SEW EURODRIVE

Assembly and Operating Instructions

Application Package

Electrified Monorail System

EMS basic

Edition 03/2015

21322597/EN

Table of contents

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1 General information

1.1 About this documentation

This documentation is an integral part of the product. The documentation is intended for all employees who perform assembly, installation, startup, and service work on the product.

Make sure this documentation is accessible and legible. Ensure 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. If you are unclear about any of the information in this documentation or 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 drive system or its environment.
INFORMATION	Useful information or tip: Simplifies handling of the drive system.	

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
	Warning of risk of crushing
	Warning of suspended load
	Warning of automatic restart

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 Rights to claim under limited warranty

A requirement of fault-free operation and fulfillment of any rights to claim under limited warranty is that you adhere to the information in the documentation. Read the documentation before you start working with the product.

1.4 Exclusion of liability

You must comply with the information contained in this documentation to ensure safe operation and to achieve the specified product characteristics and performance features. SEW-EURODRIVE assumes no liability for injury to persons or damage to equipment or property resulting from non-observance of these operating instructions. In such cases, any liability for defects is excluded.

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1.5 Other applicable documentation

Note the listed documentation in the "Application" section.

INFORMATION

If your package variant was adapted, please also note the addendum to the assembly and operating instructions.

Always use the latest version of the documentation and software.

The SEW-EURODRIVE homepage (www.sew-eurodrive.com) provides a wide selection of documents for download in various languages.

If required, you can also order printed and bound copies of the documentation from SEW-EURODRIVE.

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 basic safety notes must be read carefully to prevent injury to persons and damage to property. Mechanical and system design engineers, operators, and distributors must ensure that the basic safety notes are observed and complied with.

Make sure that those responsible for the system and its operation as well as those working on the system independently have carefully read through and understood the contents of the documentation. If you are unclear about any of the information in this documentation or if you require further information, please contact SEW-EURODRIVE.

The following safety notes refer to the use of the drive solution described in this documentation. You should also observe the supplementary safety notes included in this documentation, as well as the safety notes in the documentation for the connected units and relevant software.

This documentation does not replace the detailed documentation for the connected units and the relevant software. It assumes that the user has access to and is familiar with the documentation for all connected units and relevant software.

All trained staff have a duty with regard to information and actions in their work area.

2.2 Target group

All mechanical work is to be performed exclusively by adequately qualified personnel. Qualified personnel in the context of this documentation are persons familiar with the design, mechanical installation, troubleshooting and servicing of the product who possess the following qualifications:

- Training in mechanical engineering, e.g. as a mechanic or mechatronics technician (final examinations must have been passed).
- Knowledge of this documentation and other applicable documentation.

Any electrotechnical work may only be performed by adequately qualified electricians. Qualified electricians in the context of this documentation are persons familiar with electrical installation, startup, troubleshooting and servicing of the product who possess the following qualifications:

- Training in electrical engineering, e.g. as an electrician or mechatronics technician (final examinations must have been passed).
- Knowledge of this documentation and other applicable documentation.

Any work with the software may only be performed by adequately qualified personnel. Qualified personnel in this context are persons who have the following qualifications:

- Appropriate training.
- Knowledge of this documentation and other applicable documentation.
- SEW-EURODRIVE recommends additional product training for products that are operated using this software.

All work in the areas of transportation, storage, operation and waste disposal must be carried out by persons who are trained appropriately.

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2.3 Designated use

The drive solution is intended for installation in electrical systems and machines for industrial use under roof. The drive solution is designed for mobile use in industrial and commercial systems in the combination of inverter and corresponding AC asynchronous motor with squirrel-cage rotor. The drive solution consists of one axis. Do not connect further loads or other loads to the inverter.

Do not use the drive solution to transport persons or animals. No not use this drive solution to operate lifting applications or cranes.

Neither use the drive solution in potentially explosive atmospheres nor in areas with strict hygiene requirements.

When installed in electrical systems or machines, startup of the drive solution (i.e. the start of designated use) is prohibited until it is determined that the machine meets the requirements stipulated in EU Directive 2006/42/EC (Machinery Directive). Observe standard EN 60204-1. Startup (i.e. the start of designated use) is only permitted under observance of the EMC Directive (2004/108/EC).

The drive solution meets the requirements stipulated in low voltage guideline 2006/95/EC. The standards included in the declaration of conformity are used for the drive solution.

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

2.4 Risk assessment and risk reduction

The system/machine must be assessed to ascertain its limits, dangers and risks. For all risks that cannot be adequately reduced, you must implement additional structural measures to minimize the likelihood of any danger occurring. If this is not possible, you may be able to reduce risk by implementing preventive technical measures and consulting the relevant user information.

At the end of the process, you must check that the selected measures are effective in reducing risk and do not generate additional hazards.

The technical solutions described in this document can help to reduce risk by providing additional preventive measures. The risk assessment and selected risk reduction measures must be developed and implemented in accordance with the applicable mechanical and system engineering standards and regulations (e.g. EN ISO 12100, EN ISO 13849).

The machine or system builder, distributor or user is responsible for ensuring that an evaluation is carried out to determine whether the risk reduction measures defined in this documentation are appropriate for the task at hand and to make sure that these measures do not generate additional hazards.

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2.5 Functional safety technology

The units and solutions described in the document may not perform any safety functions without being properly connected to the interfaces and integrated in the machine or system.

Safety technology (stationary and mobile) is the responsibility of the system operator.

2.6 Transportation

Inspect the shipment for damage as soon as you receive the delivery. Inform the shipping company immediately about any damage. It may be necessary to preclude startup. Remove transport protection prior to startup.

Observe the following instructions when transporting the units:

- Ensure that the unit is not subject to mechanical impact during transportation.
- When necessary, you should use suitable means of transport with sufficient space.

Observe the information on transport and climatic conditions as stated in chapters "Transportation" and "Technical data" of the documentation for the respective SEW-EURODRIVE components.

2.7 Setup and installation

Ensure that the units are installed and cooled according to the regulations in the related documentation.

Protect the units from excessive strain. Especially during transportation and handling, do not allow the components to be deformed or insulation spaces altered. Electrical components must not be mechanically impaired or irreparably damaged.

The following applications are prohibited unless explicitly permitted:

- Use in potentially explosive atmospheres,
- Use in areas exposed to harmful oils, acids, gases, vapors, dust, radiation, etc.
- Use in applications that are subject to mechanical vibration and impact loads in excess of the requirements of EN 61800-5-1.

Observe the guidelines in the "Mechanical installation" section in the documentation for the relevant SEW components.

2.8 Electrical connection

Observe applicable national accident prevention guidelines when working on live units.

Perform electrical installation according to the pertinent regulations (such as cable cross sections, fusing, protective conductor connection). Observe the information about electrical connections in the respective documentation for the components.

Preventive measures and protection devices must meet the applicable regulations (e.g. EN 60204-1 or EN 61800-5-1).

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2.9 Safe disconnection

The units meet all of the requirements for the safe isolation of power and electronic connections in accordance with EN 61800-5-1. All connected circuits must also comply with the requirements for reliable isolation so as to guarantee reliable isolation.

2.10 Startup and operation

Never install damaged products. Submit a complaint to the shipping company immediately in the event of damage. Never take damaged products into operation.

Do not deactivate monitoring and protection devices even for a test run. If in doubt, switch off the units whenever changes occur in relation to normal operation (such as increased temperature, noise, vibration). Determine the cause of the fault and consult SEW-EURODRIVE, if necessary.

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

Additional protective measures may be necessary for applications with increased hazard potential. Check the functionality of protection devices each time you change the configuration.

Cover connections that are not being used with the supplied protection caps during operation.

Depending on the degree of protection, some units may have live, uninsulated, or sometimes moving or rotating parts, as well as hot surfaces, during operation. Unauthorized removal of covers, improper use, or incorrect installation and operation may result in severe injury to persons, or damage to machinery. Refer to the documentation for additional information.

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

Mechanical blocking or internal safety functions of the unit can cause a motor standstill. Removing the source of the malfunction or performing a reset can result in an automatic restart of the drives. If his is not permitted for the driven machine for safety reasons, disconnect the units from the grid before correcting the fault.

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

Do not touch live components or power connections immediately after disconnecting the unit from the voltage supply because some capacitors may still be charged. Observe the corresponding labels on the units.

2.11 Inspection and maintenance

Carry out maintenance and repair work only once the system has been secured and disconnected from the power supply. Before working on the system, the power must be switched off. The power must remain off while working on the system.

Switch off all necessary switches to prevent the drives from startup up accidentally. Use a padlock to prevent the main switch on the control cabinet from being switched on accidentally.

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2.12 Storage

Observe the following instructions when shutting down or storing the units:

- Make sure that the units are not subject to mechanical impact during storage.

Note the storage information in the documentation for the relevant SEW-EURODRIVE components.

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3 Application

3.1 Description

3.1.1 Definition

The electrified monorail system is a rail-mounted transportation system. Its distinguishing feature is above-ground conveying, which enables you to use expensive surfaces more efficiently.

The vehicles of the electrified monorail system are driven individually and can therefore move autonomously in the rail system. Branches are implemented using switches. The vehicles are supplied with power and control signals via power rails on the support rail. The rails are mounted on the hall's ceiling or, if the ceiling is too high, on a steel construction.

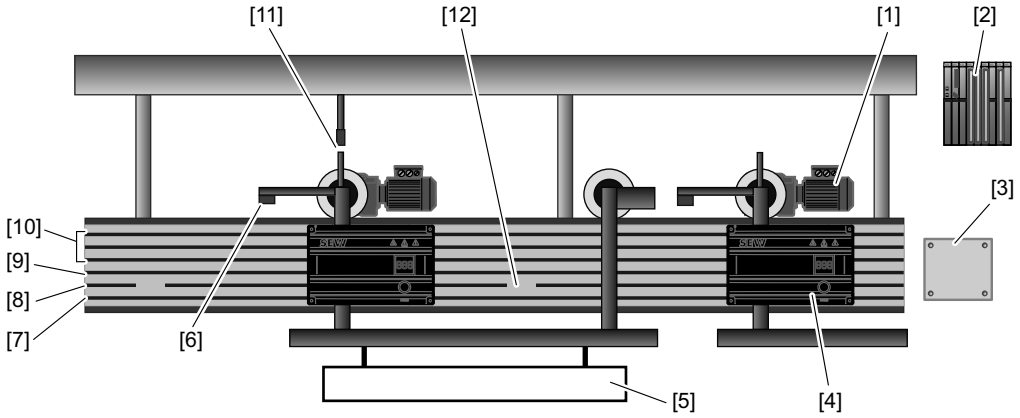
Electrified monorail systems can be used in many industries, such as in the automotive industry, food industry, timber industry, and in logistics.

Using electrified monorail systems, you can deliver raw materials and link production steps, buffer functions and the removal of products for transportation.

3.1.2 Properties

The EMS basic electrified monorail system is intended for light loads and for simple transportation tasks without synchronous operation.

With three-phase current power supply via power rail, a travel axis with up to 1.5 kW (S1) can be connected directly to EMS basic via male multipoint connector (input voltage AC 300 to 500 V, 50/60 Hz).



