRIVE to the didactics brake control module using a 4 mm laboratory cable. SEW-EURODRIVE recommends to use 4 mm safety tower plugs 1000 V CAT II.

You can connect the motor brake to the brake control unit using 4 mm safety tower plugs 1000 V CAT II. However, SEW-EURODRIVE recommends to use shielded brake cables.

4.2 Electrical connections

4.2.1 Brake voltage supply



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[1] AC power supply

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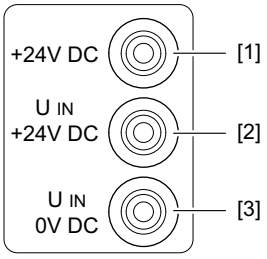
4.2.2 Control voltage



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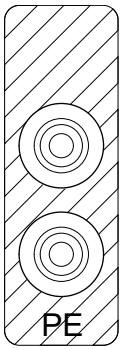
[1] Input for control voltage of the inverter
[2] Input for the control voltage/control signal U_{IN} (external)
[3] Ground (GND)

4.2.3 PE connection



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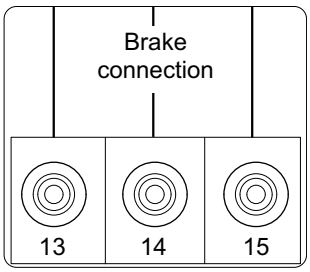
4.2.4 Brake connection



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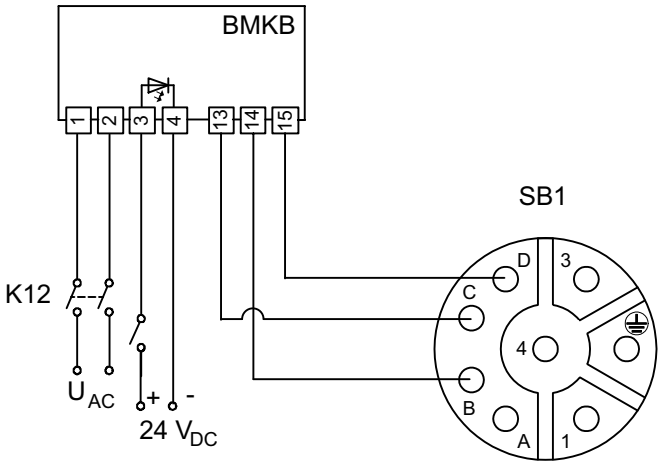
4.3 Connection to CM.. servomotor

4.3.1 BY brake

The following figure shows the wiring diagram for connection to a CM.. servomotor with BY brake:



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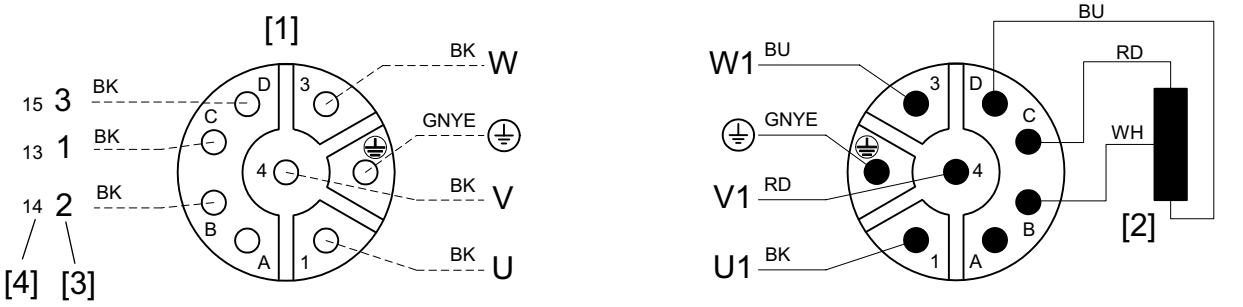
If you use a motor with BY brake, you need **terminals 13, 14, and 15**.

