# Manual

Contactless Energy Transfer System

**MOVITRANS® Configuration and Planning**

For Systems with Centralized Supply (TPS Stationary Converter and TAS Transformer Module)

Edition 05/2020

23545259/EN

# Table of contents



23545259/EN – 05/2020

23545259/EN – 05/2020



SEW EURODRIVE

# 1 General information

## 1.1 About this documentation

**The documentation at hand is the original.**

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

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

## 1.2 Other applicable documentation

Observe the corresponding documentation for all additional components.

## 1.3 Structure of the safety notes

### 1.3.1 Meaning of signal words

The following table shows the 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. | |

### 1.3.2 Structure of section-related safety notes

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

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

**SIGNAL WORD**

Type and source of hazard.

Possible consequence(s) if disregarded.

- Measure(s) to prevent the hazard.

23545259/EN – 05/2020

#### Meaning of the hazard symbols

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

| Hazard symbol | Meaning |
|---|---|
|  | General hazard |
|  | No access for persons with pacemakers or implanted defibrillators. |

### 1.3.3 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.

## 1.4 Decimal separator in numerical values

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

Example: 30.5 kg

## 1.5 Rights to claim under limited warranty

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

## 1.6 Product names and trademarks

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

## 1.7 Copyright notice

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23545259/EN – 05/2020

# 2 Safety notes

## 2.1 Preliminary information

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

## 2.2 Duties of the user

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

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

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

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

- National and regional safety and accident prevention regulations
- Warning and safety signs on the product
- All other relevant project planning documents, installation and startup instructions, and wiring diagrams
- Do not assemble, install or operate damaged products
- All system-specific specifications and conditions

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

## 2.3 Electromagnetic fields

Observe national installation regulations, such as the DGUV (German Social Accident Insurance) regulation 15 – "Electromagnetic fields" as well as DIN EN 12198-1:2000+A1:2008, during installation, startup, and operation of systems with contactless energy transfer by induction for use in industrial workplaces.

23545259/EN – 05/2020

## 2.4 Target group

Specialist for mechanical work

Any mechanical work may be performed only by adequately qualified specialists. Specialists in the context of this documentation are persons who are familiar with the design, mechanical installation, troubleshooting, and maintenance of the product who possess the following qualifications:

- Qualifications in the field of mechanics in accordance with the national regulations
- Familiarity with this documentation

Specialist for electrotechnical work

Any electrotechnical work may be performed only by electrically skilled persons with a suitable education. Electrically skilled persons in the context of this documentation are persons who are familiar with electrical installation, startup, troubleshooting, and maintenance of the product who possess the following qualifications:

- Qualifications in the field of electrical engineering in accordance with the national regulations
- Familiarity with this documentation

Additional qualifications

In addition to that, these persons must be familiar with the valid safety regulations and laws, as well as with the requirements of the standards, directives, and laws specified in this documentation.

The persons must have the express authorization of the company to operate, program, parameterize, label, and ground devices, systems, and circuits in accordance with the standards of safety technology.

Instructed persons

All work in the areas of transportation, storage, operation and waste disposal must be carried out by persons who are trained appropriately. The purpose of the training is to give persons the ability to perform the required tasks and work steps in a safe and correct manner.

## 2.5 Designated use

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

The product is intended for use in industrial and commercial systems with contactless energy transfer systems.

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

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

All documentation for stationary and mobile components used in the product also applies to the product. This document does not replace the detailed operating instructions and other applicable documentations of the used components.

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

23545259/EN – 05/2020

## 2.6 Functional safety technology

The product must not perform any safety functions without a higher-level safety system unless explicitly allowed by the documentation.

## 2.7 Transport

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

Observe the following notes when transporting the device:

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

If necessary, use suitable, sufficiently dimensioned handling equipment.

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

## 2.8 Installation/assembly

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

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

Observe the notes in chapter Mechanical installation in the documentation.

### 2.8.1 Restrictions of use

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

- Use in potentially explosive atmospheres
- Use in areas exposed to harmful oils, acids, gases, vapors, dust, and radiation
- Operation in applications with impermissibly high mechanical vibration and shock loads in excess of the regulations stipulated in EN 60068-2-6 and/or EN 60068-2-27.
- Use at an elevation greater than 2000 m above sea level

23545259/EN – 05/2020

## 2.9 Electrical installation

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

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

### 2.9.1 Mobile application

Necessary protective measures for the product are:

- Protective separation DIN VDE 0100-410/IEC 60364-4-41
- ESD protection

## 2.10 Protective separation

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

## 2.11 Startup/operation

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

Make sure that any existing transport protection is removed.

Do not deactivate monitoring and protection devices of the machine or system, even for a test run.

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

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

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

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

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.

23545259/EN – 05/2020

Cover unused connections with the supplied protection caps during operation.

Mechanical blocking or internal protective functions of the product can cause the power to interrupt. Removing the cause of this problem or performing a reset can result in the machine or system restarting on its own. If this is not permitted for the drive-controlled machine or system for safety reasons, first disconnect the product from the supply system and then start troubleshooting.

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

# 3 System description

## 3.1 What is MOVITRANS®?

MOVITRANS® is a system consisting of stationary and mobile components for contactless power supply of mobile electrical consumers.

The required energy is transferred inductively (without contact) from an insulated stationary conductor to the mobile consumers (vehicles) via an air gap.

## 3.2 System benefits

Major advantages of the MOVITRANS® contactless technology compared to traditional methods of energy transfer:

- **Wear-free energy transfer**
  - Components are not subject to wear and do not require maintenance
- **Insulated cables**
  - Cables are not impaired by contamination, moisture or temperature
- **High mechanical tolerances**
  - More flexible design with curves and switches
  - High speeds due to contactless energy supply
  - Simple track segmentation

## 3.3 Areas of application

### 3.3.1 Requirements

Contactless supply systems are preferably used instead of traditional methods of energy transfer in the following cases:

- When the mobile equipment has to cover long distances.
- When a variable, extendable track layout is required.
- When high speeds have to be achieved.
- When the energy transfer has to be wear-free.
- When used in wet and humid areas.
- When additional environmental contamination is not permitted in sensitive areas.

23545259/EN – 05/2020

### 3.3.2 Areas of application today

The MOVITRANS® system is preferably used in materials handling technology in the following sectors:

- Automotive industry
- Transportation and storage logistics
- Sorting technology
- Construction materials industry
- Metal industry

### 3.3.3 Typical applications

The MOVITRANS® system is preferably used in the following applications:

- Conveyor trolley
- Skillet conveyor
- Guided floor conveyor systems
- Automated guided vehicle systems
- Storage/retrieval systems
- Electrified monorail systems
- Pallet transportation systems
- Baggage handling systems
- Panel gantries
- Elevator technology (construction elevators, electrical supply for elevators)
- Rides in amusement parks
- Battery charging stations
- Hoist gantries

23545259/EN – 05/2020

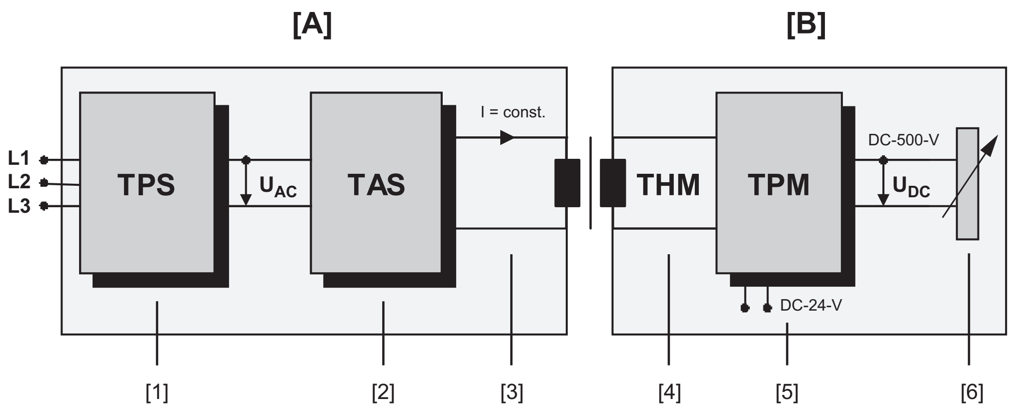
## 3.4 Functional principle

### 3.4.1 Energy transfer

Electrical energy is transferred without contact from a fixed conductor to one or more mobile consumers. The principle of inductive energy transfer is used. The electromagnetic coupling takes place across an air gap.

### 3.4.2 Overview of the system

The MOVITRANS® system is divided into **stationary** and **mobile** components:

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[A] Stationary components
[B] Mobile components
[1] MOVITRANS® TPS stationary converter
[2] MOVITRANS® TAS transformer module
[3] MOVITRANS® TCS, TIS, TLS, TVS installation material (transmission path)
[4] MOVITRANS® THM pick-up
[5] MOVITRANS® TPM mobile converter
[6] Mobile consumer

Stationary components [A]

**MOVITRANS® TPS stationary converter [1]**

The TPS stationary converter, which is based on the MOVIDRIVE® device family, converts the incoming low-frequency AC voltage (50/60 Hz) from a three-phase current supply into an alternating voltage with a constant frequency of 25 kHz.

**MOVITRANS® TAS transformer module [2]**

The TAS transformer module converts the output voltage of the TPS stationary converter into a constant sinusoidal alternating current. The output current is galvanically isolated from the three-phase current supply via a matching transformer. The transmission path is adjusted using the compensation components.

**MOVITRANS® TLS, TIS, TCS, TVS installation material [3] (transmission path)**

The TLS supply cable is used in 60 A systems between transformer module and transmission path as well as for the interconnection of several transmission paths.

The line cable TLS conducts the impressed alternating current from the TAS transformer module. It forms a conductor loop with supply and return cable.

If U-shaped THM pick-ups are intended for energy transfer, the TIS profile section system is used to support the line cable. When flat THM pick-ups are used, the line cables are cast in the floor.

The TCS compensation box is used for compensating the inductive reactance of the TLS line cable. Each TCS compensation box compensates a specific track length.

The TVS connection distributor connects the individual track parts and the TLS supply cable with the track.

Mobile components [B]

**MOVITRANS® THM pick-up [4]**

The THM pick-ups transfer the energy without contact from the line cable to the TPM mobile converter. Different mechanical designs and electrical performance ratings are available for the different transmission concepts. The TPM mobile converters must match the THM pick-ups.

The power that can be transmitted per THM pick-up depends on the amount of the TLS line cable current and the electromagnetic coupling between the TLS line cable and the THM pick-up.

**MOVITRANS® TPM mobile converter [5]**

The TPM mobile converter converts the current applied from the pick-up into DC voltage. The system is optimized for the use of inverters from SEW-EURODRIVE such as MOVIDRIVE®MOVITRAC® B and MOVIMOT®.

23545259/EN – 05/2020

## 3.5 Regulations, certifications and standards

### 3.5.1 CE marking

MOVITRANS® components comply with the regulations of the Low Voltage Directive 2014/35/EU.

The CE mark on the nameplate represents conformity with the Low Voltage Directive 2014/35/EU and the EMC Directive 2014/30/EU.

A declaration of conformity to this effect can be issued on request.

### 3.5.2 UL approval

The UL and cUL approvals have been granted for all MOVITRANS® components (with the exception of the TPM12B036-ENC-5A2-2 mobile converter). cUL is equivalent to the CSA approval.

### 3.5.3 Electromagnetic compatibility (EMC)

#### Introduction

The MOVITRANS® system allows for contactless energy transfer to mobile consumers.

With respect to electromagnetic compatibility, SEW-EURODRIVE applies the EMC product standard EN 61800-3 for the MOVITRANS® system. This standard specifies the requirements for interference immunity and interference emission for electrical drive technology devices. A large number of tests ensures that the MOVITRANS® components meet these requirements.

During installation, make sure that the regulations and recommendations for EMC-compliant installation described in this documentation are observed. This is the only way to ensure fault-free operation of the system.

This section details the level of electromagnetic compatibility (EMC) for MOVITRANS® systems in control cabinet installation.

#### TPS stationary converter and TAS transformer module

The MOVITRANS® components (TPS stationary converter and TAS transformer module) are power electronics components that operate with switching frequencies that are also common in the switched-mode power supply and inverter technology.