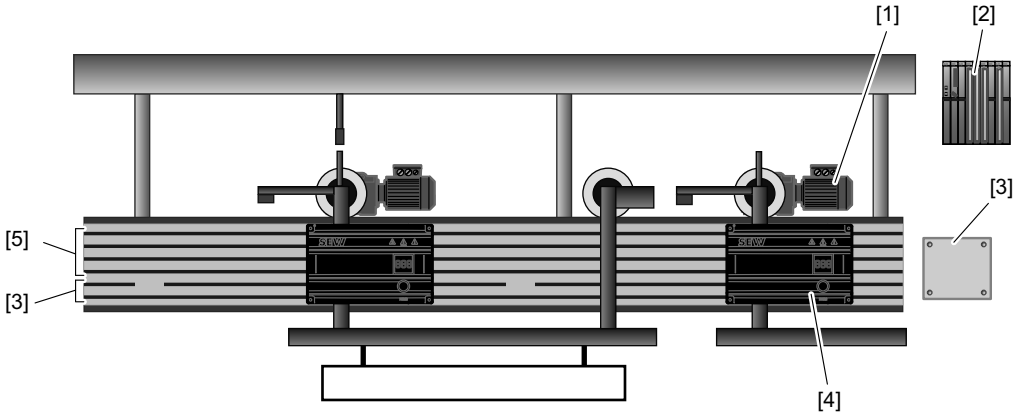
[1]	DR.. gearmotor travel drive	[7]	Message rail
[2]	Higher-level controller (PLC)	[8]	Command rail
[3]	Half-wave generation module	[9]	Protective earth PE
[4]	MOVIPRO® application controller	[10]	Three-phase current L1 – L3
[5]	Transported material	[11]	Magnetic switch and magnet
[6]	Distance sensor, collision protection sensor	[12]	Gap in the power rail

The application provides the following functions:

- Complete solution consisting of vehicle control, motor, and cables for greatest operational reliability
- Half-wave technology (positive half wave, negative half wave, full wave)

- The application parameters are set using the MOVIVISION® EMS basic software, for example:
  - 3 travel commands (forward or backward)
  - 8 speeds (speed limits)
  - 2 different distances to vehicles traveling ahead
- Status monitoring by means of 7-segment display and LEDs on the application controller
- Easy and quick startup and unit replacement with M12 parameter memory
- Optional: Manual mode via infrared remote control (PZO keypad)
- Optional: external operating stop switch

3.2 Topology



[1] Travel axis (→ 🗎 18)
[2] Higher-level controller (PLC)
[3] Communication (→ 🗎 20)
[4] Application controller (→ 🗎 15)
[5] Energy supply (→ 🗎 19)

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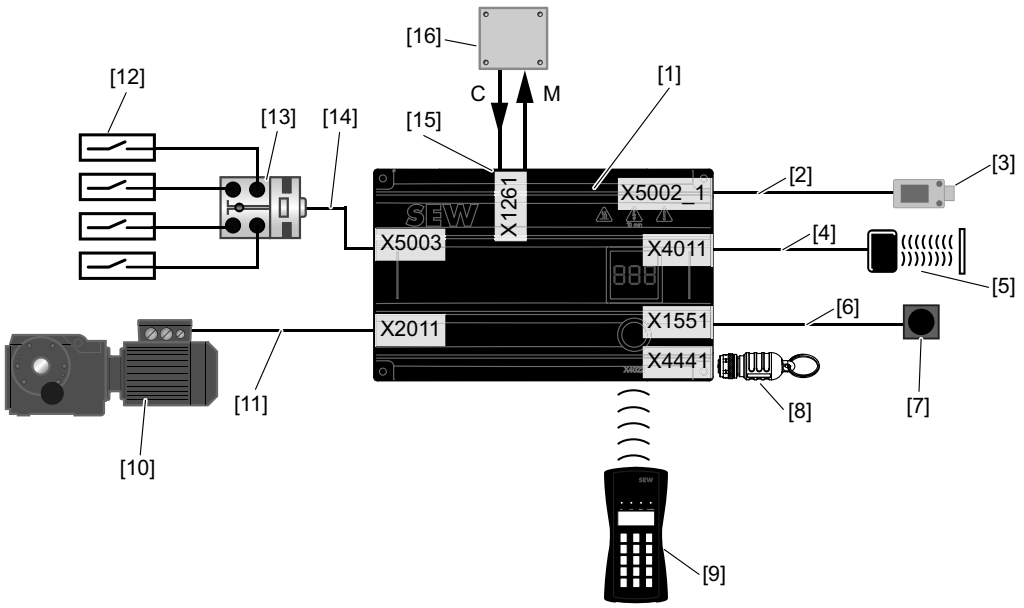
3.3 Application controller

3.3.1 Technical diagram



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No.	Component	Part number
[1]	MOVIPRO® application controller PHE..B-A15-.1X0B1A-00/000	Dependent on configuration
[2]	Cable from MOVIPRO® to collision protection sensor	See communication
[3]	Collision protection sensor	See communication
[4]	Cable from MOVIPRO® to distance sensor	See communication
[5]	Distance sensor	See communication
[6]	Cable from MOVIPRO® to operating stop switch (M12 connector)	Provided by the customer
[7]	External operating stop switch or: Jumper plug	Provided by the customer 11747099
[8]	Optional: M12 parameter memory	See communication
[9]	Optional: Infrared remote control (PZO keypad)	See communication
[10]	DR.. gearmotor travel drive	See travel axis
[11]	Cable from MOVIPRO® to motor	See travel axis
[12]	Magnetic switch	See communication
[13]	Sensor/actuator box	See communication
[14]	Cable from MOVIPRO® to sensor/actuator box	See communication
[15]	Contact conductor connection	–

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No.	Component	Part number
[16]	Half-wave command from half-wave generation module (e.g. Wetron HWS, curve modules KBS) or contactor (only full wave); Half-wave signals from the application controller to the half-wave evaluation module	Provided by the customer
	Optional: EMS angle bracket	28218248
	Optional: EMS mounting set (hinges)	18220789

Documentation	Part number
"Application Controller MOVIPRO® PHE..B-A15-. 1X0B1A-00/000" operating instructions	11485817/EN
Addendum to the "MOVIPRO® – Accessories" operating instructions	19446012/EN
Addendum to the "MOVIPRO® Accessories Keypad PZO00A-BFBIR0-01/.." operating instructions	20280947/EN

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3.3.2 Operating principle

The MOVIPRO® application controller evaluates the signals depending on the parameter setting and in this way controls the travel drive. The behavior of the vehicles is influenced by the following factors:

- Half-wave commands

  The half-wave commands specify the behavior of the vehicles.

- Collision protection sensor

  The collision protection sensor prevents vehicles from colliding.

- Distance sensor

  The distance sensor measures the distance to a reflector. Depending on the parameter setting, a minimum distance to another object can be maintained. The current speed of the vehicle as well as the length of the part to be transported can be taken into account.

- Magnetic switch (max. 4)

  The speed of the vehicle can be reduced using the magnetic switch. A magnetic switch can be used to change distance ranges between vehicles and to adjust the speed accordingly (until stop).

  Magnetic switches are connected to the MOVIPRO® application controller either directly (X5003, X5002_1, X5002_2) or via sensor/actuator box.

- Optional: External operating stop switch

  An external operating stop switch lets you stop a vehicle manually (machine stop, no STO).

Two digital outputs (X2002_1) are available for external components (such as small lights). High, low, or a 1-Hz signal can be assigned to these outputs.

The 7-segment display of the application controller indicates the present state, for example travel commands without error.

The M12 parameter memory is a storage medium for parameter data that facilitates startup and unit replacement. The M12 parameter memory is additionally used as fault memory. The M12 parameter memory is inserted on the M12 plug connector of the application controller.

The infrared remote control (PZO keypad) lets you acknowledge faults or operate the application in semi-automatic mode or manual mode. In semi-automatic mode, you simulate full-wave commands. In manual mode, the sensors and digital input signals have no function. The vehicle travels at the speed parameterized for the infrared remote control (PZO keypad) without taking account of collision protection sensors, etc.

Refer to the MOVIPRO® documentation for more information.

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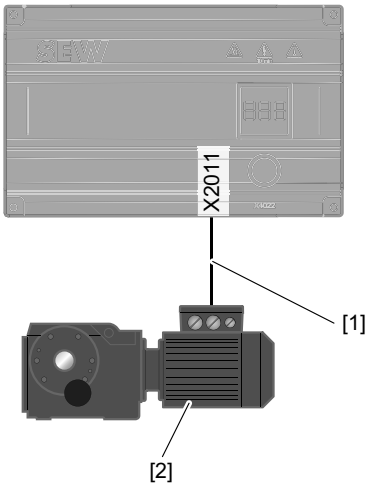
3.4 Travel axis

3.4.1 Technical diagram



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No.	Component	Part number
[1]	Cable from MOVIPRO® to motor	Depending on the configuration, see cable table
[2]	DR.. series AC motor with TH winding thermostat and global winding (Europe/USA/Canada/China 2012)	Depending on the configuration, see motor table

Cables

Motor connection	MOVIPRO® connectors		
	Han® Q8, straight	Han® Q8, angled	Han® 10E
Open end	18125794	18164234	18164242
IS (star)	18127703	18164250	18164277
IS (delta)	18127681	18164374	18164323
ABB8	18127711	18164285	–
ASB8	18127738	18164269	–

Motor

Brake (optional)	Brake voltage standard 230 V (optionally 110 V or 400 V)			
	DRS71S4	DRS71M4	DRE80M4	DRE90M4
BE05	x	x	x	–
BE1	x	x	x	x
BE2	–	–	–	x

Documentation	Part number
"DR..71 – 315, DRN80 – 315 AC Motors" operating instructions	21258996/EN

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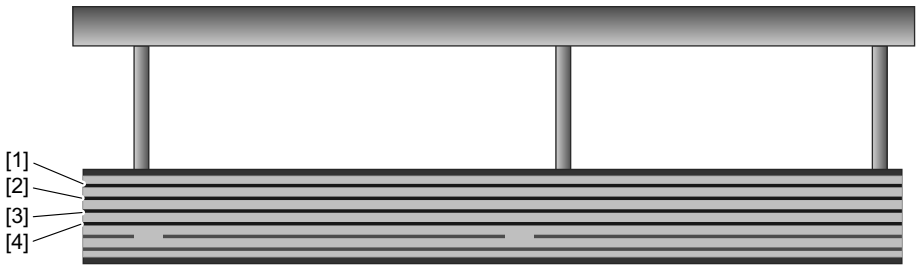
3.4.2 Operating principle

The travel axis consists of a mechanical frame, electrical components of SEW-EURODRIVE, and purchased parts. The mechanical design and construction of the vehicles is carried out by the relevant original equipment manufacturer (OEM) or by the customer itself.

An AC motor of the type DR.. with up to 1.5 kW (380 V to 500 V, 50/60 Hz) is used to move the vehicle. The mechanical connection is made using electrified monorail gear units or helical-bevel gear units. The motor is connected to the application controller using a motor cable with open ends, IS, ABB8 or ASB8 connectors on the motor end. On the application controller end, the motor is connected to the Han® Q8 or Han® 10E connector. The drives are selected based on the selection criteria of SEW-EURODRIVE.