The following figure shows the terminals on the cable end and on the motor end:

[A] [B]



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[A] Connection on cable end
[B] Connection on motor end
[1] BY brake
[2] Brake coil
[3] Motor cable labeling
[4] Designation on BMK brake control

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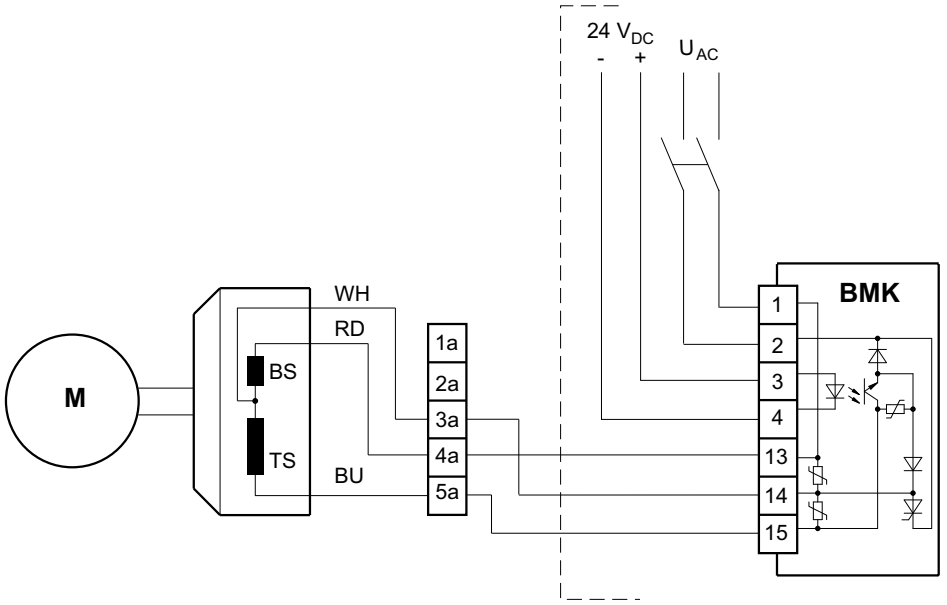
4.4 Connection to DR.. AC motor

The following figure shows the wiring diagram for connection to a DR.. AC motor with BE brake:



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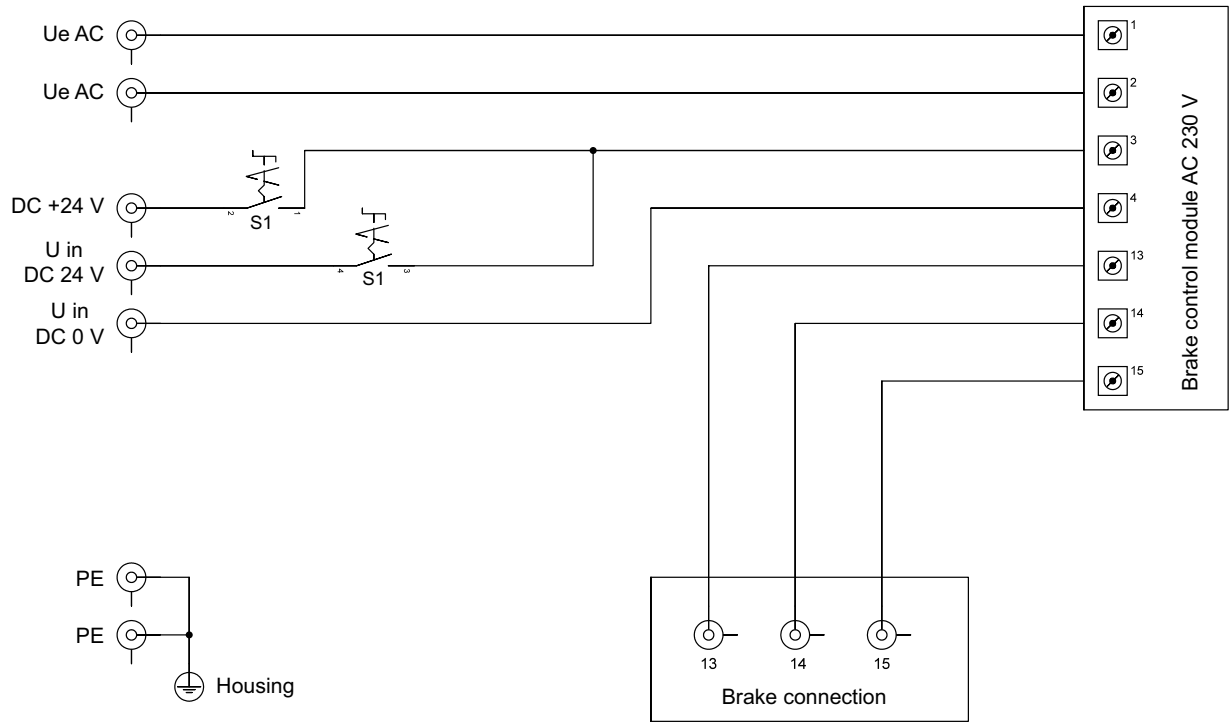
4.5 Wiring diagram