The magnetic fields that occur on the TAS transformer module are sufficiently shielded by the control cabinet.

Limit value class A in accordance with EN 55011 is achieved by using an upstream line filter.

23545259/EN – 05/2020

### 3.5.4 Electromagnetic fields (EMF)

#### Introduction

SEW-EURODRIVE had measurements taken for systems with MOVITRANS® components for contactless energy transfer. The goal of the measurements was to check that the systems comply with the permitted values.

Topologies with THM10E flat pick-up and THM10C U-shaped pick-up had been checked.

#### THM10E flat pick-up

*Standards and directives*

Applied standards and directives:

- DGUV (German Social Accident Insurance) regulation 15 "Electromagnetic fields"
- DIN EN 50413 VDE 0848-1:2018-07
- ICNIRP 2010
- IEEE C95.1-2019

*Field of application for THM10E*

Systems comprising a TPS stationary converter, a TAS transformer module, transmission paths with TLS line cables, a THM pick-up, a TPM mobile converter and mobile consumers were checked.

The following transmission path designs were tested:

- Line cable
- Distance between line cables: 140 mm

The line cable was operated with 85 A in order to measure and evaluate the permitted limit values (magnetic medium-frequency fields at 25 kHz sinusoidal current).

*International an professional association limit values*

The measured values were compared with the values permitted according to DGUV (German Social Accident Insurance) regulation 15. The comparison showed that the measured values (distance to line cable: 200 mm ) were significantly below the permitted values.

The permitted values in the ICNIRP standard are complied with a distance of 0.3 m from the line cables.

For the US-American market, the measured values were significantly below the permitted distance values of the "IEEE C95.1-2019" in the systems tested.

**INFORMATION**

A risk to health is ruled out.

*Exposure situation*

The system sections examined can be assigned exposure area 1. Permanent exposure was assumed during the tests.

*Preventive measures*

Comply with the following instructions and take any measures necessary:

## ⚠ WARNING

Health hazards may arise for persons with medical devices, e.g. pacemakers, due to electromagnetic fields.

Severe or fatal injuries.

- Keep a minimum distance from the line cable of 60 cm.
- Document this in operating instructions. Attach a suitable sign to the system as per the national provisions.

## INFORMATION

Special protective measures are not required for persons without medical devices.

**THM10C U-shaped transformer unit**

*Standards and directives*

Applied standards and directives:

- DGUV (German Social Accident Insurance) regulation 15 "Electromagnetic fields"
- DIN EN 50413 VDE 0848-1:2018-07
- ICNIRP 2010
- IEEE C95.1-2019

*Field of application for THM10C*

Systems comprising a TPS stationary converter, a TAS transformer module, transmission paths with TLS line cables, a THM pick-up, a TPM mobile converter and mobile consumers were checked.

The following transmission path designs were tested:

- TLS10E008-01-1 line cable
- Line cable routing in TIS profile section system
- Profile section system mounted on aluminum carrier plate

The line cable was operated with 60 A in order to measure and evaluate the permitted limit values (magnetic medium-frequency fields at 25 kHz sinusoidal current).

*Professional association limit values*

The measured values were compared with the values permitted according to DGUV (German Social Accident Insurance) regulation 15. The comparison showed that the measured values (starting at a distance of 100 mm to the line cable) were below the permitted values.

## INFORMATION

A risk to health is ruled out.

*Exposure situation*

The system sections examined can be assigned exposure area 1. Permanent exposure was assumed during the tests.

*Preventive measures*

Comply with the following instructions and take any measures necessary:

**⚠ WARNING**

Health hazards may arise for persons with medical devices, e.g. pacemakers, due to electromagnetic fields.

Severe or fatal injuries.

- Keep a minimum distance from the line cable of 32 cm.
- Document this in operating instructions. Attach a suitable sign to the system as per the national provisions.

**INFORMATION**

Special protective measures are not required for persons without medical devices.

# 4 Project planning

## 4.1 General information

The project planning of a MOVITRANS® system calls for specified knowledge explained in this documentation.

The following information is based on the general guidelines that apply to project planning. This documentation is drawn up for users that are familiar with and have basic knowledge of drive project planning.

## 4.2 Other applicable documentation

For technical details and additional information on the MOVITRANS® system and the current system components, refer to the following documentation:

| Documentation type | Title |
|---|---|
| System description | MOVITRANS® |
| Operating instructions | MOVITRANS® TPS10A Stationary Converter |
| Operating instructions | MOVITRANS® TAS10A Transformer Module |
| Operating instructions | MOVITRANS® THM10C/THM10E Pick-Ups |
| Operating instructions | MOVITRANS® TPM12B Mobile Converter |
| Operating instructions | MOVITRANS® Installation Material TCS/TIS/TLS/TVS |
| Manual | MOVITRANS® Installation of Transmission Paths with Casting Resin for THM10E Pick-Ups |
| Manual | Modular Engineering Software MOVITOOLS® MotionStudio<br>MOVITRANS® Parameter Tree |

Always use the latest edition of the documentation and the software.

The SEW-EURODRIVE website (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.

23545259/EN – 05/2020

### 4.2.1 Additional documentation

Additionally, SEW-EURODRIVE offers you extensive documentation covering the entire topic of electrical drive technology. The list below includes other documents that are of interest in terms of application project planning:

| Product | Documentation type | Title |
|---|---|---|
| Application inverter MOVIDRIVE® modular | Operating instructions | Application inverter MOVIDRIVE® modular |
| | Product Manual | Application inverter MOVIDRIVE® modular |
| Application inverter MOVIDRIVE® system | Operating instructions | Application inverter MOVIDRIVE® system |
| | Product Manual | Application inverter MOVIDRIVE® system |
| Application inverter MOVIDRIVE® technology | Operating instructions | Application inverter MOVIDRIVE® technology |
| | Product Manual | Application inverter MOVIDRIVE® technology |
| Application inverter MOVIDRIVE® MDX60B/61B | Operating instructions | Application inverter MOVIDRIVE® MDX60B/61B |
| | System manual | Application inverter MOVIDRIVE® MDX60B/61B |
| MOVIFIT® FC | Operating instructions | MOVIFIT® -FC |
| MOVITRAC® B | System manual | MOVITRAC® B |
| | Operating instructions | MOVITRAC® B |
| | Compact operating instructions | MOVITRAC® B |
| MOVIMOT® | Operating instructions | MOVIMOT® MM..D |
| MOVIMOT® flexible | Operating instructions | MOVIMOT® flexible |
| DR.. series AC motor | Operating instructions | DR..71 – 315, DRN80 – 315 AC Motors |
| Safety-related BST brake module | Operating instructions | Safety-related BST brake module |
| | Documentation | Drive Engineering – Practical Implementation – Project Planning for Controlled and Non-Controlled Drives |

23545259/EN – 05/2020

## 4.3 Implementation and project planning of MOVITRANS® – yes or no?

### 4.3.1 Introduction

Mobile materials handling technology with contactless energy transmission offers a number of advantages compared to traditional drive and materials handling technologies. The type and complexity of an application are the factors used to decide on the following:

1. Can the application be solved using MOVITRANS® components?
2. If yes, can project planning be performed by the customer without support from SEW-EURODRIVE?
3. Is support from SEW-EURODRIVE required for project planning?

### 4.3.2 Prerequisites

Before you start project planning, you must check whether the required drive task can be solved with MOVITRANS® components and contactless energy and information transfer.

Use the following list to determine the basic conditions on-site:

- **Description of the entire system**
  - Power demand (electrical power)
  - Functional characteristics
  - Start-ups
  - Special features
- **Ambient conditions**
  - Temperature, moisture, dust
  - Degree of protection
  - Mechanical load
  - Metal chips
- **Communication**
  - External: Data light barrier, radio
  - SEW-WLAN (only for MAXOLUTION® system solutions)
- **Line cable routing**
  - Distance to magnetic material (min. 8 cm)
  - Control cabinet power supply cable
  - Options to install compensation boxes
  - Installation material
- **Mechanical tolerances**
  - Vertical tolerance pick-up ↔ line cable
  - Horizontal tolerance pick-up ↔ line cable (clearance at the sides)
  - Torsion angle in curves

## 4.4 Drive and project planning information

### 4.4.1 Introduction

It is first necessary to determine the basic general conditions and drive data (machine data, mass, speed, setting range, etc.) to configure the drive correctly.

This data helps determine the required power, torque and speed. Refer to the documentation "Drive Engineering – Practical Implementation – Project Planning for Controlled and Non-Controlled Drives" and the "SEW-Workbench" project planning software.

To be able to perform project planning for MOVITRANS®, you must have already performed project planning for the drive.

### 4.4.2 Prerequisites

The type of application plays an important role in the project planning for MOVITRANS® systems. Therefore, you must also determine the relevant application data in addition to the basic general conditions and drive data.

- **Mobile area**
  - Number of drives
  - Concurrency factor: How many vehicles drive and accelerate simultaneously on the travel section?
  - Power profile
  - Maximum (electrical) power of the mobile component
  - DC 24 V supply
  - Other consumers
  - Pick-up type
- **Stationary area**
  - Track layout: Track length, curve radii, switches, segmentation, emergency off areas (disconnection of parts of the track)
  - Mechanical installation of the line cables
  - Number of mobile stations
  - Concurrency factor (if necessary, with reference to the track layout)

23545259/EN – 05/2020

## 4.5 Project planning procedure

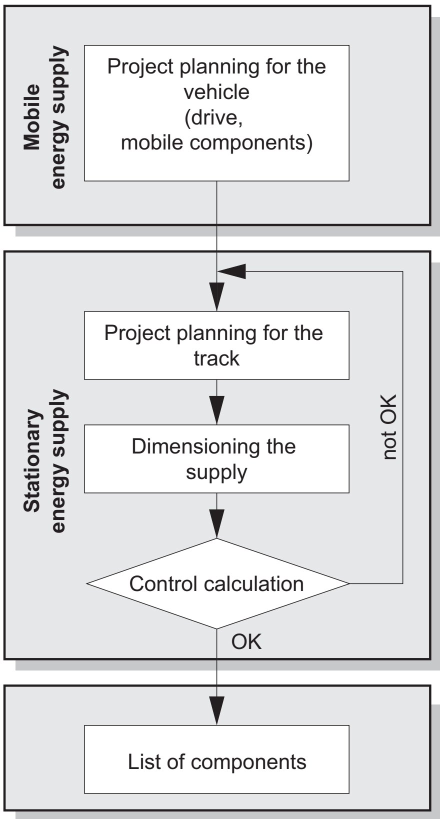
### 4.5.1 Prerequisites

The following requirements apply to project planning:

- All relevant information on designing the new application is available.
- The drives have already been configured.

### 4.5.2 Procedure

Project planning for contactless energy transfer with MOVITRANS® components is performed in several steps. The following illustration gives you an overview of the procedure:

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### 4.5.3 Project planning steps

The subsystems require individual project planning within the framework of the overall project:

- Project planning for vehicles (mobile)
- Project planning for the track (stationary) and the compensation
- Project planning for power supply (stationary)

23545259/EN – 05/2020

## 4.6 Project planning for vehicles

The first step is to determine the drive power and sensors required for the mobile station in the planned system.

### 4.6.1 Procedure

Proceed as follows to perform project planning for the vehicles:

1. First determine the power required to move the vehicle.
2. Next choose a suitable motor.

   The field weakening range of motors for AC 230/400 V and 50 Hz starts at the following frequencies:

   - ~ 45 Hz in star connection
   - ~ 77 Hz in delta connection
3. Determine whether auxiliary drives are required.

   Select respective motors for the auxiliary drives in this case.
4. Optimize the motion cycles to minimize the peak power.

   Observe the following influencing factors when determining the electrical power:

   - The efficiency of the gear units
   - The efficiency and the magnetization of the motors
   - The power loss of the frequency inverters

   Alternatively, you can determine the electrical power on the basis of the consumed power of the frequency inverter.
5. Deduce the following values from the required peak power of the vehicle:
   - Power at the DC 500 V level
   - Number of pick-ups
   - Pick-up type
   - Number of TPM12B mobile converters
6. Take the influence of the following components into account for the configuration of the DC 24 V level:
   - Configured controller
   - Power determined for the sensors
   - DC 24 V demand of the frequency inverters
   - If necessary: Determine a suitable external distance encoder system

## INFORMATION

If the power supplied by the TPM12B mobile converter is not sufficient at the DC 24 V level, a DC 500 V/DC 24 V power supply unit can be installed. In this case, the power of the power supply unit must be taken into account when configuring the DC 500 V level.