3.5 Energy supply

3.5.1 Technical diagram



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No.	Component	Part number
[1]	Power rail L1	Provided by the customer
[2]	Power rail L2	Provided by the customer
[3]	Power rail L3	Provided by the customer
[4]	Protective earth PE	Provided by the customer

3.5.2 Operating principle

The energy is supplied via power rails:

- L1 to L3: Energy supply, three-phase supply AC 380 to 500 V, 50/60 Hz
- PE: Protective earth

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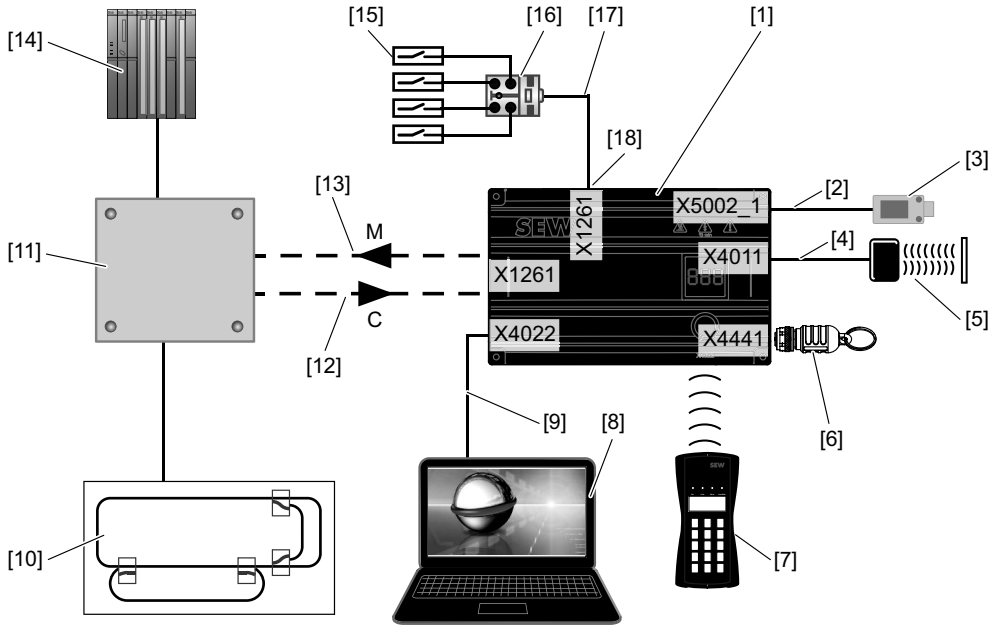
3.6 Communication

3.6.1 Technical diagram



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No.	Component	Part number
[1]	MOVIPRO® application controller	See application controller
[2]	Cable from MOVIPRO® to collision protection sensor (M12 connector)	Provided by the customer
[3]	Collision protection sensor (e.g. from Pepperl+Fuchs 2-channel non-equivalent)	Provided by the customer
[4]	Cable from MOVIPRO® to distance sensor (M12 connector)	Provided by the customer
[5]	Distance sensor (e.g. Sensopart Railpilot FR 85-2 ILLG-S1L5, baud rate 62.5 kB or 57.6 kB)	Provided by the customer
[6]	Optional: M12 parameter memory	17976340
[7]	Optional: Infrared remote control (PZO keypad) PZO00A-BFBIR0-01/L005	17976014
[8]	Parameterizable plant software MOVIVISION® EMS basic (CD)	17125812
[9]	Service interface Cable from MOVIPRO® to PC (prefabricated, RJ10 or RS485 to USB interface converter)	19104979
[10]	Electrified monorail track	Provided by the customer
[11]	Half-wave generation module (e.g. Wetron HWS or KBS) and half-wave evaluation module (e.g. Wetron HWR)	Provided by the customer

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No.	Component	Part number
[12]	Half-wave command from half-wave evaluation module to MOVIPRO® application controller	–
[13]	Message signal from MOVIPRO® application controller to half-wave generation module	–
[14]	Higher-level controller (PLC)	Provided by the customer
[15]	Magnetic switch (max 4, such as Schmersal BN 325-R-1279-2)	Provided by the customer
[16]	Sensor/actuator box 4/3-L-M12-M8	19111142
[17]	Cable from MOVIPRO® to sensor/actuator box	• Length 1 m: 18161073 • Length 2 m: 18161081 • Length 3 m: 18161103 • Length 5 m: 18161138
[18]	Contact conductor connection	Provided by the customer

Documentation	Part number
"MOVIVISION® EMS basic" manual	20266146/EN

3.6.2 Operating principle

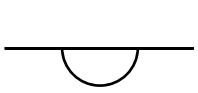
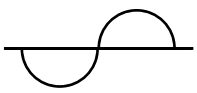
The communication is realized via:

- Command rail: half-wave signals from the half-wave generation module

  Conductor that guides the half waves of the half-wave generation module and in this way specifies the basic behavior of the application controller.
- Message rail: message signals from the application controller

  Conductor that sends the status message of the application controller to the higher-level controller (PLC) or to the half-wave evaluation module.
- Signals from the magnetic switch, collision protection sensors, and distance sensors

The command and message rail can transmit the following signals:

No signals	Positive half wave	Negative half wave	Full wave
			

The application controller receives these signals and controls the travel drive accordingly. You define the behavior of the application controller using the parameterizable plant software MOVIVISION® EMS basic.

For information on magnetic switches, distance sensors, collision protection sensors, and infrared remote control (PZO keypad), refer to chapter "Application controller" > "Operating principle" (→ 🗎 17).

INFORMATION

Contact SEW-EURODRIVE if you intend to use Wetron modules (half-wave generation modules, half-wave evaluation modules, curve block modules, etc.).

3.7 Track layout

⚠ WARNING

Risk of injury due to complex track layout

Severe or fatal injuries

- Only qualified personnel is allowed to enter the travel range.
- Never enter areas with restricted access alone (at least 2 persons).
- Adhere to the specifications for safety-related disconnection described in the documentation of the components.
- Instruct your employees accordingly.
- Mount safety devices for switching off movements in the event of a hazard.
- Mark footpaths.

INFORMATION

If you want to move a vehicle from a de-energized track section to an energized track section, consult SEW-EURODRIVE.

Subdivide the track layout into several areas. Following an example of a track layout divided into 3 areas:

- Energy supply
- Command rail
- Message rail

3.7.1 Energy supply

Properties

The energy supply comprises the energy supply of the track on power rails L1 to L3.

Divide the energy supply in track sections with the following properties:

- Emergency switching off is implemented in each track section.
- Each emergency switching off applies only to the visible track section.
- To prevent bridging of the track sections, emergency switching off areas are separated by means of separation blocks.
- The maximum number of vehicles in a track section depends on the current consumption of each vehicle. Typically, there are 20 vehicles in a track section.

Observe the following information:

- When planning the track sections, take into account the inrush currents of the EMS basic electrified monorail system.
- A vehicle stop is only ensured by emergency switching off.

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⚠ WARNING

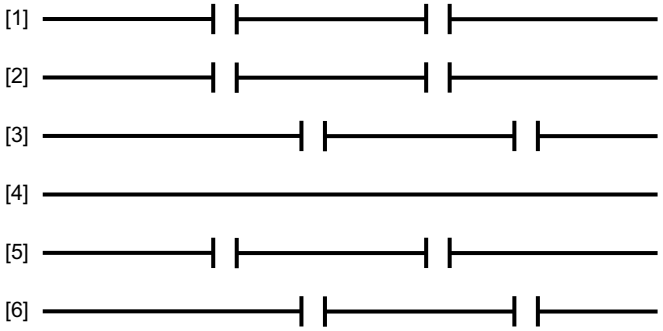
Danger of electric shock. In intersections, the energy can be bridged from an energized area to a de-energized area due to the mechanical structure of the contact conductor.

Severe or fatal injuries

- To prevent bridging, use separation blocks in front of maintenance areas.

Separation block

A separation block usually has the following structure:



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- L1 [1], L2 [2], and the command rail [5] are interrupted at the same time.
- L3 [3] and the message rail [6] are interrupted at the same time with an offset to L1, L2 and the command rail.
- PE [4] is not interrupted.

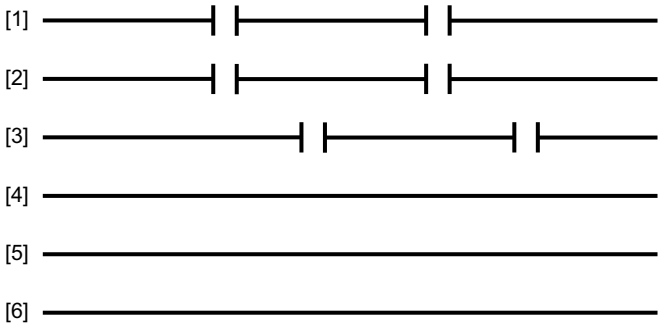
INFORMATION

If emergency switching off is triggered to the left or right of the separator block, then no electricity is present in the block.

If the track in front of the block is occupied, then a vehicle can be present in the block.

Safety block

A safety block usually has the following structure:



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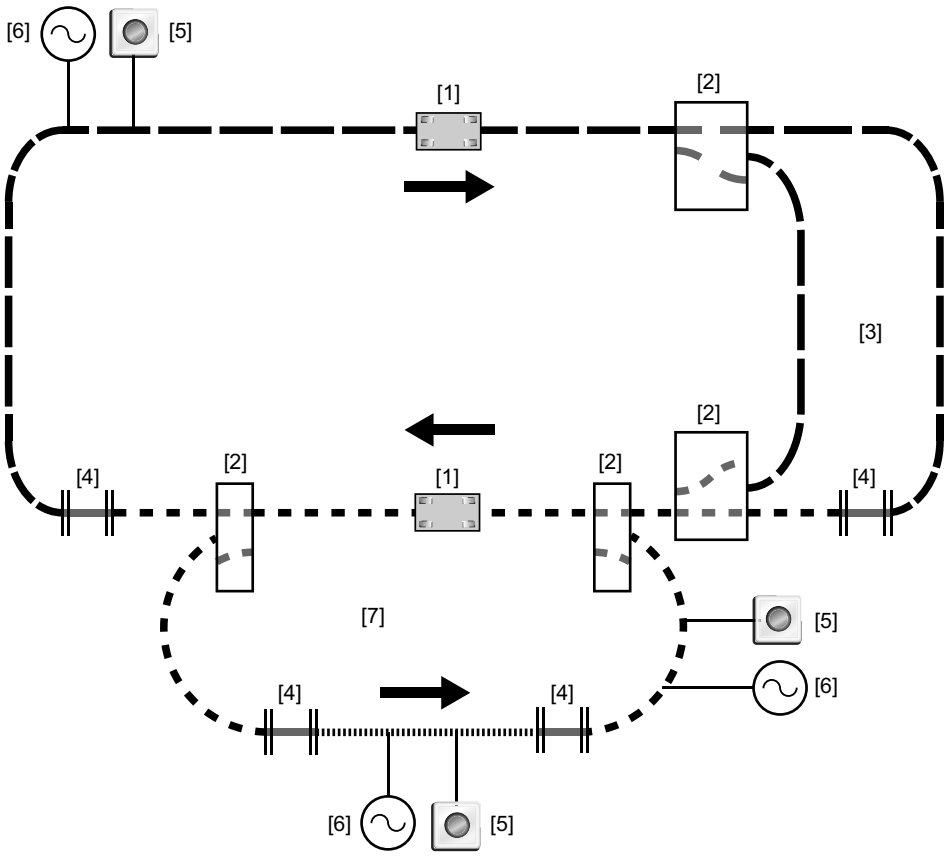
- L1 [1] and L2 [2] are interrupted at the same time.
- L3 [3] is interrupted with an offset to L1 and L2.
- PE [4], the command rail [5], and the message rail [6] are not interrupted.

INFORMATION

If emergency switching off is triggered to the left or right of the safety block, then no electricity is present in the block.

If the track in front of the block is occupied, then a vehicle can be present in the block.

Example



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[1] Vehicle
[2] Switch
[3] Buffer sections
[4] Separation block
[5] Emergency switching off
[6] Energy supply
[7] Diagnostics section / maintenance area

The various track sections are identified as follows:

Track section	Track identification
1	▬ ▬ ▬ ▬
2	▬ ▬ ▬ ▬
3	▬ ▬ ▬ ▬

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3.7.2 Command rail

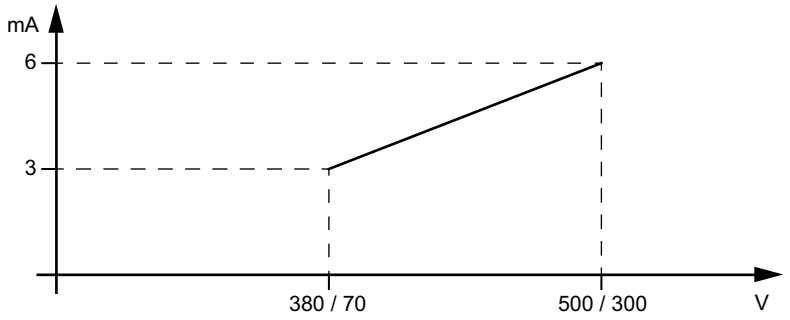
Properties

The division of the system into various track sections with different functions is mainly made on the command rail. A half-wave generation module in each track section generates the half-wave commands.

Divide the command rails in track sections with the following properties:

- Each track section is connected to a half-wave generation module. Areas with the same functions (normal travel) can be connected to a joint half-wave generation module if this is technically reasonable.
- The maximum length of the track section corresponds to the maximum number of vehicles multiplied by the vehicle length.

  The maximum number of vehicles in a track section depends on the current consumption of the application controller and of the vehicles. The current consumption of the MOVIPRO® application controller is 3 to 6 mA (+/-10%).