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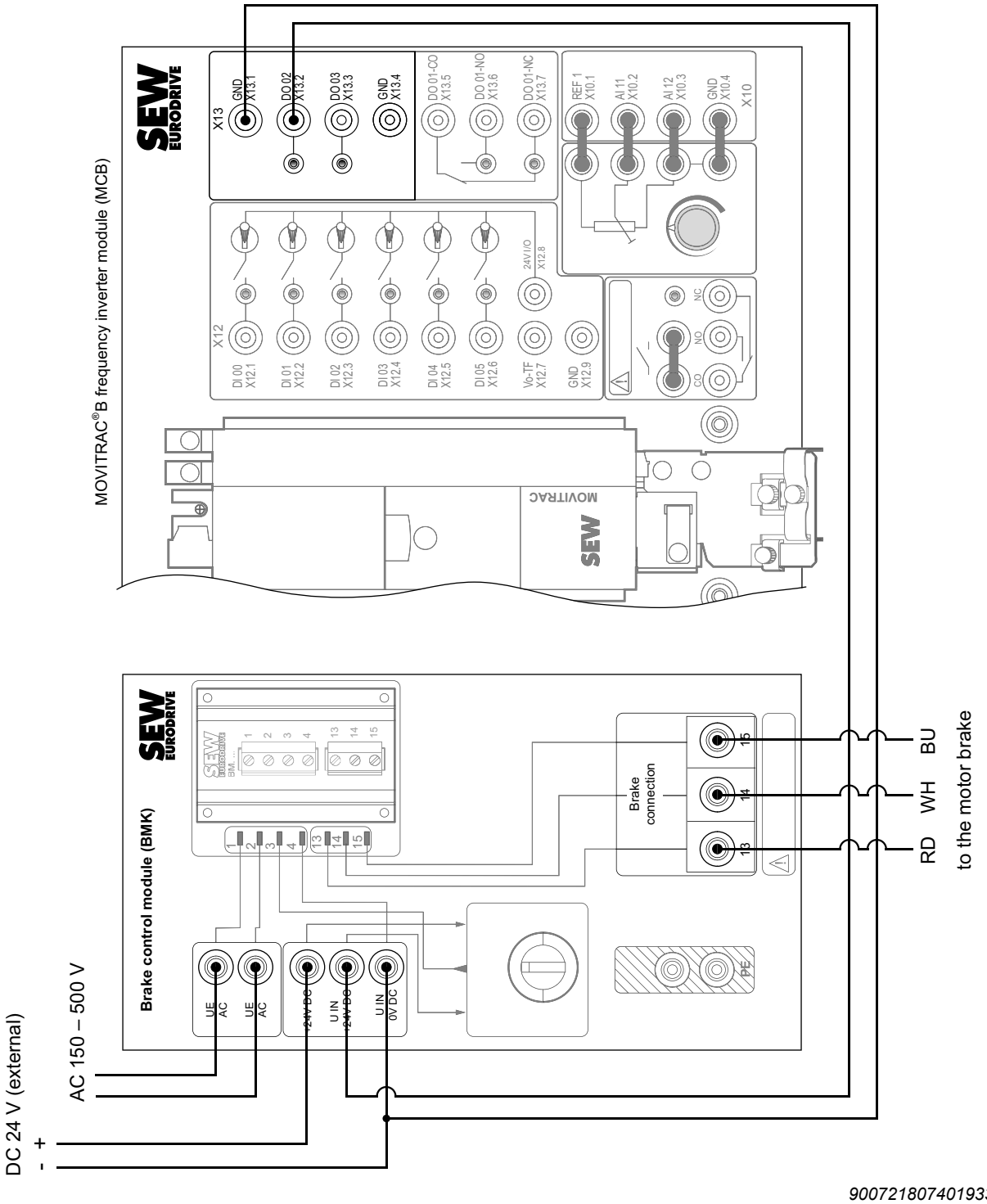
5 Startup