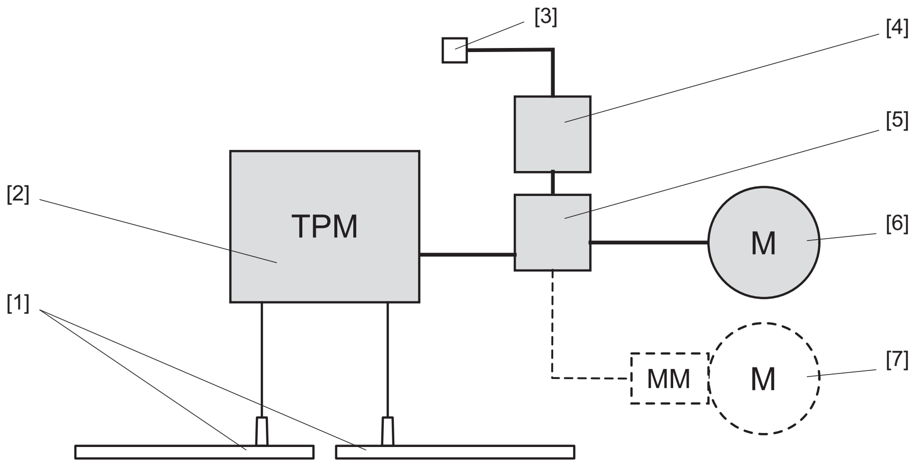
23545259/EN – 05/2020

### 4.6.2 Structure

For the project planning process, it is helpful to display the technical structure of the vehicles in a diagram.

Version with THM10E pick-up

The following illustration is an example of the technical structure of a vehicle with flat THM10E pick-ups:

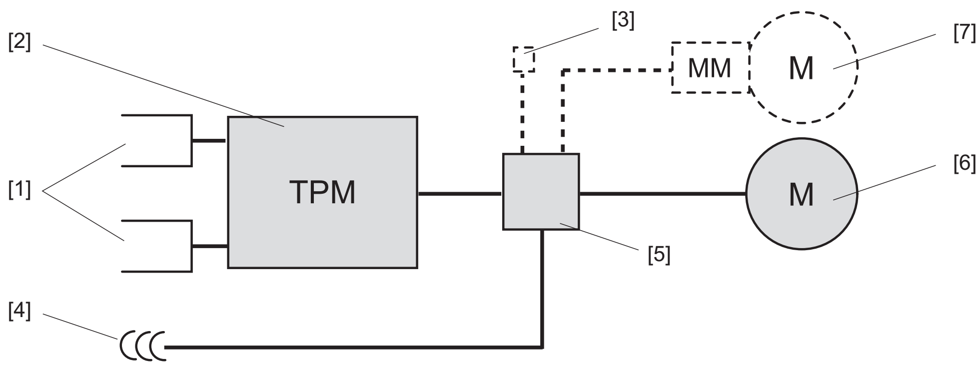



337475083

[1] MOVITRANS® THM10E pick-up
[2] MOVITRANS® TPM mobile converter
[3] Sensor technology
[4] Vehicle controller
[5] Frequency inverter
[6] Drive
[7] Auxiliary drives, e.g. MOVIMOT® (optional)

Variant with THM10C pick-up

The following illustration is an example of the technical structure of a vehicle with u-shaped THM10C pick-ups:




337467019

[1] MOVITRANS® THM10C pick-ups
[2] MOVITRANS® TPM mobile converter
[3] Sensors (optional)
[4] Communication
[5] Drive controller
[6] Drive
[7] Auxiliary drives, e.g. MOVIMOT® (optional)

23545259/EN – 05/2020

**INFORMATION**

Also observe optional auxiliary drives and sensor technology, if available.

## 4.7 Project planning for the track

In a second step, the design and segmentation of the track are determined for the planned system.

### 4.7.1 Available transmission power of the line cable

The two characteristic curves show the available transmission power of the line cable that can be transferred to the mobile component using the pick-ups.

The following system-related losses are taken into account for calculating the characteristic curves:

- Reactive power
- Ohmic losses of the line cable
- Eddy-current losses due to structures consisting of iron or conductive material (e.g. carbon) near the line cable

The system-related losses are proportional to the length of the transmission path. The system-related losses are deducted from the output cable of the TPS/TAS supply.

With the help of the characteristic curves, you can estimate which supply (4 kW or 16 kW) can be used.

Furthermore, you can estimate whether more supply units are necessary. For example, this is the case when the required power above the line cable is too high. The total track is divided by adding more supply units.

When using the THM10E pick-up, you can reduce the current of the line cable from 85 A to 60 A. However, the transmission power is then reduced from 1.5 kW to 0.9 kW. The advantage is a higher transmission power of the line cable. Reason: The system-related losses are reduced.

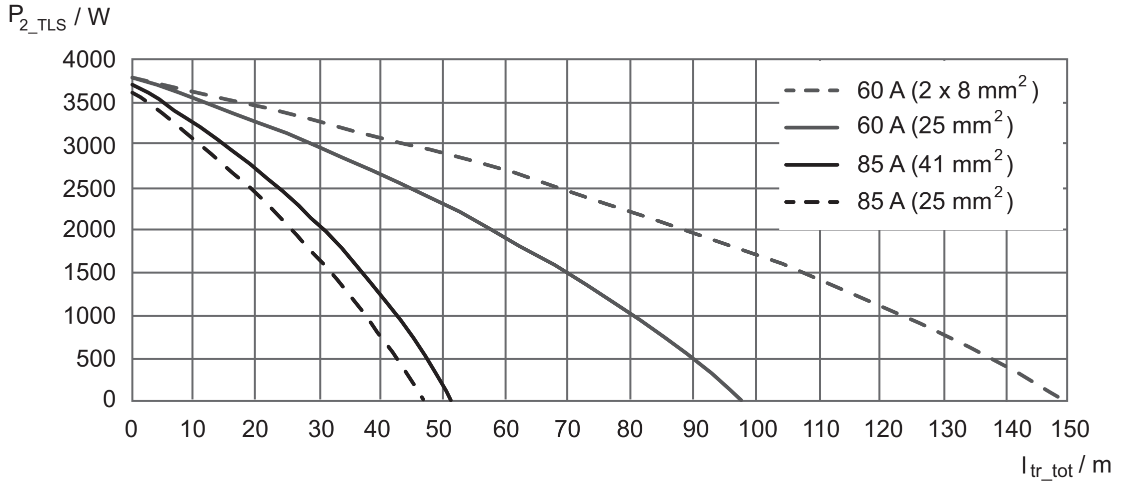
The calculations of the characteristic curves are based on the following conditions:

- Distance between line cable and conductive structures (e.g. iron / carbon) for floor installation: 8 cm
- Length of supply cable from supply unit to track: 10 m

The supply cable lengths of the compensation boxes on the travel section are not taken into account.

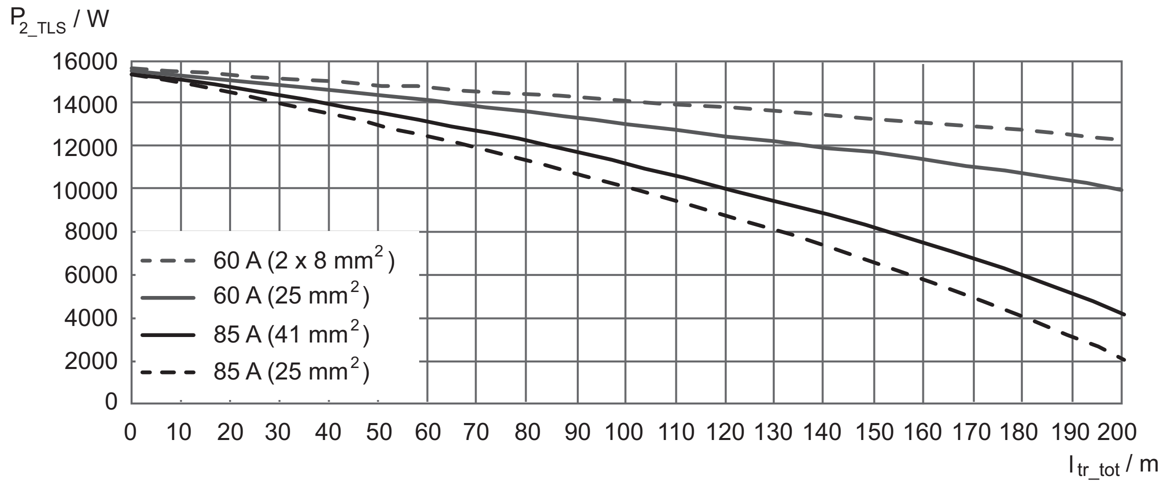
23545259/EN – 05/2020

**Transmission power of the line cable (4 kW supply):**




32631720587

**Transmission power of the line cable (16 kW supply):**



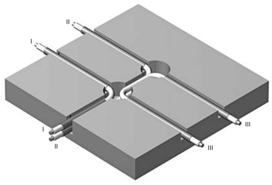
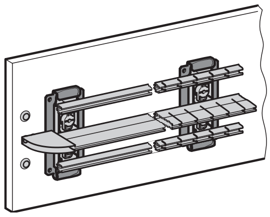
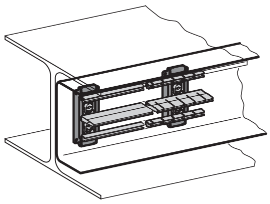
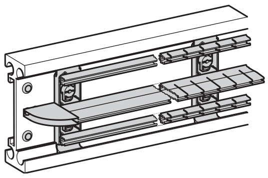

32631724555

$P_{2\_TLS}$ Transmission power of the TLS line cable
$l_{tr\_tot}$ Total length of the transmission path

23545259/EN – 05/2020

### 4.7.2 Overview installation types

The following installation types are possible depending on the pick-up:

| Design of the pick-up | Installation type | | Description |
|---|---|---|---|
| THM10E flat pick-up |  | Encapsulation | Suitable for floors that are sealed, e.g. industrial floor surface |
| THM10C U-shaped pick-up |  | Universal retaining plate with aluminum plate | Suitable for aluminum constructions or non-magnetizable mounting surfaces e.g. plastic |
| |  | Universal retaining plate with shielding plate | Suitable for steel constructions |
| |  | Aluminum profile rail | Suitable for electrified monorail systems |

### 4.7.3 Procedure

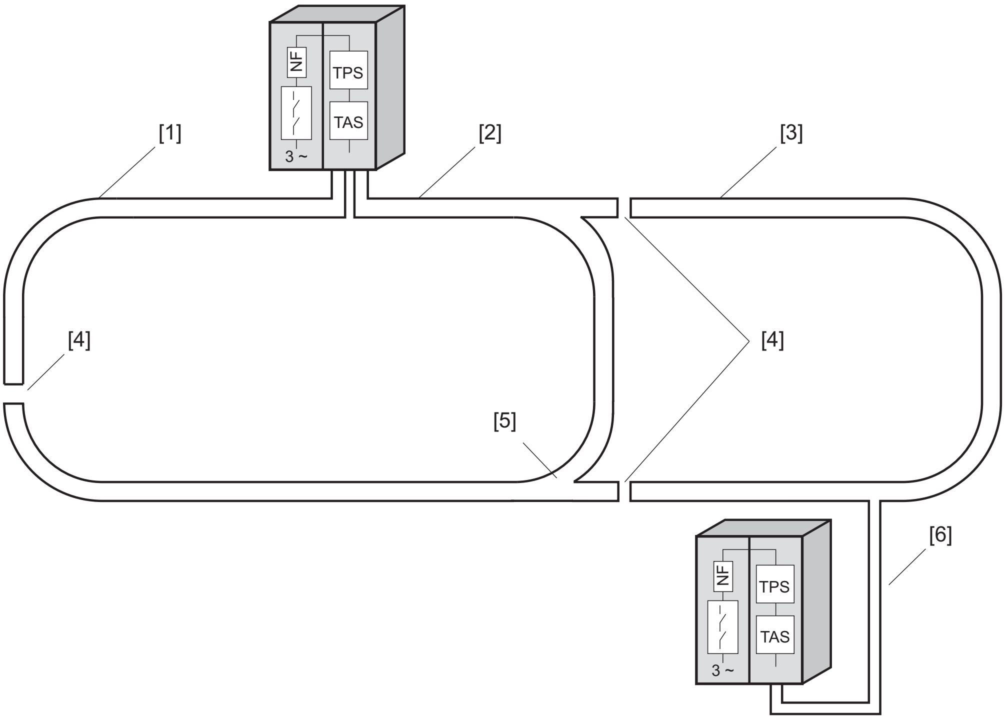
Proceed as follows to perform project planning for the track:

1. Determine the installation type according to the pick-up design.

   The further procedure for project planning of the track is independent of the pick-up design and installation type.
2. Determine the required emergency off areas.
3. Deduce the track segmentation from this.
4. Plan the compensation.