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- There is a gap in the command rail in front of each track section.
- You can set an extended delay time in the MOVIVISION® system to prevent an undesired behavior of the vehicles when bridging track sections briefly. A new signal is not executed until the delay time has elapsed.
- Initiators along the track detect the individual vehicles. These initiators send information directly to the higher-level controller (PLC) or to the block modules (curve block modules, switch block modules, etc.).

Special areas require different concepts:

- Curves

  Not more than one vehicle may be present in a curve. This function is controlled by special curve block modules (such as Wetron KBS). There is a wait block (curve block) that buffers vehicles as long as another vehicle is present in the curve.
- Switches and lifting stations

  Switch control is carried out like the control of lifting stations and the blocks in front of them via the higher-level controller (PLC).

  A wait block (control block) in addition to the safety block in front of the switch or the lifting station increases the safety of the system.

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- Safety block

  Safety blocks are controlled directly by the higher-level controller (PLC).

  If the downstream area is occupied, safety blocks are de-energized by the higher-level controller (PLC).
- Maintenance areas and diagnostics sections

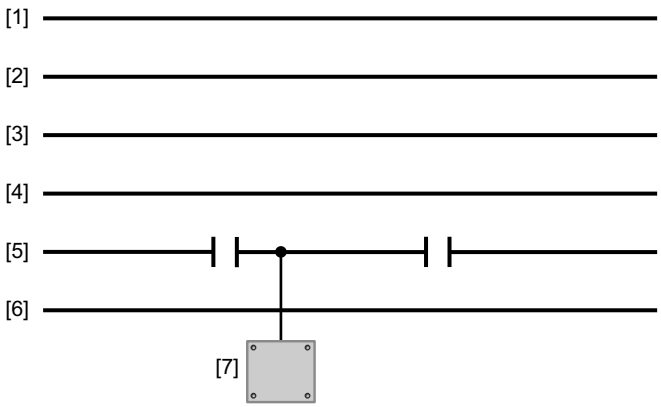
  Diagnostics sections are used to check that the vehicle is working properly. The following test methods are carried out for this purpose:

  – PE test (protective earth test)
  – Speed monitoring
  – Collision test to check distance sensors and collision protection sensors
  – Brake test

  Install a separation block in front of the maintenance area to prevent bridging.

Curve block and wait block (control block)

A control block usually has the following structure:



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- L1 [1], L2 [2], L3 [3], PE [4], and the message rail [6] are not interrupted.
- The command rail [5] is interrupted.
- A half-wave generation module [7] is connected in the area where the gap is located in the command rail.

INFORMATION

If the track after the block is occupied, the "enable travel" command is revoked (e.g. no half-wave signal). The vehicle stops within the area of the block.

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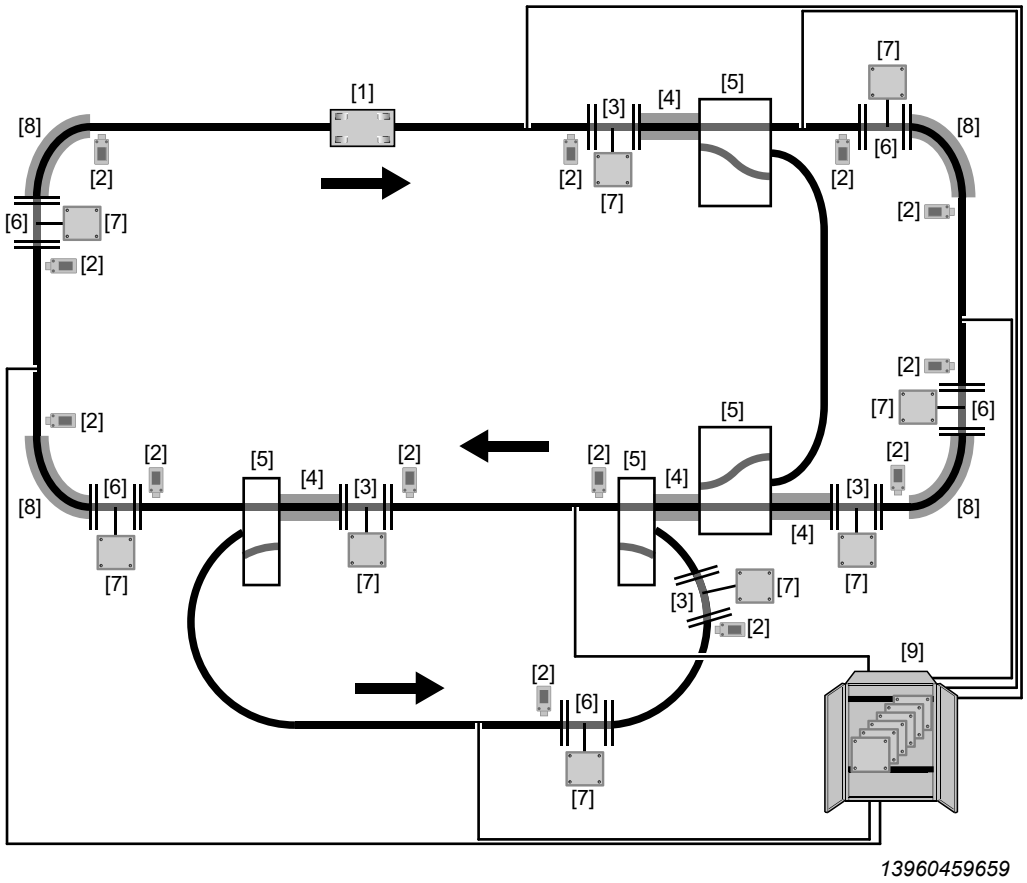
Example



[1] Vehicle
[2] Initiator
[3] Wait/control block
[4] Safety block
[5] Switch
[6] Wait/control block
[7] Decentral half-wave generation module in the curve block in front of curves and in the wait block in front of switches
[8] Curve area, reduced speed
[9] Control cabinet with a half-wave generation module each for every track section

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3.7.3 Message rail

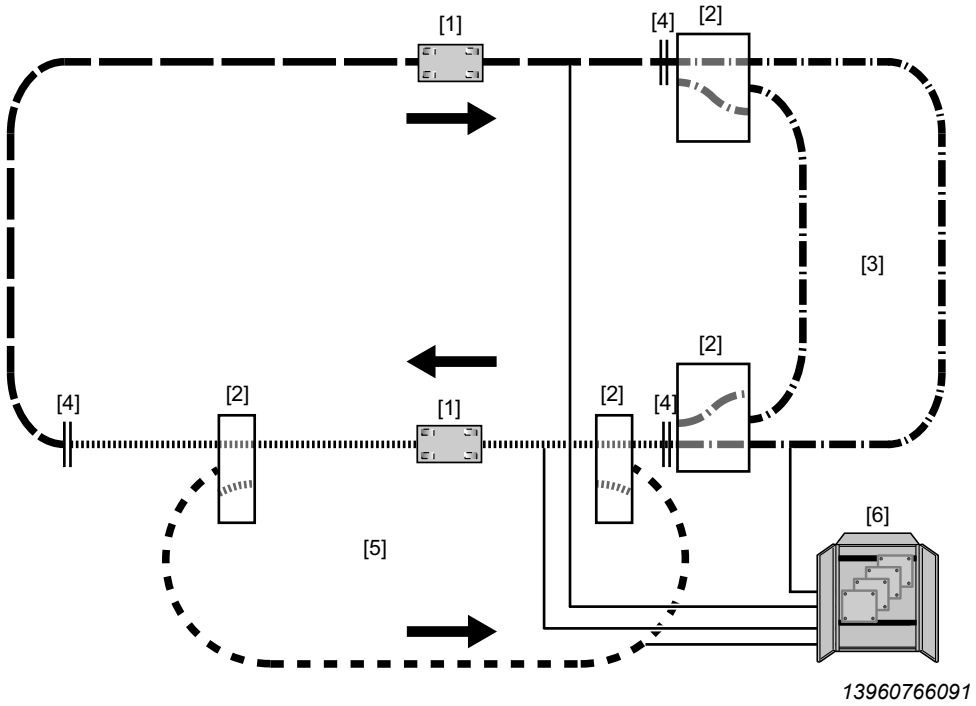
Properties

Status information of the application controller is sent to the higher-level controller (PLC) or to the half-wave evaluation module via message rails.

If an application controller has a fault, this fault is signaled on the message rail (full wave).

The track is divided into sections with gaps in the message rail. A half-wave evaluation module is installed in the control cabinet for each track section.

Example



[1] Vehicle
[2] Switch
[3] Buffer sections
[4] Message rail gap
[5] Diagnostics section / maintenance area
[6] Control cabinet with half-wave evaluation module each for every track section

The various track sections are identified as follows:

Track section	Track identification
1	
2	
3	
4	

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4 Assembly and installation

4.1 General information

Note the following information for the installation:

- The general guidelines and instructions provided by the system manufacturer.
- All information about the permitted conditions at the place of installation.
- The general safety notes for the respective units.
- The assembly notes and installation instructions for the respective units.

⚠ WARNING

Danger due to freely accessible rotating shaft ends and system parts

Severe or fatal injuries

- Install fences for freely accessible rotating parts before startup.
- Start up the system only after the system parts are installed correctly.

⚠ WARNING

Danger due to insufficiently secured component parts on rotating shaft ends

Severe or fatal injuries

- Secure loose parts on shaft ends (e.g. keys) from becoming detached.
- Observe the component documentation.

⚠ WARNING

Danger due to live parts

Severe or fatal injuries

- Comply with the assembly specifications from the manufacturer.
- Switch off the electrical system before working on the main switch and prevent it from being switched on accidentally.
- Work must be carried out by qualified specialists.
- Observe the 5 safety rules before commencing the work: Disconnect. Secure the device against a restart. Establish that there is no voltage. Ground and short-circuit the device. Cover or cordon off neighboring live parts.

⚠ WARNING

Danger due to incorrectly fitted parts or system components

Severe or fatal injuries

- The system builder must take appropriate measures.

⚠ CAUTION

Danger due to surrounding components

Injury

- Keep your work space and the system installation area clean.

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4.2 Requirements

Ensure that the following requirements have been met:

- A fully operational vehicle is present.
- The track and buffer tracks are installed and have been checked for proper mechanical functioning.
- The energy supply (L1 to L3, PE), the message rail, and the command rail are installed in the rail.
- The hardware is installed for each track section for the half-wave generation and evaluation modules.
- Circuit breakers with characteristics C or D are installed. 1.2-fold nominal current of all consumers in continuous duty or at least 1 A fusing per vehicle.
- The vehicle is equipped with collision sensors (2-channel non-equivalent) and/or optical distance sensors.
- The vehicle is equipped with a magnetic switch. Magnets are installed on the track.
- Optional: External operating switch (DC 24 V, M12 5-pole female, A-coded) is connected to the MOVIPRO® application controller to stop the carrier manually.

4.3 Mechanical installation

4.3.1 Clearance

When installing the mechanical components, observe the minimum clearance:

- For the connection of cables and plug connectors
- For the handling of any display elements, diagnostics elements and actuator elements

Observe the documentation for the devices used.

4.3.2 Cooling

Observe the following rules:

- Ensure that excessive heat can be dissipated to the environment by means of free convection.
- Observe the specified minimum clearance below the cooling fins.

Observe the documentation for the devices used.

4.3.3 Assembly

Observe the following rules:

- When selecting and dimensioning the mounting and safety elements, observe the applicable standards, the technical data of the unit, as well as on-site circumstances.
- Use only mounting and safety elements that fit into the bores, threads and countersinks provided.
- Observe the relevant minimum distances and clearances.

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- Ensure that there is no risk of collision with other components or construction elements along the track after installation.
- Ensure that all display and diagnostic elements (such as LEDs, displays and diagnostic interfaces) are visible and accessible after installation.

⚠ CAUTION

Risk of injury due to protruding parts

Risk of cutting or crushing injuries

- Secure sharp and protruding parts by using cover plates.
- The installation may only be carried out by trained specialists.