5.1 With MOVITRAC® B frequency inverter module

Wire the didactics modules as shown in the following figure:



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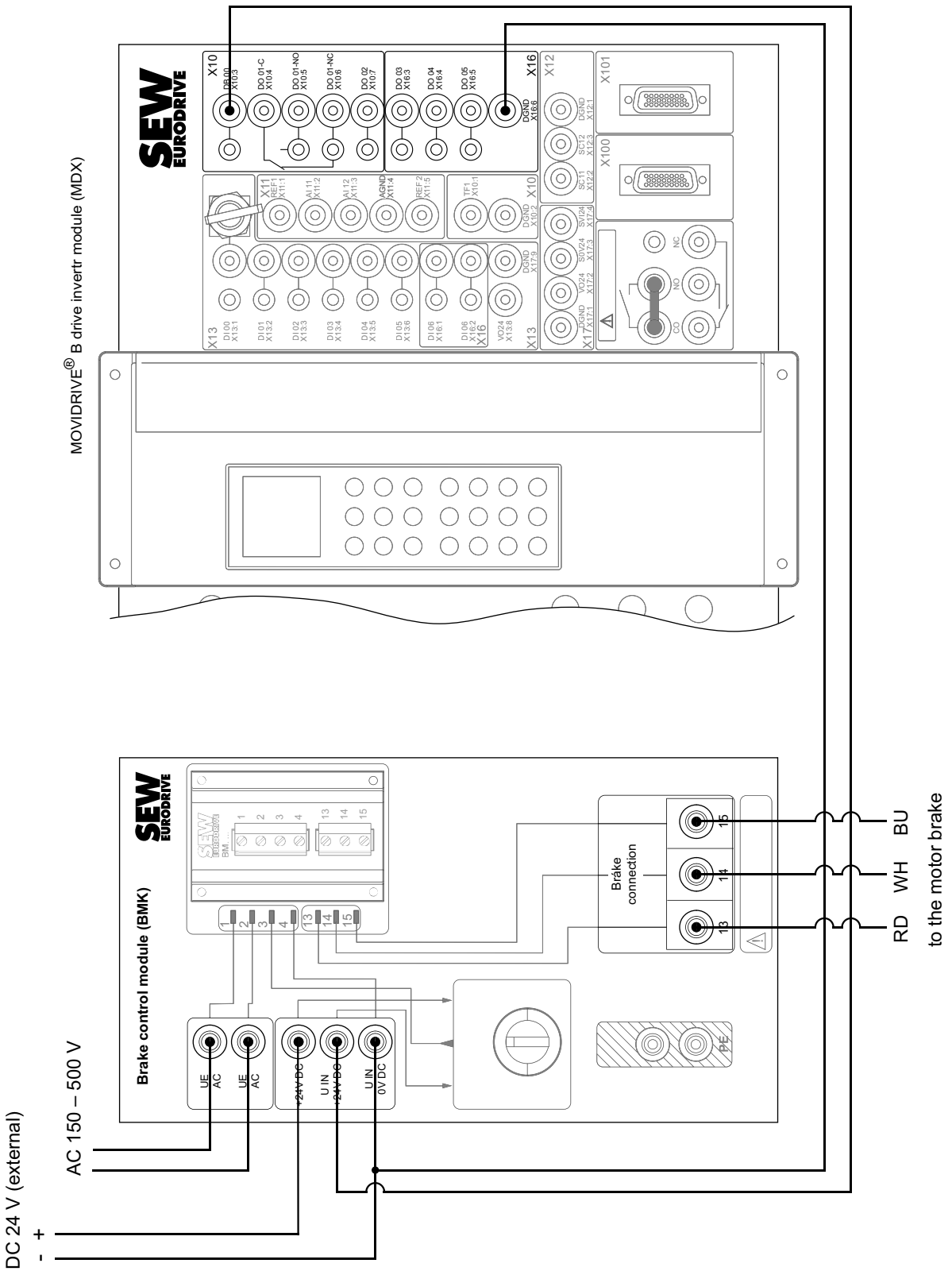
5.2 With MOVIDRIVE® B drive inverter module