### 4.7.4 Structure

The following figure shows the schematic structure of a track with maintenance and track loop:



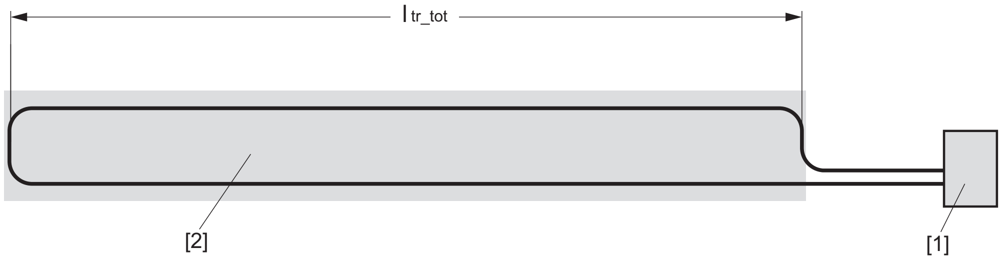

9007199592602507

[1] Emergency off circuit 1 - segment 1
[2] Emergency off circuit 1 - segment 2
[3] Emergency off circuit 2 - maintenance loop
[4] Joint
[5] Switch
[6] Supply cable

The electromagnetic coupling between TLS line cable and THM pick-up is not optimal at joints, switches and supply points. Therefore, the THM pick-ups do not reach the nominal power at these points. If the nominal power of the THM pick-up is required at these points, an additional THM pick-up must be installed.

### 4.7.5 Compensation

The number of TCS compensation boxes in the supply areas can be determined with the tables in chapter "Selection tables for compensation boxes" (→ 🗎 130).




25452638347

[1] MOVITRANS® supply in the control cabinet
[2] Transmission path

To determine the position of the TCS compensation boxes on the track, the length of the TLS line cables in a track segment is calculated first:

$$l_{TLS} = 2 \times l_{tr\_tot}$$

25452626955

| | | | |
|---|---|---|---|
| $l_{TLS}$ | = | Length of the line cable | $[l_{TLS}]$ = m |
| $l_{tr\_tot}$ | = | Total length of the transmission path | $[l_{tr\_tot}]$ = m |

With the total length of the line cables and the number of TCS compensation boxes, you can determine the line cable length after which a TCS compensation box has to be installed:

$$l_{TCS} = \frac{l_{TLS}}{n_{TCS} + 1}$$

25452630795

| | | | |
|---|---|---|---|
| $l_{TCS}$ | = | Line cable length after which a TCS compensation box must be installed | $[l_{TCS}]$ = m |
| $l_{TLS}$ | = | Length of the line cable | $[l_{TLS}]$ = m |
| $n_{TCS}$ | = | Number of TCS compensation boxes | |

If the calculated location for the TCS compensation box is in an unfavorable area (e.g. in the way of floor conveyor vehicles like forklifts), the TCS compensation box can be installed ± 5 m before or after the calculated location.

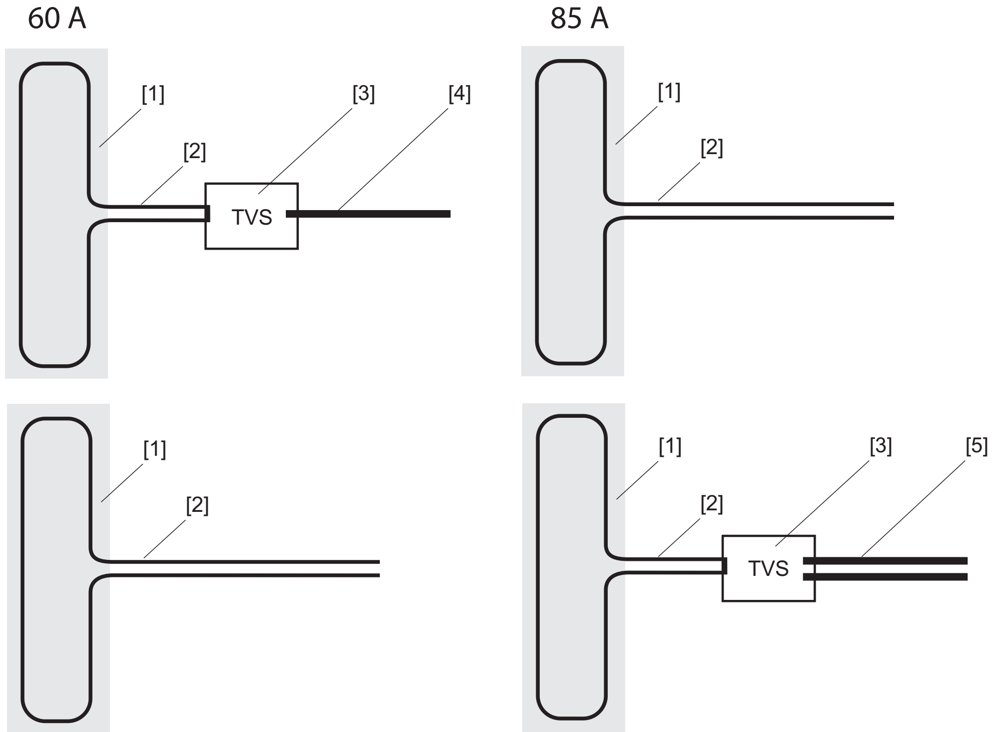
## INFORMATION

SEW-EURODRIVE recommends to compile an overview of the arrangement of the TCS compensation boxes in case of a larger project. For an example of such an overview, refer to chapter "Project planning for compensation" (→ 🗎 52).

### 4.7.6 Supply cable

The figure shows the supply on the track:

**60 A system / 85 A system**




*9007199592260107*

[1] Transmission path
[2] MOVITRANS® TLS line cable (25 $mm^2$ or 41 $mm^2$)
[3] MOVITRANS® TVS connection distributor
[4] For transmission paths with 60 A line cable current: MOVITRANS® TLS supply cable (6 × 6 $mm^2$)
[5] For transmission paths with 85 A line cable current: MOVITRANS® 2 × TLS supply cable (6 × 6 $mm^2$)

In a 60 A system, power is supplied in a track segment using a TLS10E006-06-1 supply cable and the TVS connection distributor at any point of the track. Alternatively, you can use the TLS line cable as a supply cable to the TAS transformer module with the 60 A system.

For an 85 A supply, the TLS line cable is fed directly to the TAS transformer module. Alternatively, you can use two TLS10E006-06-1 supply cables in parallel and the TVS connection distributor with the 85 A system.

It is important that the maximum power on the vehicle is not required at the point where the power is supplied.

The TLS10E006-06-1 supply cable can be trailed and is therefore suitable as supply cable for moving track sections.

23545259/EN – 05/2020

### 4.7.7 Cable routing for floor routing

Outside the transmission path, the TLS line cables are routed next to or on top of each other without a gap. If flat THM10E pick-ups are used, the distance between the line cables within the transmission path should be 140 mm.

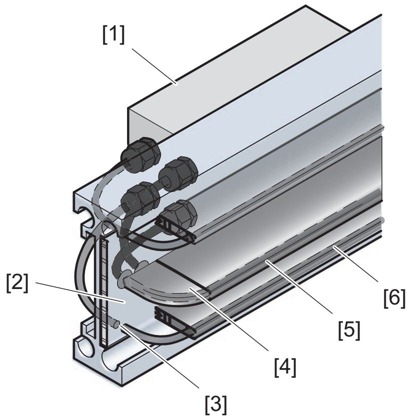
For more information on cable routing for floor installation, refer to the manual "MOVITRANS® Installation of Transmission Paths with Casting Resin for THM10E Pick-Ups".

23545259/EN – 05/2020

### 4.7.8 Cable routing in profile section system

On the track, the TLS line cables are routed in the profile section system. Cable entry frames and cable bushing grommets can be used at the supply points and compensation boxes or the TLS line cables can be inserted directly into the profile section system.

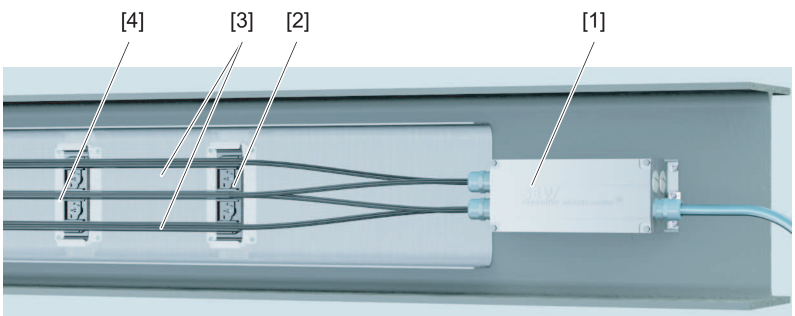
The following figure shows the supply with the cables being inserted via cable entry frames and cable bushing grommets:




368632843

[1] MOVITRANS® TVS connection distributor
[2] Aluminum profile rail
[3] MOVITRANS® TIS cable bushing grommets
[4] MOVITRANS® TIS cable entry frames
[5] MOVITRANS® TIS profile sections with TLS line cable (supply cable)
[6] MOVITRANS® TIS profile sections with TLS line cable (return cable)

The following figure shows the supply with the cables being inserted directly into the profile section system:




368408459

[1] MOVITRANS® TVS connection distributor
[2] MOVITRANS® TIS holding fixture
[3] MOVITRANS® TIS profile sections with TLS line cable (supply cable)
[4] MOVITRANS® TIS profile sections with TLS line cable (return cable)

23545259/EN – 05/2020



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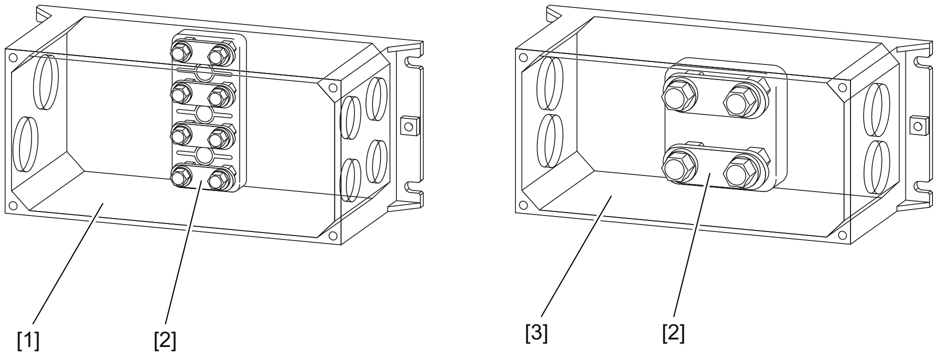
### 4.7.9 Wiring in the TVS connection distributor

On delivery, the following terminal connection points are jumpered with connecting plates in the TVS connection distributors:



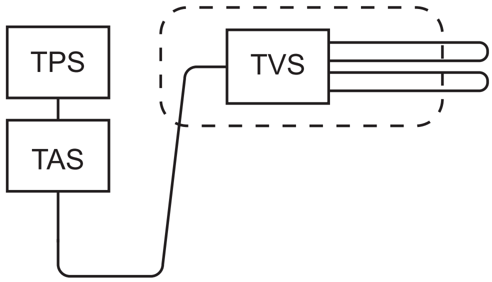
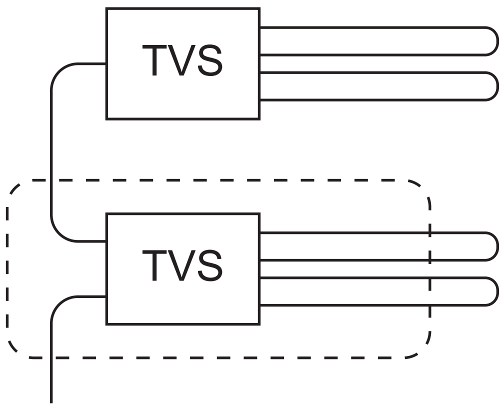

[1] MOVITRANS® connection distributor TVS10B-E06-000-1

[2] Connection, jumpered (with 2 superimposed connecting plates)

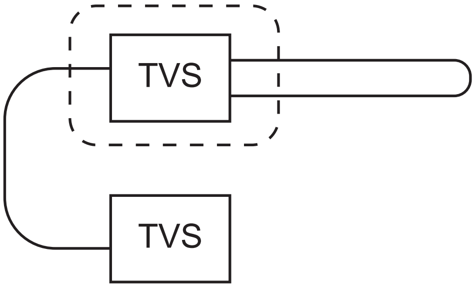
[3] MOVITRANS® connection distributor TVS10B-E08-000-2

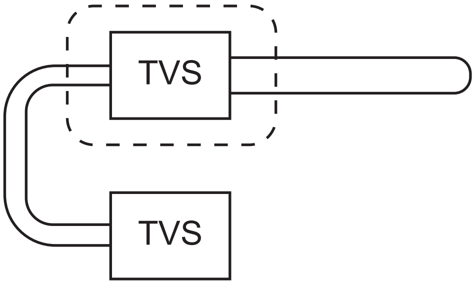
The wiring of the TVS connection distributors varies depending on the application.