Drive

Observe the following rules:

- The specifications on the nameplate of the drive must correspond with the supply system or the output voltage of the frequency inverter.
- The drive is not damaged (no damage caused by transport or storage).
- The following requirements have to be met:
  - Ambient temperature 5 °C to 40 °C; up to 60 °C derating of 1% per 1 K
  - No oils, acids, gases, vapors, radiation etc. in the vicinity
  - Max. installation altitude 1000 m above sea level
  - Restrictions for encoders are adhered to
  - Special designs: The drive is designed in accordance with the ambient conditions

INFORMATION

The mounting position for installation must correspond with the specifications on the nameplate.

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4.4 Electrical installation

Prefabricated cables are provided to connect the majority of components. You can order these cables from SEW-EURODRIVE.

If you require additional cables, the team at SEW-EURODRIVE will be happy to assist you in selecting them.

4.4.1 Preventive measures

Adhere to the following rules:

- Adhere to the permitted EMC limit values of the units.

  For detailed information on EMC-compliant installation, refer to the document "Electromagnetic Compatibility in Drive Engineering" from SEW-EURODRIVE.
- Connect only ohmic/inductive loads, such as motors, to the motor connection. Never connect capacitive loads.
- The motor supply cable must not exceed 3 m in length.
- Ensure that the prescribed measures for preventing electrical hazards are implemented (protective earth or electrical separation/equipotential bonding and ESD protection).
- Use the shortest possible low-impedance, HF-compatible cables with the prescribed minimum cross sections and colors.

4.4.2 Cable routing

Observe the following rules:

- To connect the power supply and the communication, use suitable cables.
- Route power cables and signal cables in separate cable ducts.
- Choose the greatest possible distance between power cables and signal cables.
- Avoid using long cables running parallel to one another.

4.4.3 Shielding

Observe the following rules:

- The power signals and electronics signals (motor and control leads) are installed in shielded cables.
- The shield against capacitive coupling is applied to at least one end.
- A shield end is applied using a capacitor to avoid excessive loop currents.
- For cables with single shielding, the shield to the connector housing is applied on both ends over a wide area.
- For cables with double shielding (e.g. hybrid cables), the outer shielding is applied to the unit side and the inner shielding to the other side (e.g. on the motor).
- For external buses, the bus-specific installation instructions apply.

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4.5 Procedure

Install the components in the following order:

Component	Required documentation
MOVIPRO® application controller	"Application Controller MOVIPRO® PHE..B-A15-. 1X0B1A-00/000" operating instructions Chapter "Mechanical installation" Chapter "Electrical installation"
DR.. series AC motors	"DR..71 – 315, DRN80 – 315 AC Motors" operating instructions Chapter "Mechanical installation" Chapter "Electrical installation"

4.6 Procedure

Install the hardware as described in the documentation for the application components.

4.7 Terminal strips

⚠ WARNING

Electric shock due to connecting or disconnecting plug connectors when voltage is applied.

Severe or fatal injuries.

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

⚠ WARNING

Electric shock due to live contacts and conductors

The operating switch only switches off the internal 24 V supply for the frequency inverter.

- Only use the operating switch to stop the drive during operation.
- Do not use the operating switch for work on live parts.

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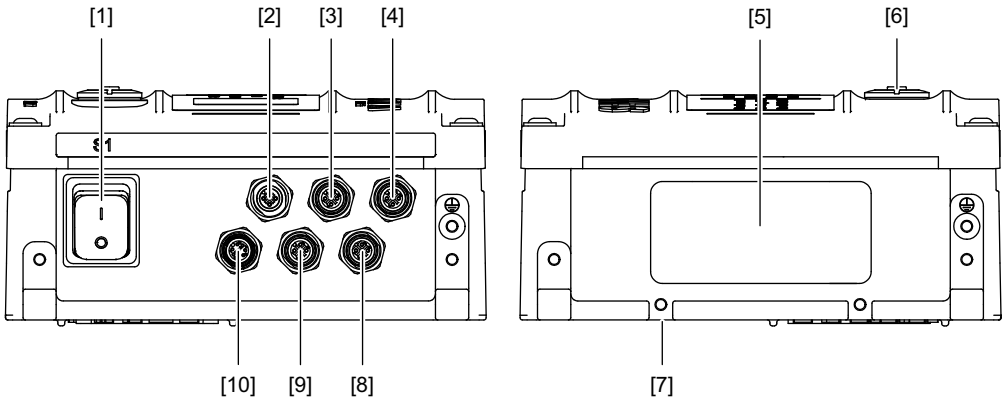
⚠ WARNING

Unintentional start up of the motor

The operating switch switches off the internal 24 V supply for the frequency inverter only at one pole.

- Only use the operating switch to stop the drive during operation.
- Do not use the operating switch for safety-related stopping of the drive.



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[1]	S1	Operating switch
[2]	X4441	M12 parameter memory
[3]	X5002_2	Digital inputs – communication and control unit
[4]	X5002_1	Digital inputs/outputs – communication and control unit
[5]	X2011	Variant 1: Motor with Han® Q8/0 connector
	X2013	Variant 2: Motor with Han® 10 E connector
[6]	X4022	RS485 interface – service
[7]	X1261	AC 400 V contact conductor connection
[8]	X4011	RS485 interface – external
[9]	X1551	DC 24 V connection for external operating switches
[10]	X5003	Digital inputs – communication and control unit

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5 Software startup

5.1 General information

Observe the following information for startup:

- The general guidelines and instructions provided by the system manufacturer.
- The general safety notes for the respective units.
- The startup notes and instructions for the units.
- The rules and procedures described in this document.

⚠ WARNING

Danger due to incorrect programming

Severe or fatal injuries

- Perform a function test of the system safety components.
- Adhere to the application specifications.
- Use the software approved by SEW-EURODRIVE.

⚠ WARNING

Danger due to incorrectly programmed control parameters

Severe or fatal injuries

- To start up the system, perform a system validation to ensure that all parameters are set correctly.
- Document the results of the validation.

5.2 Requirements

Ensure that the following requirements have been met:

- The hardware startup has been completed:
  - The AC 400 V supply on the MOVIPRO® application controller is activated.
- Power has been supplied to the entire track or to the track section for which startup is to be carried out.
- A fully operational vehicle is present.
- A computer and a connection cable are available.
- An M12 parameter memory is present as option.
- The software for startup and configuration is available:
  - MOVIVISION® EMS basic parameterizable plant software

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5.3 Procedure

Take the application package into operation using the MOVIVISION® EMS basic software. The software is included as CD.

Observe the following documentation for startup:

- "MOVIVISION® EMS basic" manual

5.3.1 Functions

Half-wave commands

Command	Signal	Suggested behavior	Speed range of values	Ramp range of values	Deceleration range of values
C00	No signal	Stop	0 – 3000	100 – 10 000	0 – 10 000
C01	Positive half wave	Reverse travel	0 – 3000	100 – 10 000	0 – 10 000
C02	Negative half wave	Brake release	0 – 3000	100 – 10 000	0 – 10 000
C03	Full wave	Forward travel	0 – 3000	100 – 10 000	0 – 10 000

Speed limitation through digital inputs (magnetic switch (MS))

Command	Signal	Suggested behavior	Speed range of values	Ramp range of values	Deceleration range of values
L00	–	Stop for collision protection sensor	0 – 3000	100 – 10 000	0 – 10 000
L01	• DI04: high (MS 1: +) • DI05: low (MS 2: -) • DI06: low (MS 3: -)	Speed limitation	0 – 3000	100 – 10 000	0 – 10 000
L02	• DI04: high (MS 1: +) • DI05: low (MS 2: -) • DI06: high (MS 3: +)	Speed limitation	0 – 3000	100 – 10 000	0 – 10 000
L03	• DI04: high (MS 1: +) • DI05: high (MS 2: +) • DI06: low (MS 3: -)	Speed limitation	0 – 3000	100 – 10 000	0 – 10 000

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Command	Signal	Suggested behavior	Speed range of values	Ramp range of values	Deceleration range of values
L04	• DI04: high (MS 1: +) • DI05: high (MS 2: +) • DI06: high (MS 3: +)	Speed limitation	0 – 3000	100 – 10 000	0 – 10 000
L05	• DI04: low (MS 1: -) • DI05: low (MS 2: -) • DI06: high (MS3: +)	Speed limitation	0 – 3000	100 – 10 000	0 – 10 000
L06	• DI04: low (MS1: -) • DI05: high (MS2: +) • DI06: high (MS3: +)	Speed limitation	0 – 3000	100 – 10 000	0 – 10 000
L07	• DI04: low (MS1: -) • DI05: high (MS2: +) • DI06: low (MS3: -)	Speed limitation	0 – 3000	100 – 10 000	0 – 10 000
L08	• DI04: low (MS1: -) • DI05: low (MS2: -) • DI06: low (MS3: -)	Speed limitation	0 – 3000	100 – 10 000	0 – 10 000

Messages

Command	Signal	Suggested behavior	Speed range of values	Ramp range of values	Deceleration range of values
Message 1 output	Positive half wave	–	–	–	–
Message 2 output	Negative half wave	–	–	–	–
Message 3 output	Full wave	Fault	–	–	–

Distance sensor

Command	Signal	Suggested behavior	Speed range of values	Ramp range of values	Deceleration range of values
d00	Distance to the vehicle ahead	Stop command from distance sensor	0	100 – 10 000	100 – 10 000
d01	Distance to the vehicle ahead	Reduce speed	0 – 3000	100 – 10 000	0 – 10 000
d02	Distance to the vehicle ahead	Reduce speed	0 – 3000	100 – 10 000	0 – 10 000

Long field / short field changeover of the distance sensor

Command	Signal	Suggested behavior	Speed range of values	Ramp range of values	Deceleration range of values
Long field	DI07: low (IS4: -)	Reduce speed, maintain long distance	d02 (0 – 3 000) and d00	d02 (100 – 10 000) and d00	d02 and d00
Short field	DI07: high (IS 4: +)	Increase speed, maintain short distance	d01 (0 – 3 000) and d00	d01 (100 – 10 000) and d00	d01 and d00

Collision protection sensor

Command	Signal	Suggested behavior	Speed range of values	Ramp range of values	Deceleration range of values
Input A	Distance sensor 0 V	Stop command from distance sensor	0	100 – 10 000	100 – 10 000
	Distance sensor 24 V	Enable command from distance sensor	–	–	–
Input B	Distance sensor 0 V	Stop command from distance sensor	0	100 – 10 000	0 – 10 000
	Distance sensor 24 V	Enable command from distance sensor	–	–	–
L00	Collision protection sensor	Stop command from distance sensor	0	100 – 10 000	100 – 10 000

Manual mode with PZO keypad

Command	Signal	Suggested behavior	Speed range of values	Ramp range of values	Deceleration range of values
JS	PZO keypad	Slow speed	–	–	–
JF	PZO keypad	Fast speed	–	–	–

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5.3.2 M12 parameter memory

Use the M23 parameter memory to save the parameter data in several MOVIPRO® application controllers. Before you save data to the M12 parameter memory, activate the function in order to have the device IDs incremented automatically. Every MOVIPRO® application controller needs an individual device ID. You can plug the M12 parameter memory one after the other onto all MOVIPRO® application controllers. If the M12 parameter memory contains valid data, the parameters are written to the MOVIPRO® application controller.

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6 Hardware startup

6.1 General information

Note the following information for the startup:

- The general guidelines and instructions provided by the system manufacturer.
- All information about the permitted conditions at the place of installation.
- The general safety notes for the respective units.
- The startup notes and instructions for the relevant units.

⚠ WARNING

Uncontrolled unit behavior due to inoperative emergency switching off circuit

Severe or fatal injuries

- Observe the installation notes.
- Install the protective covers in accordance with the instructions.
- The installation must be carried out by trained specialists.

⚠ WARNING

Danger due to unintended motor startup

Severe or fatal injuries

- Comply with the startup instructions.
- Set the controller inhibit.
- Switch off the output stage.
- Decouple the drive.
- Deactivate the auto-reset function for drives that start up automatically.