Wire the didactics modules as shown in the following figure:



5.3 Startup with other modules

The brake need not necessarily be released by a frequency inverter.

The "inverter" input can be switched, for example, by a higher-level controller (PLC) or by other similar modules.

5.4 Checking the connection of the brake

Check for correct connection of the brake to the didactics module.

Check to see which brake type is used:

- 3-wire brake (BY brake when using synchronous servomotors)
- 2- or 3-wire brake (BE brake when using AC asynchronous motors)

NOTICE

Damage or destruction of the brake resulting from incorrect voltage.

Damage to property.

- Refer to the motor nameplate to check whether the correct brake voltage is used.

Use shielded brake cables.

5.5 Operating principle of BMKB brake control

BMKB brake control energizes the brake coil if both power supply (according to the brake voltage 150 to 500 V) and a DC 24 V signal (e.g. from a frequency inverter or PLC) are present **at the same time**. The brake is applied if one condition is not being met.

The ground of the inverter, e.g. X13.1 GND, must be connected with the ground of the external DC 24 V power supply. Only then can the brake be released (for example manually) via frequency inverter or higher-level controller.

BMKB brake control allows for shortest response and application times.

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6 Operation

6.1 Important information

INFORMATION

- Check that all protective covers are installed correctly.
- Observe the documentation of components connected or mounted to the module (e.g. motor, inverter).

⚠ WARNING

Electric shock when disconnecting or connecting voltage-carrying plug connectors.

Severe or fatal injuries.

- Disconnect all supply voltages.
- Make sure that the device is de-energized.
- Never plug or unplug the plug connectors while they are energized.

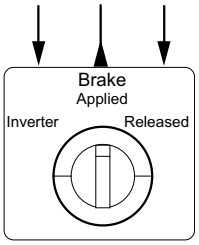
⚠ CAUTION

Risk of burns due to hot surfaces of the device or connected options, e.g. braking resistors.

Injury.

- Provide for covers to secure hot surfaces.
- Install the protection devices according to the regulations.
- Check the protection devices on a regular basis.
- Let the device and the connected options cool down before you start working on them.