The TVS connection distributor is used in the following cases:

| 60 A system | |
|---|---|
| In stationary track sections | Wiring between TVS connection distributor and supply   |
| | Wiring of several TVS connection distributors in series (loop)   |

23545259/EN – 05/2020

| 60 A system | |
|---|---|
| In moving track sections |  |

| 85 A system | |
|---|---|
| In moving track sections |  |

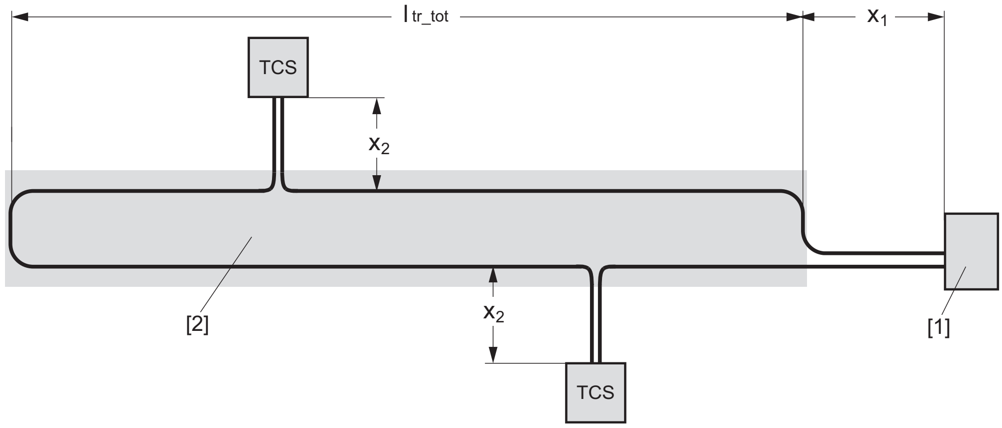
For more information on wiring, refer to the following documents:

- MOVITRANS® TCS, TVS, TLS, TIS Installation Materials operating instructions
- Circuit diagram

23545259/EN – 05/2020

### 4.7.10 Determining the components for floor routing

The length of the TLS line cable required for floor routing can be determined with the track length and the total of all supply cables (double for supply and return cables):




25421038475

[1] MOVITRANS® supply in the control cabinet
[2] Transmission path

$$l_{TLS\_tot} = [x_1 + (n_{TCS} \times x_2) + l_{tr\_tot}] \times 2$$

25452809739

| | | | |
|---|---|---|---|
| $l_{TLS\_tot}$ | = | Total length of the line cable | $[l_{TLS\_tot}]$ = m |
| $x_1$ | = | Distance supply/transmission path | $[x_1]$ = m |
| $x_2$ | = | Distance TCS compensation box/transmission path | $[x_2]$ = m |
| $n_{TCS}$ | = | Number of TCS compensation boxes | |
| $l_{tr\_tot}$ | = | Total length of the transmission path | $[l_{tr\_tot}]$ = m |

### 4.7.11 Determining the components for cable routing in profile section system

$$l_{TLS\_tot} = 4 \times l_{tr\_tot} + (n_{TVS} + n_{TCS}) \times 2\,m$$

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| | | | |
|---|---|---|---|
| $l_{TLS\_tot}$ | = | Total length of the line cable | $[l_{TLS\_tot}]$ = m |
| $l_{tr\_tot}$ | = | Total length of the transmission path | $[l_{tr\_tot}]$ = m |
| $n_{TVS}$ | = | Number of TVS connection distributors | |
| $n_{TCS}$ | = | Number of TCS compensation boxes | |

In the profile section system, use two TLS10E-008-01-1 line cables (8 mm² cross section) in parallel for the supply cable and the return cable. The 6-core TLS10E-006-06-1 supply cable is used as supply cable between supply and track.

$$l_{TLS10E006} = x_1$$

25453149963

| | | | |
|---|---|---|---|
| $l_{TLS10E006}$ | = | Total supply cable length | $[l_{TLS10E006}]$ = m |
| $x_1$ | = | Distance supply/transmission path | $[x_1]$ = m |

The TIS10A008 installation material is used for the profile section system. The TIS10A008 installation material comprises:

- The TIS...-P.. rigid profile section

23545259/EN – 05/2020

- The TIS...-F.. flexible profile section
- The TIS...-H.. holding fixture.

Generally, rigid TIS...-P.. profile sections are used on straight tracks and flexible TIS...-F.. profile sections are used in curves. For the return cable, you always need twice as many profile sections as for the supply cable. This applies to straight sections and to curves. The determined numbers of profile sections is rounded up to whole numbers.

$$n_{TISP\_fl} = \frac{l_{str\_tot}}{l_{TISP}} = \frac{l_{str\_tot}}{3}$$

$$n_{TISF\_fl} = \frac{l_{curve\_tot}}{l_{TISF}} = \frac{l_{curve\_tot}}{2.2}$$

$$n_{TISP\_bl} = 2 \times n_{TISP\_fl}$$

$$n_{TISF\_bl} = 2 \times n_{TISF\_fl}$$

*25454600331*

| | | | |
|---|---|---|---|
| $n_{TISP\_fl}$ | = | Number of rigid profile sections (supply cable) | |
| $n_{TISF\_fl}$ | = | Number of flexible profile sections (supply cable) | |
| $n_{TISP\_bl}$ | = | Number of rigid profile sections (return cable) | |
| $n_{TISF\_bl}$ | = | Number of flexible profile sections (return cable) | |
| $l_{str\_tot}$ | = | Total length of all straight track sections | $[l_{str\_tot}]$ = m |
| $l_{curve\_tot}$ | = | Total length of all curves | $[l_{curve\_tot}]$ = m |
| $l_{TISP}$ | = | Length of the TIS...-P.. rigid profile section (3 m) | $[l_{TISP}]$ = m |
| $l_{TISF}$ | = | Length of the TIS...-F.. flexible profile section (2.2 m) | $[l_{TISF}]$ = m |

The calculation does not include the expansion gap between the individual profile sections (10 mm each). For more information on material expansion of the profile sections, refer to the "Installation material TCS, TVS, TLS, TIS" operating instructions.

In order to fix the TIS profile sections on the transmission path, TIS...-H.. holding fixtures are installed in certain intervals. For fixation, use 7 holders per profile section segment.

Depending on the structure of the transmission path, TIS...-X.. retaining plates and TIS...-A.. cable entry frames/cable bushing grommets are required for the holding fixtures. SEW-EURODRIVE recommends to increase the order quantity by 5 – 10% to take the off-cut during installation into account.

23545259/EN – 05/2020

## 4.8 Project planning for the power supply

In the third step, you configure the supply unit. The supply unit consists of 2 components:

- TPS stationary converter
- TAS transformer module

In order to determine the power supply components, the transmission path must already be planned and divided into emergency off circuits and track segments.

### 4.8.1 Procedure

Proceed as follows to perform project planning for the power supply:

1. Calculate the maximum power demand per track element. Note the following during calculation:
   - The electrical power of the individual vehicles in the track segment.
   - The losses of the mobile MOVITRANS® components.
   - Number and concurrency factor of the vehicles in the track segment.
   - The losses due to TLS line cables: Reactive power and, if applicable, stray field induction.
2. The results of this calculation can be used to determine the power supply components.

**INFORMATION**

The total power consumed (including reactive power) of a track segment must not exceed 16 kW. Otherwise, you must either divide the track segment or revise the segmentation of the entire transmission path.

Depending on the THM pick-up design and the power that has to be transferred per vehicle, a line cable current of 60 A or 85 A has been determined. Select the TAS transformer module in the 60 A or 85 A design according to the project-planned line cable current.

### 4.8.2 Emergency stop function

In an emergency switch-off situation, the system can be disconnected on the line end (3 × AC 380 – 500 V) via contactors in the supply cable of the stationary converter. You have the following options:

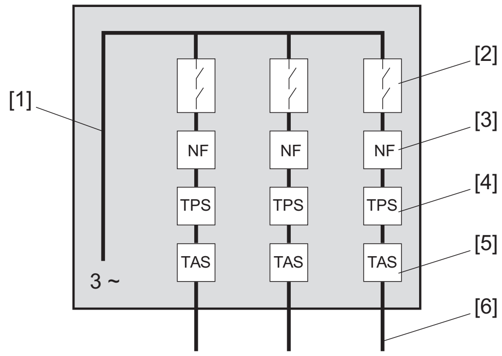
- Several TPS stationary converters are connected to and switched off by the same contactors.
- Each MOVITRANS® supply unit is connected to one contactor and is switched off separately.

23545259/EN – 05/2020

### 4.8.3 Structure

The figure shows the power supply under the following conditions:

- 3 track segments
- Separate emergency off circuits




*337470859*

[1] Supply system
[2] Power contactors
[3] Line filter
[4] MOVITRANS® TPS stationary converter
[5] MOVITRANS® TAS transformer module
[6] Transfer of emergency off circuits and track segments 1 to 3

23545259/EN – 05/2020

## 4.9 System power and system-related power reduction

Determining the mobile power available at the TPM mobile converter plays an important role when performing project planning for MOVITRANS® systems.

If the system-related power losses are too great, the mobile power available is reduced to such an extent that the mobile consumers are no longer sufficiently supplied. This leads to a standstill or failure of the system.

Therefore, you must determine not only the general conditions and data but also the exact system-related power losses and the effective mobile power available in the system during project planning.

**INFORMATION**

Inaccurate project planning at the power limit can cause the mobile unit to start incorrectly.

### 4.9.1 System-related power reduction

The following section describes the various system-related power losses for mobile and stationary components and the influence of the power losses on the effective mobile power available.

**INFORMATION**

When selecting the drive technology, make sure that the output power of the TPM mobile converter is taken into account as electrical power (not as mechanical output power). Observe the efficiency and the magnetization of the motors.

**TLS line cable**

You have to take the following power reductions into account when calculating the power available at the TLS line cables:

- Losses caused by incorrect compensation
- Power loss of the TAS transformer module
- Ohmic losses in the TLS line cables
- Losses caused by stray field induction along the TLS line cable

**Mobile components**

You have to take the following power reductions into account when calculating the power available for the mobile components:

- Power loss of the THM pick-ups
- Power loss of the TPM mobile converter

**INFORMATION**

For continuous operation, the maximum power available for the individual mobile components is the nominal output power of the TPS stationary converter.

23545259/EN – 05/2020

### 4.9.2 Calculations

Use the following formulas and selection tables to determine the maximum incorrect compensation that can occur at the TPS stationary converter during operation. The calculation is based on the least favorable conditions.

## INFORMATION

You can find tables with the different system-related power losses in chapter "Project planning data" (→ 🗎 112).