⚠ WARNING

Electric shock due to missing or defective protection covers

Severe or fatal injuries

- The installation must be carried out by trained specialists.
- Install the protective covers in accordance with the instructions.
- Never start the unit if the protective covers are not installed.

⚠ WARNING

Danger of electric shock due to open connections

Severe or fatal injuries

- The installation may only be carried out by trained specialists.
- Never start the unit if the touch guard is not installed.

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⚠ WARNING

Risk of short circuit due to open line ends or unconnected cables

Severe or fatal injuries

- Before startup, ensure that all lines and cables are connected in accordance with the instructions.
- Observe the connection instructions in the documentation for the components.

6.2 Requirements

Ensure that the following requirements have been met:

- All units are mounted, installed and connected as specified.

  For detailed information about mounting and installation, refer to the documentation of the respective units.
- Power has been supplied to the entire track or to the track section for which startup is to be carried out.
- A fully operational vehicle is present.
- Appropriate safety measures prevent the drives from starting up accidentally.
- Appropriate safety measures prevent the risk of injury to persons or damage to the machine.

6.3 Procedure

Take the components into operation in the following order:

Component	Required documentation
DR.. series AC motors	"DR..71 – 315, DRN80 – 315 AC Motors" operating instructions Chapter "Startup"
MOVIPRO® application controller	"Application Controller MOVIPRO® PHE..B-A15-. 1X0B1A-00/000" operating instructions Chapter "Startup"

6.4 Procedure

Start up the hardware as described in the documentation for the application components.

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7 Operation

⚠ WARNING

Danger due to operating errors

Severe or fatal injuries

- Observe the documentation for the devices.
- Train your staff.

⚠ WARNING

Hazard when working in the area of the system

Severe or fatal injuries

- Only qualified personnel is allowed to enter the travel range.
- Never enter areas with restricted access alone (at least 2 persons).
- Adhere to the specifications for safety-related disconnection described in the documentation of the components.
- Instruct employees about the hazards when working within the area of the system.
- Install safety devices to stop hazardous movement in the event of danger.
- Mark footpaths.

⚠ WARNING

Risk from falling travel drive.

Severe or fatal injuries

- Secure the travel drive against falling.

⚠ WARNING

Risk from protruding, sharp-edged transported material

Severe or fatal injuries

- The system design engineer assesses the hazard based on the material to be transported and takes appropriate measures.

⚠ WARNING

Risk from collision or buffering of vehicles

Severe or fatal injuries

- Instruct your employees (at least 2 persons per system).
- Install suitable safety devices for stopping movements in the event of a hazard.

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⚠ WARNING

Danger due to unexpected startup of the system components

Severe or fatal injuries

- Take measures to ensure that there is no danger to persons due to an unexpected startup.
- In normal operation, there must be no persons in dangerous areas.
- Train your staff.

⚠ WARNING

Risk from breaking carrier or rail during operation

Severe or fatal injuries

- The system design engineer takes appropriate measures.
- Adhere to the project planning information of the manufacturer.

⚠ WARNING

Risk from manual operation via infrared remote control

Severe or fatal injuries

- Only trained personnel operates the system in manual mode using the infrared remote control.
- Adhere to the specifications in the documentation.

⚠ WARNING

Risk from veering off in curves

Severe or fatal injuries

- The system design engineer takes appropriate design measures.
- Instruct your employees accordingly.

⚠ WARNING

Risk from sharp edges

Severe or fatal injuries

- The system design engineer takes appropriate measures.

⚠ WARNING

Risk from falling travel drive parts

Severe or fatal injuries

- The system design engineer takes appropriate measures.

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⚠ WARNING

Risk from being hit by a vehicle in the assembly area

Severe or fatal injuries

- Instruct your employees (at least 2 persons per system).
- Install suitable safety devices for stopping movements in the event of a hazard.

⚠ CAUTION

Risk from high-frequency noise

Injuries

- Ensure correct design.
- Take measures to reduce noise (ear protection).
- Adhere to the notes in the documentation of the units.

More information:

- "MOVIVISION® EMS basic" manual

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8 Service

8.1 Electronics service from SEW-EURODRIVE

8.1.1 Hotline

Service specialists from SEW-EURODRIVE are available for you at the Drive Service Hotline on 365 days a year, 24 hours a day.

Simply dial the prefix **0 800** and then enter the key combination **SEWHELP** using the telephone keypad. Or simply dial **0 800 739 4357**.

8.1.2 Repair service

If you cannot rectify a fault, contact the Service at SEW-EURODRIVE.

Please provide the following information when sending the device in for repair:

- Serial number (see nameplate)
- Type designation
- Short description of the application (application, control via terminals or serial)
- Connected motor (motor voltage, star or delta connection)
- Error message of the status display
- Nature of the fault
- Circumstances
- Your own presumptions as to what has happened
- Unusual events preceding the problem

8.2 Waste disposal

Observe the applicable national regulations.

Dispose of materials separately in accordance with the nature of the materials and the regulations in force, for example:

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

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9 Inspection and maintenance

⚠ WARNING

Danger due to live machine parts and/or system parts in the event of a fault

Severe or fatal injuries

- Replace defective and faulty components of the electrical system immediately.
- Do not operate the system with defective component parts.
- After any modifications to the system, perform an electrical test.

⚠ CAUTION

Danger due to hot surfaces on components

Injury

- Observe the information in the component documentation.

For the inspection and maintenance of the components used, observe the component documentation.

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10 Technical data

Observe the technical data in the documentation of the components.

10.1 General

Classification	Electrified monorail system (light loads)
Energy supply	Via half-wave generation module
Compliance with C1 standard (VDI Directive 3643)	Yes
Diagnostics	Continuous
Material flow	Smart (just in time, just in sequence)
Target market	Light load applications, material flow optimization

10.2 Vehicle

Nominal power in total	Up to 1.5 kW
Number of axes	1 travel axis
Positioning	Via barcode
Distance between vehicles	Variable up to buffering via distance sensor or collision protection sensor
Brake management	Release without drive enable
Manual mode	Via infrared remote control (PZO keypad)
Safety technology	No
Function level	Simple (move, stop)
Travel profile	3 travel commands, 8 speeds (speed limitations)
Collision protection sensor	1-channel or 2-channel (non-equivalent)

10.3 Application controller

Housing	Conforms to C1
Number of inputs and outputs	3 inputs and outputs, freely configurable
Degree of protection	IP65
Connection	Industrial plug connector for current collector
Display	3 × 7-segment display, 16 LEDs
Switch (optional)	Operating switch for 24 V level

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Motor control	1 integrated frequency inverter Travel drive: • 1.5 kW (8 kHz) (S1) • 1.3 kW (16 kHz) (S1)
Configuration memory	M12 parameter memory

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11 Standards and certifications

The SEW 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.

11.1 Standards and directives

- Low Voltage Directive 2006/95/EEC
- Electromagnetic Compatibility Directive 2004/108/EC
- VDE 100: Provisions for setting up power installations with nominal voltages up to 1000 V
- Additional standards: See the declaration of incorporation.

11.2 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:

http://www.sew-eurodrive.com/support/index.php

11.3 Certifications

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

http://www.sew-eurodrive.com/support/index.php

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11.4 Declaration of incorporation

Declaration of Incorporation

SEW EURODRIVE

Translation of the original text **900530015**

SEW-EURODRIVE GmbH & Co KG
Ernst-Blickle-Straße 42, D-76646 Bruchsal

declares under sole responsibility that the following products are in compliance with the basic health and safety requirements of Directive 2006/42/EC, appendix I:

1.3.2, 1.3.3, 1.3.7, 1.5.1, 1.5.6, 1.6.3, 1.7.1.1, 1.7.2, 3.6.1

EMS basic

Applied harmonized standards:

EN ISO 12100:2010
EN 60204-1:2006+ AC:2010
EN ISO 13849-1:2008

The products are intended for installation in a machine. Putting these products into service is prohibited until it has been established that the machine into which the products are to be incorporated complies with the provisions of the applicable directive.

The special technical documents for partly completed machinery have been created and can be made available to the national authorities in response to a reasonable request.

Bruchsal	**10.02.2015**	Johann Soder	
Place	Date	Managing Director Technology	a) b)

a) Authorized representative for issuing this declaration on behalf of the manufacturer
b) Authorized representative for compiling the technical documents with same address as manufacturer

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12 Appendix

12.1 Component list

12.1.1 Application controller

No.	Component	Part number
[1]	MOVIPRO® application controller PHE..B-A15-.1X0B1A-00/000	Dependent on configuration
[2]	Cable from MOVIPRO® to collision protection sensor	See communication
[3]	Collision protection sensor	See communication
[4]	Cable from MOVIPRO® to distance sensor	See communication
[5]	Distance sensor	See communication
[6]	Cable from MOVIPRO® to operating stop switch (M12 connector)	Provided by the customer
[7]	External operating stop switch or: Jumper plug	Provided by the customer 11747099
[8]	Optional: M12 parameter memory	See communication
[9]	Optional: Infrared remote control (PZO keypad)	See communication
[10]	DR.. gearmotor travel drive	See travel axis
[11]	Cable from MOVIPRO® to motor	See travel axis
[12]	Magnetic switch	See communication
[13]	Sensor/actuator box	See communication
[14]	Cable from MOVIPRO® to sensor/actuator box	See communication
[15]	Contact conductor connection	–
[16]	Half-wave command from half-wave generation module (e.g. Wetron HWS, curve modules KBS) or contactor (only full wave); Half-wave signals from the application controller to the half-wave evaluation module	Provided by the customer
	Optional: EMS angle bracket	28218248
	Optional: EMS mounting set (hinges)	18220789

12.1.2 Travel axis

No.	Component	Part number
[1]	Cable from MOVIPRO® to motor	Depending on the configuration, see cable table
[2]	DR.. series AC motor with TH winding thermostat and global winding (Europe/USA/Canada/China 2012)	Depending on the configuration, see motor table

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Cables

Motor connection	MOVIPRO® connectors		
	Han® Q8, straight	Han® Q8, angled	Han® 10E
Open end	18125794	18164234	18164242
IS (star)	18127703	18164250	18164277
IS (delta)	18127681	18164374	18164323
ABB8	18127711	18164285	–
ASB8	18127738	18164269	–

Motor

Brake (optional)	Brake voltage standard 230 V (optionally 110 V or 400 V)			
	DRS71S4	DRS71M4	DRE80M4	DRE90M4
BE05	x	x	x	–
BE1	x	x	x	x
BE2	–	–	–	x

12.1.3 Energy supply

No.	Component	Part number
[1]	Power rail L1	Provided by the customer
[2]	Power rail L2	Provided by the customer
[3]	Power rail L3	Provided by the customer
[4]	Protective earth PE	Provided by the customer

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12.1.4 Communication

No.	Component	Part number
[1]	MOVIPRO® application controller	See application controller
[2]	Cable from MOVIPRO® to collision protection sensor (M12 connector)	Provided by the customer
[3]	Collision protection sensor (e.g. from Pepperl+Fuchs 2-channel non-equivalent)	Provided by the customer
[4]	Cable from MOVIPRO® to distance sensor (M12 connector)	Provided by the customer
[5]	Distance sensor (e.g. Sensopart Railpilot FR 85-2 ILLG-S1L5, baud rate 62.5 kB or 57.6 kB)	Provided by the customer
[6]	Optional: M12 parameter memory	17976340
[7]	Optional: Infrared remote control (PZO keypad) PZO00A-BFBIR0-01/L005	17976014
[8]	Parameterizable plant software MOVIVISION® EMS basic (CD)	17125812
[9]	Service interface Cable from MOVIPRO® to PC (prefabricated, RJ10 or RS485 to USB interface converter)	19104979
[10]	Electrified monorail track	Provided by the customer
[11]	Half-wave generation module (e.g. Wetron HWS or KBS) and half-wave evaluation module (e.g. Wetron HWR)	Provided by the customer
[12]	Half-wave command from half-wave evaluation module to MOVIPRO® application controller	–
[13]	Message signal from MOVIPRO® application controller to half-wave generation module	–
[14]	Higher-level controller (PLC)	Provided by the customer
[15]	Magnetic switch (max 4, such as Schmersal BN 325-R-1279-2)	Provided by the customer
[16]	Sensor/actuator box 4/3-L-M12-M8	19111142
[17]	Cable from MOVIPRO® to sensor/actuator box	• Length 1 m: 18161073 • Length 2 m: 18161081 • Length 3 m: 18161103 • Length 5 m: 18161138
[18]	Contact conductor connection	Provided by the customer