6.2 Operating and controlling the brake



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Using the selector switch, the brake of the connected motor can be operated as follows:

Inverter

When the selector switch is set to "Inverter", the brake control receives a signal from the inverter to release the brake. The inverter controls release and application of the brake.

NOTICE

Damage and destruction of the brake resulting from incorrectly set parameters.

Damage to property.

- When the motor is energized, the brake must be released in time to prevent the motor from turning against the brake while it is still applied. Set the inverter parameters accordingly.

Applied

When the selector switch is set to "Applied", the brake is applied.

NOTICE

Damage and destruction of the brake and excessive wear of the brake lining.

Damage to property.

- Do not operate or energize the motor when the switch is set to "Applied".

Released

When the selector switch is set to "Released", the brake is released permanently. (Requirement: Brake control is externally connected to 24 V and is wired accordingly, see wiring in the chapter "Startup".)

In this case, brake control ignores the control signal from the inverter.

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7 Service

7.1 Electronics Service by SEW-EURODRIVE

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

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

- Information on the device type on the nameplate (e.g. type designation, serial number, part number, product key, purchase order number)
- Brief description of the application
- Fault message on the status display
- Nature of the fault
- Accompanying circumstances
- Any unusual events preceding the problem

7.2 Waste disposal

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

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

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

- Oil and grease

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

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8 Technical data

Brake control module (BMK)	
Part number	18985785
Degree of protection	IP20
Power supply connection	AC voltage
Connection voltage	AC 150 – 500 V (depending on the operating voltage of the brake)
Control voltage	DC 24 V
Line frequency	50 Hz
Holding current	1.5 A
Weight	1.2 kg
Dimensions W × H × D	140 mm × 295 mm × 145 mm

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9 Standards and certifications

The SEW-EURODRIVE components were developed and tested based on the latest, national standards and certifications.

If special approvals are necessary for additional requirements, request them separately from SEW-EURODRIVE.

9.1 EC declaration of conformity

The EC declarations of conformity for the SEW components are listed on the website of SEW-EURODRIVE with the respective products.

9.2 Certifications

The certificates for the SEW components are listed on the website of SEW-EURODRIVE with the respective products.

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10 Address list

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Drive Service Hotline / 24 Hour Service			0 800 SEWHELP 0 800 7394357

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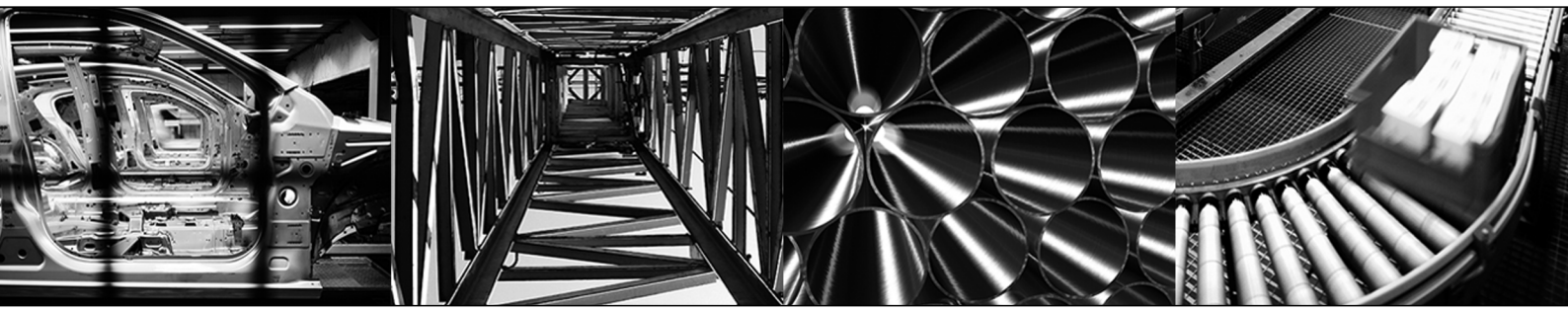

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