**Incorrect compensation**

The rated power of the TPS stationary converter ($P_{N\_TPS}$) is 4 kW or 16 kW. Losses caused by incorrect compensation are reactive power losses.

Determine the effective power of the system using the following formula.

**Effective power after deducting the reactive power:**

$$P_{2\_TPS} = \sqrt{P_{N\_TPS}^2 - Q_{tot}^2}$$

*25457991819*

| | | | |
|---|---|---|---|
| $P_{2\_TPS}$ | = | Effective power of the system | $[P_{2\_TPS}]$ = W |
| $P_{N\_TPS}$ | = | Rated power of the MOVITRANS® TPS stationary converter | $[P_{N\_TPS}]$ = W |
| $Q_{tot}$ | = | Track-dependent reactive power of the system | $[Q_{tot}]$ = var |

### Track-dependent reactive power

The track-depending reactive power can be determined for each case using the formulas below. The reactive power is calculated on the basis of the least favorable compensation conditions.

Determine the reactive power of the system depending on the line cable current and the type of cable routing using the following formula:

**Reactive power of the system:**

$$Q_{tot} = Q_{C\_fix} + Q_{\text{var}} \times l_{tr\_tot}$$

*25459885451*

**Reactive power for floor routing with 85 A line cable current:**

$$Q_{tot} = (795 + 52 \times l_{tr\_tot})\,\text{var}$$

*25459894283*

**Reactive power for floor routing with 60 A line cable current:**

$$Q_{tot} = (400 + 26 \times l_{tr\_tot})\,\text{var}$$

*25459890699*

**Reactive power for routing in profile section with 60 A line cable current:**

$$Q_{tot} = (400 + 16 \times l_{tr\_tot})\,\text{var}$$

*25459923467*

| | | | |
|---|---|---|---|
| $Q_{tot}$ | = | Track-dependent reactive power of the system | $[Q_{tot}]$ = var |
| $Q_{C\_fix}$ | = | Track-**in**dependent reactive power (affected by the quantification of the capacitor capacities) | $[Q_{C\_fix}]$ = var |
| $Q_{var}$ | = | Track-dependent reactive power (affected by the track-related component tolerances) | $[Q_{var}]$ = var $m^{-1}$ |
| $l_{tr\_tot}$ | = | Total length of the transmission path | $[l_{tr\_tot}]$ = m |

23545259/EN – 05/2020

### 4.9.3 Example

The following section explains the calculation of the power losses and the remaining mobile power using a practical example.

**Basic data**

The following technical data is given:

| | |
|---|---|
| TPM supply | 4 kW |
| Length of transmission path | 25 m |
| Cable cross-section | 25 $mm^2$ |
| Distance supply/track | 5 m |
| Required mobile power | 1.8 kW |
| Distance reinforcing iron in the floor/TLS line cable | Approx. 10 cm |

**Procedure**

The calculation takes place in several steps. Proceed as follows:

- Determine the individual power losses.
- From this data, deduce the mobile power available in the system.

**Calculation**

The following values result using the technical data above:

**Track-dependent reactive power:**

$$Q_{tot} = (795 + 52 \times l_{tr\_tot})\,\text{var} = (795 + 52 \times 25)\,\text{var} = 2095\ \text{var}$$

*25461730059*

| | | | |
|---|---|---|---|
| $Q_{tot}$ | = | Track-dependent reactive power of the system | $[Q_{\_tot}]$ = var |
| $l_{tr\_tot}$ | = | Total length of the transmission path | $[l_{tr\_tot}]$ = m |

**Effective power of the system:**

$$P_{2\_TPS} = \sqrt{P_{N\_TPS}^{2} - Q_{tot}^{2}}\ W = \sqrt{4^2 - 2.095^2}\ kW \approx 3.4\ kW$$

*25461733899*

| | | | |
|---|---|---|---|
| $P_{2\_TPS}$ | = | Effective power of the system | $[P_{2\_TPS}]$ = kW |
| $P_{N\_TPS}$ | = | Rated power of the MOVITRANS® TPS stationary converter | $[P_{N\_TPS}]$ = kW |
| $Q_{tot}$ | = | Track-dependent reactive power of the system | $[Q_{\_tot}]$ = kvar |

23545259/EN – 05/2020

**Ohmic losses in the TLS line cables:**

$$P_{TLS\_loss} = [l_{tr\_tot} \times (P_{loss} + P_{ind\_loss}) + x_1 \times P_{loss}]\ W$$
$$= [25 \times (25 + 12) + 5 \times 25]\ W = 1050\ W$$

*25461737483*

| | | | |
|---|---|---|---|
| $P_{TLS\_loss}$ | = | Power loss of the TLS line cable | $[P_{TLS\_loss}]$ = W |
| $l_{tr\_tot}$ | = | Total length of the transmission path | $[l_{tr\_tot}]$ = m |
| $P_{loss}$ | = | Power loss of the cable per track meter, see section "Ohmic losses" (→ 🗎 127). | $[P_{loss}]$ = W $m^{-1}$ |
| $P_{ind\_loss}$ | = | Power loss of the cable per track meter due to induction, see section "losses due to eddy currents" (→ 🗎 128). | $[P_{ind\_loss}]$ = W $m^{-1}$ |
| $x_1$ | = | Distance supply/transmission path | $[x_1]$ m |

**Available power in the TLS line cable:**

$$P_{2\_TLS} = (P_{2\_TPS} - P_{TLS\_loss} - P_{TAS\_loss})\ W = (3407 - 1050 - 50)\ W = 2307\ W$$

*25462163467*

| | | | |
|---|---|---|---|
| $P_{2\_TLS}$ | = | Transmission power of the TLS line cable | $[P_{2\_TLS}]$ = W |
| $P_{2\_TPS}$ | = | Effective power of the system | $[P_{2\_TPS}]$ = W |
| $P_{TLS\_loss}$ | = | Power loss of the TLS line cable | $[P_{TLS\_loss}]$ = W |
| $P_{TAS\_loss}$ | = | Power loss of the TAS transformer module, see section "TAS transformer module" (→ 🗎 127). | $[P_{TAS\_loss}]$ = W |

**Available power in the TPM mobile converter:**

$$P_{1\_TPM} = (P_{2\_TLS} - P_{pickup\_loss} - P_{pickup\_loss} - P_{TPM\_loss})\ W$$
$$= (2307 - 60 - 60 - 120)\ W = 2067\ W$$

*25462167819*

| | | | |
|---|---|---|---|
| $P_{1\_TPM}$ | = | Available power in the TPM mobile converter | $[P_{1\_TPM}]$ = W |
| $P_{2\_TLS}$ | = | Transmission power of the TLS line cable | $[P_{2\_TLS}]$ = W |
| $P_{pickup\_loss}$ | = | Power loss of the pick-up, see section "THM pick-ups" (→ 🗎 127). | $[P_{pickup\_loss}]$ = W |
| $P_{TPM\_loss}$ | = | Power loss of the TPM mobile converter, see section "Mobile converter" (→ 🗎 129). | $[P_{TPM\_loss}]$ = W |

## Result

The mobile power available in the TPM mobile converter is 2.067 kW. The required value for the mobile power of 1.8 kW is achieved.

# 5 Project planning example for flat THM10E pick-ups

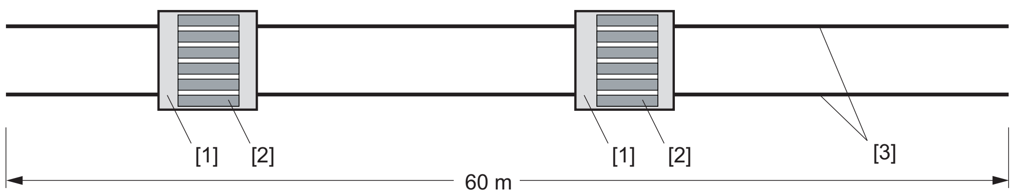
In this section, project planning is explained using a sample system. The sample system consists of a rail-mounted conveyor trolley based on MOVITRANS® components with flat THM10E pick-up.

## 5.1 Technical data

Project planning is to be performed for a rail-mounted conveyor trolley application comprising a straight track and 2 vehicles with a roller conveyor.

### 5.1.1 Structure

The following figure shows the design of the sample system:




*337527563*

[1] Conveyor trolley
[2] Roller conveyor
[3] Track (line)

### 5.1.2 Data

The following data is known for project planning:

| | |
|---|---|
| Number of vehicles | 2 |
| Vehicle movement | Independent of each other |
| Travel and roller conveyor drive | On one vehicle; never in operation simultaneously |
| Track length | 60 m |
| Distance track/control cabinet | 10 m |
| Frequency inverter | MOVIMOT® |
| Gear unit efficiency | 94% |
| Communication | PROFIBUS radio module (DC 24 V/800 mA) |
| Distance reinforcing iron in the floor/TLS line cable | Approx. 10 cm |

23545259/EN – 05/2020

## 5.2 Project planning for the vehicles

To be able to select the mobile MOVITRANS® components correctly, the maximum electrical power required on the vehicle must be determined as accurately as possible.

**INFORMATION**

If an exact calculation is not possible, schedule a power reserve.

### 5.2.1 Configuration of the travel drive

The following technical data is given:

| | |
|---|---|
| Mass of the vehicle (maximum value) m | 2.5 t (2500 kg) |
| Resistance to vehicle motion $F_{tr}$ | 120 N $t^{-1}$ (0.12 N $kg^{-1}$) |
| Speed V | 0.75 m $s^{-1}$ |
| Acceleration a | 0.5 m $s^{-2}$ |

The following formulas can be used to configure the travel drive and to determine the motor power.

$$F_{dyn} = m \times F_{tr} = (2500 \times 0.12)\ N = 300\ N$$

$$P_{veh2} = F_{dyn} \times V = (300 \times 0.75)\ \mathrm{W} = 225\ \mathrm{W}$$

$$P_{veh1} = m \times a \times V = (2500 \times 0.5 \times 0.75)\ \mathrm{W} = 938\ \mathrm{W}$$

*25346594955*

| | | | |
|---|---|---|---|
| $F_{dyn}$ | = | Force applied by the motor to move the vehicle. | $[F_{dyn}]$ = N |
| m | = | Mass of the vehicle (maximum value) | [m] = kg |
| $F_{tr}$ | = | Resistance to motion | $[F_{tr}]$ = N $kg^{-1}$ |
| $P_{veh1}$ | = | Required dynamic (mechanical) power for acceleration | $[P_{veh1}]$ = W |
| $P_{veh2}$ | = | Required static (mechanical) power for constant travel | $[P_{veh2}]$ = W |
| V | = | Speed | [V] = m $s^{-1}$ |
| a | = | Acceleration | [a] = m $s^{-2}$ |

For example, you can use the following motor with a rated power of 1.1 kW:

- DRN90S4/BE2 AC motor with MOVIMOT® MM11D frequency inverter

23545259/EN – 05/2020

The required electrical power can be estimated using the consumed power of the frequency inverter at the 400 V supply system. The line current $I_{line}$ of the frequency inverter with a line voltage $U_{line}$ of 3 × AC 400 V is 2.4 A, see MOVIMOT® MM..D operating instructions.

$$P_{veh1\_\eta} = \sqrt{3} \times \frac{U_{line} \times I_{line}}{P_N} \times \frac{P_{veh2} + P_{veh1}}{\eta_G} = \sqrt{3} \times \frac{400 \times 2.4}{1100} \times \frac{(225 + 938)}{0.94}\ W = 1870\ W \approx 1.87\ kW$$

$$P_{veh2\_\eta} = \sqrt{3} \times \frac{U_{line} \times I_{line}}{P_N} \times \frac{P_{veh2}}{\eta_G} = \sqrt{3} \times \frac{400 \times 2.4}{1100} \times \frac{225}{0.94}\ W = 361\ W \approx 0.36\ kW$$