13 Address list

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Gabon
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Sales	Tel Aviv	Liraz Handasa Ltd. Ahofer Str 34B / 228 58858 Holon	Tel. +972 3 5599511 Fax +972 3 5599512 http://www.liraz-handasa.co.il office@liraz-handasa.co.il
Italy			
Assembly Sales Service	Solaro	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Via Bernini,14 I-20020 Solaro (Milano)	Tel. +39 02 96 9801 Fax +39 02 96 79 97 81 http://www.sew-eurodrive.it sewit@sew-eurodrive.it
Ivory Coast			
Sales	Abidjan	SEW-EURODRIVE SARL Ivory Coast Rue des Pècheurs, Zone 3 26 BP 916 Abidjan 26	Tel. +225 21 21 81 05 Fax +225 21 25 30 47 info@sew-eurodrive.ci http://www.sew-eurodrive.ci
Japan			
Assembly Sales Service	Iwata	SEW-EURODRIVE JAPAN CO., LTD 250-1, Shimoman-no, Iwata Shizuoka 438-0818	Tel. +81 538 373811 Fax +81 538 373814 http://www.sew-eurodrive.co.jp sewjapan@sew-eurodrive.co.jp
Kazakhstan			
Sales	Almaty	SEW-EURODRIVE LLP 291-291A, Tole bi street 050031, Almaty	Tel. +7 (727) 238 1404 Fax +7 (727) 243 2696 http://www.sew-eurodrive.kz sew@sew-eurodrive.kz
	Tashkent	SEW-EURODRIVE LLP Representative office in Uzbekistan 96A, Sharaf Rashidov street, Tashkent, 100084	Tel. +998 71 2359411 Fax +998 71 2359412 http://www.sew-eurodrive.uz sew@sew-eurodrive.uz
	Ulaanbaatar	SEW-EURODRIVE LLP Representative office in Mongolia Suite 407, Tushig Centre Seoul street 23, Sukhbaatar district, Ulaanbaatar 14250	Tel. +976-77109997 Fax +976-77109997 http://www.sew-eurodrive.mn sew@sew-eurodrive.mn
Kenya			

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Latvia			
Sales	Riga	SIA Alas-Kuul Katlakalna 11C LV-1073 Riga	Tel. +371 6 7139253 Fax +371 6 7139386 http://www.alas-kuul.ee info@alas-kuul.com
Lebanon			
Sales Lebanon	Beirut	Gabriel Acar & Fils sarl B. P. 80484 Bourj Hammoud, Beirut	Tel. +961 1 510 532 Fax +961 1 494 971 ssacar@inco.com.lb
Sales / Jordan / Kuwait / Saudi Arabia / Syria	Beirut	Middle East Drives S.A.L. (offshore) Sin El Fil. B. P. 55-378 Beirut	Tel. +961 1 494 786 Fax +961 1 494 971 http://www.medrives.com info@medrives.com
Lithuania			
Sales	Alytus	UAB Irseva Statybininku 106C LT-63431 Alytus	Tel. +370 315 79204 Fax +370 315 56175 http://www.sew-eurodrive.lt irmantas@irseva.lt
Luxembourg			
Assembly Sales Service	Brussels	SEW-EURODRIVE n.v./s.a. Researchpark Haasrode 1060 Evenementenlaan 7 BE-3001 Leuven	Tel. +32 16 386-311 Fax +32 16 386-336 http://www.sew-eurodrive.lu info@sew-eurodrive.be
Macedonia			
Sales	Skopje	Boznos DOOEL Dime Anicin 2A/7A 1000 Skopje	Tel. +389 23256553 Fax +389 23256554 http://www.boznos.mk
Madagascar			
Sales	Antananarivo	Ocean Trade BP21bis. Andraharo Antananarivo 101 Madagascar	Tel. +261 20 2330303 Fax +261 20 2330330 oceantrabp@moov.mg
Malaysia			
Assembly Sales Service	Johor	SEW-EURODRIVE SDN BHD No. 95, Jalan Seroja 39, Taman Johor Jaya 81000 Johor Bahru, Johor West Malaysia	Tel. +60 7 3549409 Fax +60 7 3541404 sales@sew-eurodrive.com.my
Mexiko			
Assembly Sales Service	Quéretaro	SEW-EURODRIVE MEXICO SA DE CV SEM-981118-M93 Tequisquiapan No. 102 Parque Industrial Quéretaro C.P. 76220 Quéretaro, México	Tel. +52 442 1030-300 Fax +52 442 1030-301 http://www.sew-eurodrive.com.mx scmexico@seweurodrive.com.mx
Mongolia			
Technical Office	Ulaanbaatar	SEW-EURODRIVE LLP Representative office in Mongolia Suite 407, Tushig Centre Seoul street 23, Sukhbaatar district, Ulaanbaatar 14250	Tel. +976-77109997 Fax +976-77109997 http://www.sew-eurodrive.mn sew@sew-eurodrive.mn
Morocco			
Sales Service	Mohammedia	SEW-EURODRIVE SARL 2 bis, Rue Al Jahid 28810 Mohammedia	Tel. +212 523 32 27 80/81 Fax +212 523 32 27 89 http://www.sew-eurodrive.ma sew@sew-eurodrive.ma

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Namibia			
Sales	Swakopmund	DB Mining & Industrial Services Einstein Street Strauss Industrial Park Unit1 Swakopmund	Tel. +264 64 462 738 Fax +264 64 462 734 anton@dbminingnam.com
Netherlands			
Assembly Sales Service	Rotterdam	SEW-EURODRIVE B.V. Industrieweg 175 NL-3044 AS Rotterdam Postbus 10085 NL-3004 AB Rotterdam	Tel. +31 10 4463-700 Fax +31 10 4155-552 Service: 0800-SEWHELP http://www.sew-eurodrive.nl info@sew-eurodrive.nl
New Zealand			
Assembly Sales Service	Auckland	SEW-EURODRIVE NEW ZEALAND LTD. P.O. Box 58-428 82 Greenmount drive East Tamaki Auckland	Tel. +64 9 2745627 Fax +64 9 2740165 http://www.sew-eurodrive.co.nz sales@sew-eurodrive.co.nz
	Christchurch	SEW-EURODRIVE NEW ZEALAND LTD. 10 Settlers Crescent, Ferrymead Christchurch	Tel. +64 3 384-6251 Fax +64 3 384-6455 sales@sew-eurodrive.co.nz
Nigeria			
Sales	Lagos	EISNL Engineering Solutions and Drives Ltd Plot 9, Block A, Ikeja Industrial Estate (Ogba Scheme) Adeniyi Jones St. End Off ACME Road, Ogba, Ikeja, Lagos	Tel. +234 1 217 4332 http://www.eisnl.com team.sew@eisnl.com
Norway			
Assembly Sales Service	Moss	SEW-EURODRIVE A/S Solgaard skog 71 N-1599 Moss	Tel. +47 69 24 10 20 Fax +47 69 24 10 40 http://www.sew-eurodrive.no sew@sew-eurodrive.no
Pakistan			
Sales	Karachi	Industrial Power Drives Al-Fatah Chamber A/3, 1st Floor Central Commercial Area, Sultan Ahmed Shah Road, Block 7/8, Karachi	Tel. +92 21 452 9369 Fax +92-21-454 7365 seweurodrive@cyber.net.pk
Paraguay			
Sales	Fernando de la Mora	SEW-EURODRIVE PARAGUAY S.R.L De la Victoria 112, Esquina nueva Asunción Departamento Central Fernando de la Mora, Barrio Bernardino	Tel. +595 991 519695 Fax +595 21 3285539 sewpy@sew-eurodrive.com.py
Peru			
Assembly Sales Service	Lima	SEW EURODRIVE DEL PERU S.A.C. Los Calderos, 120-124 Urbanizacion Industrial Vulcano, ATE, Lima	Tel. +51 1 3495280 Fax +51 1 3493002 http://www.sew-eurodrive.com.pe sewperu@sew-eurodrive.com.pe
Philippines			
Sales	Makati	P.T. Cerna Corporation 4137 Ponte St., Brgy. Sta. Cruz Makati City 1205	Tel. +63 2 519 6214 Fax +63 2 890 2802 mech_drive_sys@ptcerna.com http://www.ptcerna.com
Poland			
Assembly Sales Service	Łódź	SEW-EURODRIVE Polska Sp.z.o.o. ul. Techniczna 5 PL-92-518 Łódź	Tel. +48 42 293 00 00 Fax +48 42 293 00 49 http://www.sew-eurodrive.pl sew@sew-eurodrive.pl
	Service	Tel. +48 42 293 0030 Fax +48 42 293 0043	24 Hour Service Tel. +48 602 739 739 (+48 602 SEW SEW) serwis@sew-eurodrive.pl

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Portugal			
Assembly Sales Service	Coimbra	SEW-EURODRIVE, LDA. Apartado 15 P-3050-901 Mealhada	Tel. +351 231 20 9670 Fax +351 231 20 3685 http://www.sew-eurodrive.pt infosew@sew-eurodrive.pt
Romania			
Sales Service	Bucharest	Sialco Trading SRL str. Brazilia nr. 36 011783 Bucuresti	Tel. +40 21 230-1328 Fax +40 21 230-7170 sialco@sialco.ro
Russia			
Assembly Sales Service	St. Petersburg	ZAO SEW-EURODRIVE P.O. Box 36 RUS-195220 St. Petersburg	Tel. +7 812 3332522 / +7 812 5357142 Fax +7 812 3332523 http://www.sew-eurodrive.ru sew@sew-eurodrive.ru
Sambia			
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Senegal			
Sales	Dakar	SENEMECA Mécanique Générale Km 8, Route de Rufisque B.P. 3251, Dakar	Tel. +221 338 494 770 Fax +221 338 494 771 http://www.senemeca.com senemeca@senemeca.sn
Serbia			
Sales	Belgrade	DIPAR d.o.o. Ustanicka 128a PC Košum, IV floor SRB-11000 Beograd	Tel. +381 11 347 3244 / +381 11 288 0393 Fax +381 11 347 1337 office@dipar.rs
Singapore			
Assembly Sales Service	Singapore	SEW-EURODRIVE PTE. LTD. No 9, Tuas Drive 2 Jurong Industrial Estate Singapore 638644	Tel. +65 68621701 Fax +65 68612827 http://www.sew-eurodrive.com.sg sewsingapore@sew-eurodrive.com
Slovakia			
Sales	Bratislava	SEW-Eurodrive SK s.r.o. Rybničná 40 SK-831 06 Bratislava	Tel.+421 2 33595 202, 217, 201 Fax +421 2 33595 200 http://www.sew-eurodrive.sk sew@sew-eurodrive.sk
	Košice	SEW-Eurodrive SK s.r.o. Slovenská ulica 26 SK-040 01 Košice	Tel. +421 55 671 2245 Fax +421 55 671 2254 Mobile +421 907 671 976 sew@sew-eurodrive.sk
Slovenia			
Sales Service	Celje	Pakman - Pogonska Tehnika d.o.o. UI. XIV. divizije 14 SLO - 3000 Celje	Tel. +386 3 490 83-20 Fax +386 3 490 83-21 pakman@siol.net
South Africa			
Assembly Sales Service	Johannesburg	SEW-EURODRIVE (PROPRIETARY) LIMITED Eurodrive House Cnr. Adcock Ingram and Aerodrome Roads Aeroton Ext. 2 Johannesburg 2013 P.O.Box 90004 Bertsham 2013	Tel. +27 11 248-7000 Fax +27 11 248-7289 http://www.sew.co.za info@sew.co.za
	Cape Town	SEW-EURODRIVE (PROPRIETARY) LIMITED Rainbow Park Cnr. Racecourse & Omuramba Road Montague Gardens Cape Town P.O.Box 36556 Chempet 7442	Tel. +27 21 552-9820 Fax +27 21 552-9830 Telex 576 062 bgriffiths@sew.co.za