*25346602507*

| | | | |
|---|---|---|---|
| $P_{veh1\_\eta}$ | = | Required dynamic (electrical) power for acceleration | $[P_{veh1\_\eta}]$ = W |
| $P_{veh2\_\eta}$ | = | Required static (electrical) power for constant travel | $[P_{veh2\_\eta}]$ = W |
| $P_{veh1}$ | = | Required dynamic (mechanical) power for acceleration | $[P_{veh1}]$ = W |
| $P_{veh2}$ | = | Required static (mechanical) power for constant travel | $[P_{veh2}]$ = W |
| $\eta_G$ | = | Efficiency of the gear unit | $[\eta_G]$ = 1 |
| $U_{line}$ | = | Line voltage of the frequency inverter | $[U_{line}]$ = V |
| $I_{line}$ | = | Line current of the frequency inverter | $[I_{line}]$ = A |
| $P_N$ | = | Rated power of the frequency inverter | $[P_N]$ = W |

23545259/EN – 05/2020

### 5.2.2 Configuration of the roller conveyor drive

The following technical data is given:

| | |
|---|---|
| Mass of the pallet (maximum value) | 1.6 t (1600 kg) |
| Rolling resistance $F_{tr}$ | 250 N $t^{-1}$ (0.25 N $kg^{-1}$) |
| Speed V | 0.5 m $s^{-1}$ |
| Acceleration a | 0.5 m $s^{-2}$ |

The following formulas can be used to configure the roller conveyor drive and to determine the motor power.

$$F_{dyn} = m \times F_{tr} = (1600 \times 0.25)\ N = 400\ N$$
$$P_{veh2} = F_{dyn} \times V = (400 \times 0.5)\,\mathrm{W} = 200\ \mathrm{W}$$
$$P_{veh1} = m \times a \times V = (1600 \times 0.5 \times 0.5)\,\mathrm{W} = 400\ \mathrm{W}$$

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| | | | |
|---|---|---|---|
| $F_{dyn}$ | = | Force applied by the motor to move the roller conveyor drive. | $[F_{dyn}]$ = N |
| m | = | Mass (maximum value) | [m] = kg |
| $F_{tr}$ | = | Rolling resistance | $[F_{tr}]$ = N $kg^{-1}$ |
| $P_{veh1}$ | = | Required dynamic (mechanical) power for acceleration | $[P_{veh1}]$ = W |
| $P_{veh2}$ | = | Required static (mechanical) power for constant travel | $[P_{veh2}]$ = W |
| V | = | Speed | [V] = m $s^{-1}$ |
| a | = | Acceleration | [a] = m $s^{-2}$ |

For example, you can use the following motor with a rated power of 0.55 kW:

- DRN80MK4/BE1 AC motor with MOVIMOT® MM05D frequency inverter

The required electrical power can be estimated using the consumed power of the frequency inverter at the 400 V supply system. The line current $I_{line}$ of the frequency inverter with a line voltage $U_{line}$ of 3 × AC 400 V is 1.6 A, see MOVIMOT® MM..D operating instructions.

$$P_{veh1\_\eta} = \sqrt{3} \times \frac{U_{line} \times I_{line}}{P_N} \times \frac{P_{veh2} + P_{veh1}}{\eta_G} = \sqrt{3} \times \frac{400 \times 1.6}{550} \times \frac{(200+400)}{0.94}\ W = 1286\ W \approx 1.29\ kW$$

$$P_{veh2\_\eta} = \sqrt{3} \times \frac{U_{line} \times I_{line}}{P_N} \times \frac{P_{veh2}}{\eta_G} = \sqrt{3} \times \frac{400 \times 1.6}{550} \times \frac{200}{0.94}\ W = 428\ W \approx 0.43\ kW$$

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| | | | |
|---|---|---|---|
| $P_{veh1\_\eta}$ | = | Required dynamic (electrical) power for acceleration | $[P_{veh1\_\eta}]$ = W |
| $P_{veh2\_\eta}$ | = | Required static (electrical) power for constant travel | $[P_{veh2\_\eta}]$ = W |
| $P_{veh1}$ | = | Required dynamic (mechanical) power for acceleration | $[P_{veh1}]$ = W |
| $P_{veh2}$ | = | Required static (mechanical) power for constant travel | $[P_{veh2}]$ = W |
| $\eta_G$ | = | Efficiency of the gear unit | $[\eta_G]$ = 1 |
| $U_{line}$ | = | Line voltage of the frequency inverter | $[U_{line}]$ = V |
| $I_{line}$ | = | Line current of the frequency inverter | $[I_{line}]$ = A |
| $P_N$ | = | Rated power of the frequency inverter | $[P_N]$ = W |

### 5.2.3 Current demand at the DC 24 V level

The current demand at the DC 24 V level is calculated as follows:

| | **Current consumption** |
|---|---|
| 2 × MOVIMOT® | 0.4 A |
| Initiators/sensors | 1.7 A |
| Communication (2 × MFx and radio module) | 1.1 A |
| Warning lamp | 0.3 A |
| Other/reserve | 0.5 A |
| **Total current demand** | **4.0 A** |
| **Total power demand at the DC 24 V level** | **96 W ≈ 0.10 kW** |

The mobile converter provides a maximum output current of 2 A. The required current of 4 A at the DC 24 V level cannot be provided solely by the mobile converter.

Therefore, you must install an external power supply unit with a supply of 5 A in this case.

### 5.2.4 Resulting vehicle power

The maximum power capable of being transmitted is required in the travel drive. Since the travel drive and the roller conveyor drive do not run at the same time, the resulting power is based on the larger drive.

The peak power demand for the vehicle is calculated as follows:

| | |
|---|---|
| Dynamic (electrical) power, travel drive $P_{veh1\_\eta}$ | 1.87 kW |
| Power, DC 24 V level | 0.10 kW |
| **Dynamic power demand in total**<br>$P_{veh1\_tot}$ = Maximum (electrical) power to be consumed by the vehicle for operation via MOVITRANS®. | **1.97 kW** |

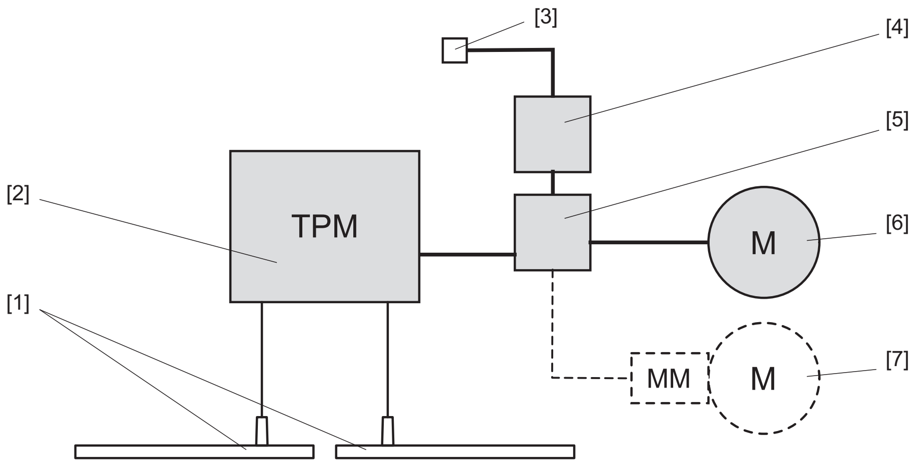
The static power demand is calculated as follows:

| | |
|---|---|
| Static (electrical) power, travel drive $P_{veh2\_\eta}$ | 0.36 kW |
| Power, DC 24 V level | 0.10 kW |
| **Static power demand in total**<br>$P_{veh2\_tot}$ = Static (electrical) power to be consumed by the vehicle for constant travel via MOVITRANS®. | **0.46 kW** |

23545259/EN – 05/2020

### 5.2.5 Vehicle structure

The following illustration is an example of the technical structure of the vehicles:




337475083

[1] MOVITRANS® THM10E pick-up
[2] MOVITRANS® TPM mobile converter
[3] Sensor technology
[4] Vehicle control/communication
[5] Frequency inverter
[6] Travel drive
[7] Roller conveyor drive

## 5.3 Project planning for the track

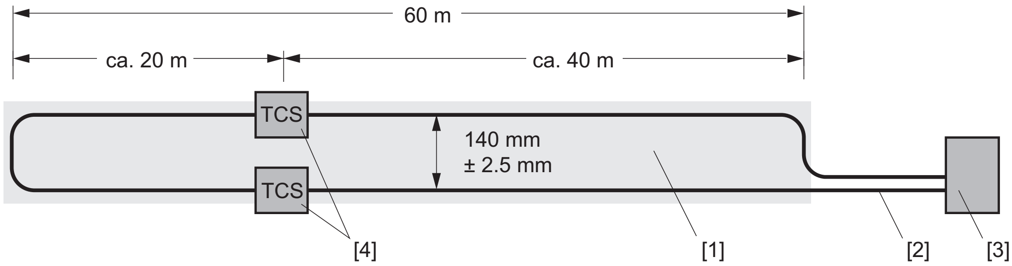
A track length of 60 m cannot be operated without any intermediate compensation. Therefore, the track installation must be considered more closely.

### 5.3.1 Project planning for compensation

Two compensation boxes are required in the system to compensate the track, see tables in chapter "Selection tables for compensation boxes" (→ 🗎 130). They must be installed so that the entire track can be divided into 3 track sections that are roughly the same size.

**Position**

The following figure shows the position of the compensation boxes on the track:

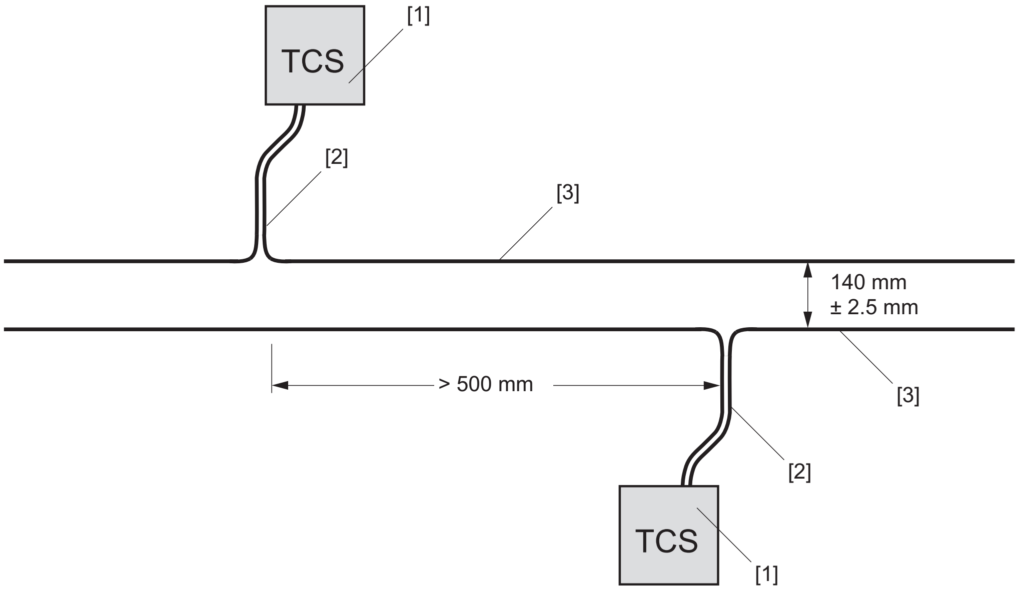



*337540235*

[1] Transmission path
[2] MOVITRANS® TLS supply cable
[3] MOVITRANS® supply in the control cabinet
[4] MOVITRANS® TCS compensation boxes

**Layout**

Make sure that the compensation boxes at the supply and return cable are offset by at least 500 mm. Otherwise, the transmission power of the pick-ups is reduced.




*9007199592285451*

[1] MOVITRANS® TCS compensation boxes
[2] Connection between MOVITRANS® TLS line cable and MOVITRANS® TCS compensation box
[3] MOVITRANS® TLS line cable

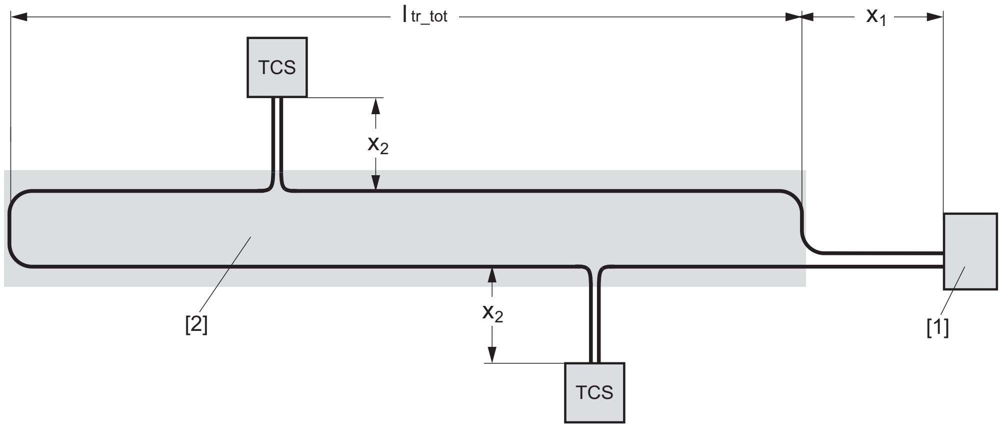
## INFORMATION

For more complex travel distances, create an overview of the arrangement and wiring of the track components.