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South Africa			
	Durban	SEW-EURODRIVE (PROPRIETARY) LIMITED 48 Prospecton Road Isipingo Durban P.O. Box 10433, Ashwood 3605	Tel. +27 31 902 3815 Fax +27 31 902 3826 cdejager@sew.co.za
	Nelspruit	SEW-EURODRIVE (PROPRIETARY) LIMITED 7 Christie Crescent Vintonia P.O.Box 1942 Nelspruit 1200	Tel. +27 13 752-8007 Fax +27 13 752-8008 robermeyer@sew.co.za
South Korea			
Assembly Sales Service	Ansan	SEW-EURODRIVE KOREA CO., LTD. 7, Dangjaengi-ro, Danwon-gu, Ansan-si, Gyeonggi-do, Zip 425-839	Tel. +82 31 492-8051 Fax +82 31 492-8056 http://www.sew-eurodrive.kr master.korea@sew-eurodrive.com
	Busan	SEW-EURODRIVE KOREA CO., LTD. 28, Noksansandan 262-ro 50beon-gil, Gangseo-gu, Busan, Zip 618-820	Tel. +82 51 832-0204 Fax +82 51 832-0230
Spain			
Assembly Sales Service	Bilbao	SEW-EURODRIVE ESPAÑA, S.L. Parque Tecnológico, Edificio, 302 E-48170 Zamudio (Vizcaya)	Tel. +34 94 43184-70 Fax +34 94 43184-71 http://www.sew-eurodrive.es sew.spain@sew-eurodrive.es
Sri Lanka			
Sales	Colombo	SM International (Pte) Ltd 254, Galle Raod Colombo 4, Sri Lanka	Tel. +94 1 2584887 Fax +94 1 2582981
Swaziland			
Sales	Manzini	C G Trading Co. (Pty) Ltd PO Box 2960 Manzini M200	Tel. +268 2 518 6343 Fax +268 2 518 5033 engineering@cgtrading.co.sz
Sweden			
Assembly Sales Service	Jönköping	SEW-EURODRIVE AB Gnejsvägen 6-8 S-55303 Jönköping Box 3100 S-55003 Jönköping	Tel. +46 36 34 42 00 Fax +46 36 34 42 80 http://www.sew-eurodrive.se jonkoping@sew.se
Switzerland			
Assembly Sales Service	Basel	Alfred Imhof A.G. Jurastrasse 10 CH-4142 Münchenstein bei Basel	Tel. +41 61 417 1717 Fax +41 61 417 1700 http://www.imhof-sew.ch info@imhof-sew.ch
Taiwan			
Sales	Taipei	Ting Shou Trading Co., Ltd. 6F-3, No. 267, Sec. 2 Tung Huw S. Road Taipei	Tel. +886 2 27383535 Fax +886 2 27368268 Telex 27 245 sewtwn@ms63.hinet.net http://www.tingshou.com.tw
	Nan Tou	Ting Shou Trading Co., Ltd. No. 55 Kung Yeh N. Road Industrial District Nan Tou 540	Tel. +886 49 255353 Fax +886 49 257878 sewtwn@ms63.hinet.net http://www.tingshou.com.tw
Tanzania			
Sales	Daressalam	SEW-EURODRIVE PTY LIMITED TANZANIA Plot 52, Regent Estate PO Box 106274 Dar Es Salaam	Tel. +255 0 22 277 5780 Fax +255 0 22 277 5788 http://www.sew-eurodrive.co.tz central.mailbox@sew.co.tz

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Thailand			
Assembly Sales Service	Chonburi	SEW-EURODRIVE (Thailand) Ltd. 700/456, Moo.7, Donhuaroh Muang Chonburi 20000	Tel. +66 38 454281 Fax +66 38 454288 sewthailand@sew-eurodrive.com
Tunisia			
Sales	Tunis	T. M.S. Technic Marketing Service Zone Industrielle Mghira 2 Lot No. 39 2082 Fouchana	Tel. +216 79 40 88 77 Fax +216 79 40 88 66 http://www.tms.com.tn tms@tms.com.tn
Turkey			
Assembly Sales Service	Kocaeli-Gebze	SEW-EURODRİVE Hareket Sistemleri San. Ve TIC. Ltd. Sti Gebze Organize Sanayi Böl. 400 Sok No. 401 41480 Gebze Kocaeli	Tel. +90 262 9991000 04 Fax +90 262 9991009 http://www.sew-eurodrive.com.tr sew@sew-eurodrive.com.tr
Ukraine			
Assembly Sales Service	Dnipropetrovsk	ООО «СЕВ-Евродрайв» ул.Рабочая, 23-В, офис 409 49008 Днепропетровск	Tel. +380 56 370 3211 Fax +380 56 372 2078 http://www.sew-eurodrive.ua sew@sew-eurodrive.ua
United Arab Emirates			
Sales Service	Sharjah	Copam Middle East (FZC) Sharjah Airport International Free Zone P.O. Box 120709 Sharjah	Tel. +971 6 5578-488 Fax +971 6 5578-499 copam_me@eim.ae
Uruguay			
Assembly Sales	Montevideo	SEW-EURODRIVE Uruguay, S. A. Jose Serrato 3569 Esqina Corumbe CP 12000 Montevideo	Tel. +598 2 21181-89 Fax +598 2 21181-90 sewuy@sew-eurodrive.com.uy
USA			
Production Assembly Sales Service	Southeast Region	SEW-EURODRIVE INC. 1295 Old Spartanburg Highway P.O. Box 518 Lyman, S.C. 29365	Tel. +1 864 439-7537 Fax Sales +1 864 439-7830 Fax Production +1 864 439-9948 Fax Assembly +1 864 439-0566 Fax Confidential/HR +1 864 949-5557 http://www.seweurodrive.com cslyman@seweurodrive.com
Assembly Sales Service	Northeast Region	SEW-EURODRIVE INC. Pureland Ind. Complex 2107 High Hill Road, P.O. Box 481 Bridgeport, New Jersey 08014	Tel. +1 856 467-2277 Fax +1 856 845-3179 csbridgeport@seweurodrive.com
	Midwest Region	SEW-EURODRIVE INC. 2001 West Main Street Troy, Ohio 45373	Tel. +1 937 335-0036 Fax +1 937 332-0038 cstroy@seweurodrive.com
	Southwest Region	SEW-EURODRIVE INC. 3950 Platinum Way Dallas, Texas 75237	Tel. +1 214 330-4824 Fax +1 214 330-4724 csdallas@seweurodrive.com
	Western Region	SEW-EURODRIVE INC. 30599 San Antonio St. Hayward, CA 94544	Tel. +1 510 487-3560 Fax +1 510 487-6433 cshayward@seweurodrive.com
	Additional addresses for service in USA provided on request!		
Uzbekistan			
Technical Office	Tashkent	SEW-EURODRIVE LLP Representative office in Uzbekistan 96A, Sharaf Rashidov street, Tashkent, 100084	Tel. +998 71 2359411 Fax +998 71 2359412 http://www.sew-eurodrive.uz sew@sew-eurodrive.uz

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Venezuela			
Assembly Sales Service	Valencia	SEW-EURODRIVE Venezuela S.A. Av. Norte Sur No. 3, Galpon 84-319 Zona Industrial Municipal Norte Valencia, Estado Carabobo	Tel. +58 241 832-9804 Fax +58 241 838-6275 http://www.sew-eurodrive.com.ve ventas@sew-eurodrive.com.ve sewfinanzas@cantv.net
Vietnam			
Sales	Ho Chi Minh City	Nam Trung Co., Ltd Huế - South Vietnam / Construction Materials 250 Binh Duong Avenue, Thu Dau Mot Town, Binh Duong Province HCM office: 91 Tran Minh Quyen Street District 10, Ho Chi Minh City	Tel. +84 8 8301026 Fax +84 8 8392223 khanh-nguyen@namtrung.com.vn http://www.namtrung.com.vn
	Hanoi	MICO LTD Quảng Trị - North Vietnam / All sectors except Construction Materials 8th Floor, Ocean Park Building, 01 Dao Duy Anh St, Ha Noi, Viet Nam	Tel. +84 4 39386666 Fax +84 4 3938 6888 nam_ph@micogroup.com.vn http://www.micogroup.com.vn

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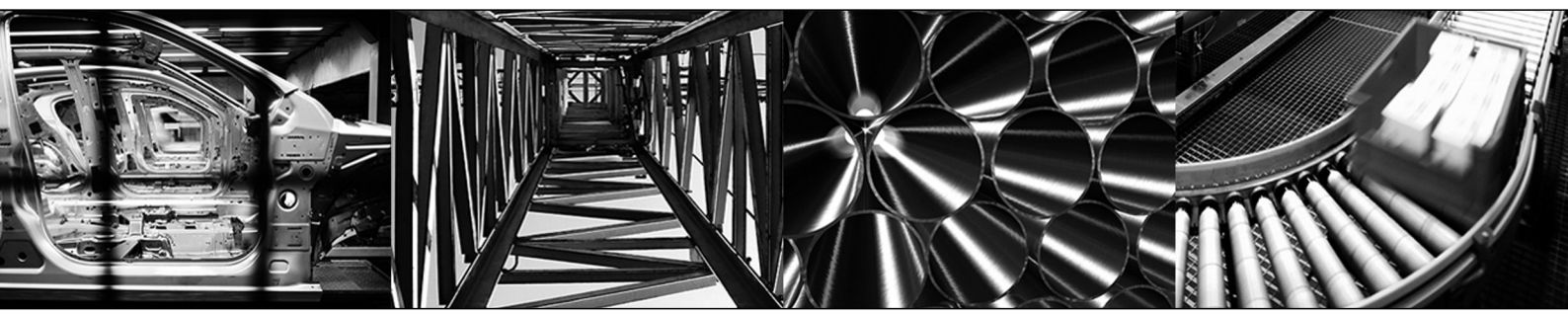

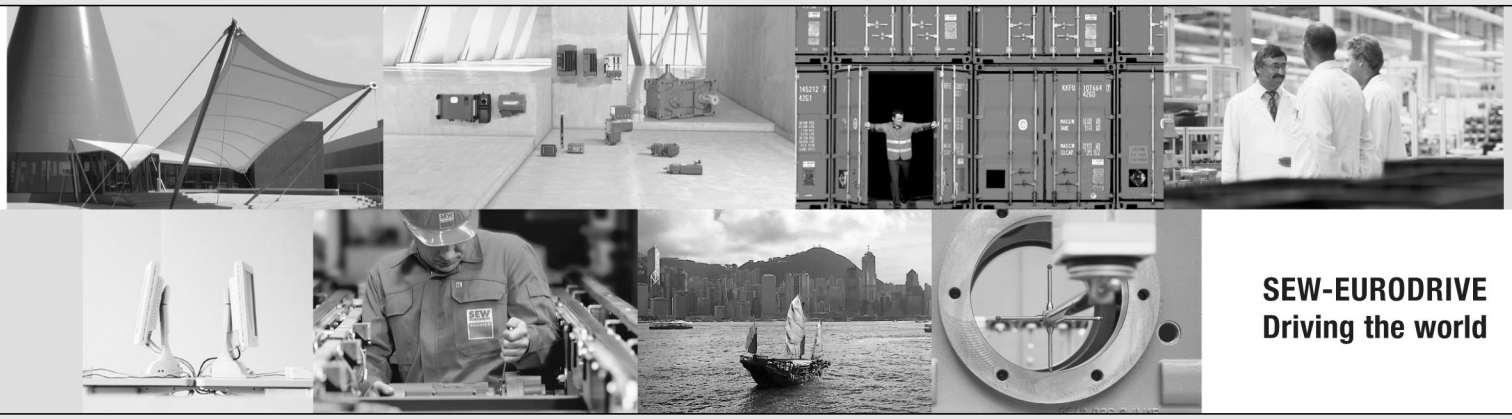

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