23545259/EN – 05/2020

### 5.3.2 Track structure

The following figure shows the track design:




25421038475

[1] MOVITRANS® supply in the control cabinet
[2] Transmission path

The **total length of the line cable** is calculated as follows:

$$l_{TLS\_tot} = [x_1 + (n_{TCS} \times x_2) + l_{tr\_tot}] \times 2$$

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| | | | |
|---|---|---|---|
| $l_{TLS\_tot}$ | = | Total length of the line cable | $[l_{TLS\_tot}]$ = m |
| $x_1$ | = | Distance supply/transmission path | $[x_1]$ = m |
| $x_2$ | = | Distance TCS compensation box/transmission path | $[x_2]$ = m |
| $n_{TCS}$ | = | Number of TCS compensation boxes | |
| $l_{tr\_tot}$ | = | Total length of the transmission path | $[l_{tr\_tot}]$ = m |

The total length of the **sample system** is calculated as follows:

| | | |
|---|---|---|
| $x_1$ | = | 10 m |
| $x_2$ | = | 2 m |
| $n_{TCS}$ | = | 2 |
| $l_{tr\_tot}$ | = | 60 m |

$$l_{TLS\_tot} = [(10 + 2 \times 2 + 60) \times 2]\ m = 148\ m$$

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148 m of the TLS10E 025-01-1 line cable are required for this application.

## 5.4 Project planning for the power supply

Due to the short track length, only one emergency off circuit is configured for the entire track.

### 5.4.1 Function

The line voltage is provided to the TPS stationary converter using a line filter. The stationary converter processes the energy and passes it onto the TAS transformer module. The output of the transformer module acts as a current source that feeds the energy into the track section.

### 5.4.2 Operating conditions

As the vehicles move independently of each other, the least favorable case for operation is the simultaneous acceleration of both conveyor trolleys.

### 5.4.3 Dimensioning

In case of the project planning example, the maximum (electrical) power to be consumed by the vehicle for operation via MOVITRANS® is 1.97 kW ($P_{veh1\_tot}$).

Since the system consists of a transmission path with 2 vehicles, the supply unit must be dimensioned in such a way that a power of at least twice the maximum electrical travel power ($2 \times P_{veh1\_tot}$ = 3.94 kW) can be transmitted for acceleration.

The flat THM10E pick-up delivers a power of 0.9 kW with a line cable current of 60 A and a power of 1.5 kW with a line cable current of 85 A.

With 2 pick-ups and a line cable current of 60 A, the MOVITRANS® system provides 1.8 kW. This value is lower than 1.97 kW. This is why a line cable current of 85 A must be provided.

With this current and 60 m track length, the transmission power is significantly reduced with a supply of 4 kW.

The following values result:

| | |
|---|---|
| Supply power | 16 kW |
| TPS10A stationary converter | Size 4 |
| TAS10A transformer module | Size 4 |
| Line cable current | 85 A |

23545259/EN – 05/2020

## 5.5 System power and system-related power reduction

### 5.5.1 Control calculation

You can determine the power that is available at different points under the most unfavorable conditions by performing a control calculation. The control calculation is based on the technical data.

$$Q_{tot} = (795 + 52 \times l_{tr\_tot})\,\mathrm{var} = (795 + 52 \times 60) = 3915\,\mathrm{var} \approx 3.92\,\mathrm{kvar}$$

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| | | | |
|---|---|---|---|
| $Q_{tot}$ | = | Track-dependent reactive power of the system | $[Q_{\_tot}]$ = var |
| $l_{tr\_tot}$ | = | Total length of the transmission path | $[l_{tr\_tot}]$ = m |

$$P_{2\_TPS} = \sqrt{{P_{N\_TPS}}^2 - {Q_{tot}}^2} = \sqrt{16^2 - 3.92^2}\ kW == 15.51\ kW$$

25474337163

| | | | |
|---|---|---|---|
| $P_{2\_TPS}$ | = | Effective power of the system | $[P_{2\_TPS}]$ = kW |
| $P_{N\_TPS}$ | = | Rated power of the MOVITRANS® TPS stationary converter | $[P_{N\_TPS}]$ = kW |
| $Q_{tot}$ | = | Track-dependent reactive power of the system | $[Q_{tot}]$ = kvar |

If you add all the possible causes for incorrect track compensation, a reactive power of 3.92 kvar results.

As you can see from the control calculation, the system provides the required acceleration power despite the incorrect compensation:

$$P_{TLS\_loss} = [l_{tr\_tot} \times (P_{loss} + P_{ind\_loss}) + (x_1 + 2 \times x_2) \times P_{loss}]\ W$$
$$= [60 \times (25 + 12) + (10 + 2 \times 2) \times 25]\ W = 2570\ W = 2.57\ kW$$

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| | | | |
|---|---|---|---|
| $P_{TLS\_loss}$ | = | Power loss of the TLS line cable | $[P_{TLS\_loss}]$ = W |
| $l_{tr\_tot}$ | = | Total length of the transmission path | $[l_{tr\_tot}]$ = m |
| $P_{loss}$ | = | Power loss of the cable per track meter, see section "Ohmic losses" (→ 🗎 127). | $[P_{loss}]$ = W $m^{-1}$ |
| $P_{ind\_loss}$ | = | Power loss of the cable per track meter due to induction, see section "losses due to eddy currents" (→ 🗎 128). | $[P_{ind\_loss}]$ = W $m^{-1}$ |
| $x_1$ | = | Distance supply unit/transmission path | $[x_1]$ m |
| $x_2$ | = | Distance TCS compensation box/transmission path | $[x_2]$ m |

$$P_{2\_TLS} = (P_{2\_TPS} - P_{TLS\_loss} - P_{TAS\_loss})\ kW = (15.51 - 2.57 - 0.2)\ kW = 12.74\ kW$$

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| | | | |
|---|---|---|---|
| $P_{2\_TLS}$ | = | Transmission power of the TLS line cable | $[P_{2\_TLS}]$ = kW |
| $P_{2\_TPS}$ | = | Effective power of the system | $[P_{2\_TPS}]$ = kW |
| $P_{TLS\_loss}$ | = | Power loss of the TLS line cable | $[P_{TLS\_loss}]$ = kW |
| $P_{TAS\_loss}$ | = | Power loss of the TAS transformer module, see section "TAS transformer module" (→ 🗎 127). | $[P_{TAS\_loss}]$ = kW |

$$P_{1\_TPM} = [P_{2\_TLS} - (4 \times P_{pickup\_loss}) - (2 \times P_{TPM\_loss})]\ W$$
$$= [12740 - (4 \times 60) - (2 \times 120)]\ W = 12260\ W = 12.26\ kW$$

*25474498187*

| | | | |
|---|---|---|---|
| $P_{1\_TPM}$ | = | Available power in the TPM mobile converter | $[P_{1\_TPM}]$ = W |
| $P_{2\_TLS}$ | = | Transmission power of the TLS line cable | $[P_{2\_TLS}]$ = W |
| $P_{pickup\_loss}$ | = | Power loss of the pick-up, see section "THM pick-ups" (→ 🗎 127). | $[P_{pickup\_loss}]$ = W |
| $P_{TPM\_loss}$ | = | Power loss of the TPM mobile converter, see section "Mobile converter" (→ 🗎 129). | $[P_{TPM\_loss}]$ = W |

The available power in the mobile converter $P_{1\_TPM}$ is higher than twice the maximum (electrical) power for the acceleration phase of the vehicle:

2 × $P_{veh1\_tot}$ = 3.94 kW

Consequently, the available power is sufficient.

Operation with extreme incorrect compensation is not recommended because of the excessive heat that the stationary converter would be subject to and also due to the fact that it is uneconomical as it uses energy unnecessarily.

## INFORMATION

Check the compensation annually with the "MOVITOOLS® MotionStudio MOVITRANS® parameter tree". This prevents excessive incorrect compensation.

## 5.6 Component selection

### 5.6.1 Mobile components

With a maximum electrical power consumption of $P_{veh1\_tot}$ = 1.97 kW per conveyor trolley, the following MOVITRANS® components are required for one conveyor trolley:

| Quantity | Component | Description | Type designation |
|---|---|---|---|
| 2 | THM10E pick-up | Flat pick-up<br>with 1.5 kW | THM10E 015-010-000-1 |
| 1 | TPM12B mobile converter | Mobile converter for flat<br>Pick-ups | TPM12B 030-ENE-5A2-1 |
| 1 | Connection cable<br>TPM12B mobile converter | Hybrid cable with Phoenix T1 plug connector - open at one end with conductor end sleeves (part number 11715073) | – |

### 5.6.2 Stationary components

The following stationary MOVITRANS® components are required for the conveyor trolleys to design the supply and the track:

| Quantity | Component | Description | Type designation |
|---|---|---|---|
| 1 | TPS10A stationary converter | Built-in device, IP20, 16 kW<br>Connection AC 380 – 500 V +/-10% | TPS10A160-NF0-503-1 |
| 1 | NF053 line filter (TPS10A accessories) | Built-in device, IP20, 35 A,<br>used for TPS10A160 | NF035-503 |
| 1 | TAS10A transformer module | Built-in device, IP20, 16 kW<br>incl. gyrator, transformer, without<br>Compensation capacitors | TAS10A160-N08-4x1-1 |
| 1 set | TCS compensation capacitors<br>(TAS10A accessories) | 60 A or 85 A<br>Complete set of compensation capacitors for installation in TAS10A | TCS10A-008-xxx-0 |
| 148 m | TLS10E line cable | Floor routing,<br>Cable cross section of 25 $mm^2$ | TLS10E025-01-1 |
| 2 | TCS compensation boxes | 60 A or 85 A<br>Capacitive reactance at 25 kHz = 5.3 Ω | TCS10B-E08-120-1 |

23545259/EN – 05/2020

## 5.7 Alternative project planning example

If the ramp time of the travel drive can be prolonged (the acceleration is reduced), the maximum peak power of the conveyor trolley drops below 1.8 kW.

The MOVITRANS® system offers significant saving potentials with an acceleration of $a = 0.45\ m/s^2$ instead of $0.5\ m/s^2$ (previous project planning example).

The maximum (electrical) power consumption per vehicle is $P_{veh1\_tot}$ = 1.73 kW with $a = 0.45\ m/s^2$. With 2 pick-ups and a line cable current of 60 A, the MOVITRANS® system provides 1.8 kW. A line cable current of 60 A can be used.

The reduction of the line cable current to 60 A results in improved values for the system-related power reduction and the line cable losses. Further, only one TCS compensation box is required as opposed to the 85 A system that requires 2 TCS compensation boxes.

The system-related power reduction of the 60 A MOVITRANS® system is:

$$Q_{tot} = (400 + 26 \times l_{tr\_tot})\,\text{var} = (400 + 26 \times 60)\,\text{var} = 1960\ \text{var} = 1.96\ \text{kvar}$$

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| | | | |
|---|---|---|---|
| $Q_{tot}$ | = | Track-dependent reactive power of the system | $[Q_{\_tot}]$ = var |
| $l_{tr\_tot}$ | = | Total length of the transmission path | $[l_{tr\_tot}]$ = m |

The following continuous and peak power values result from a 4 kW supply (calculated with 1.5-fold overload):

$$P_{2\_TPS} = \sqrt{P_{N\_TPS}^2 - Q_{tot}^2}\ kW = \sqrt{4^2 - 1.96^2}\ kW = 3.48\ kW$$
$$P_{2\_TPS\_pk} = \sqrt{(1.5 \times P_{N\_TPS})^2 - Q_{tot}^2}\ kW = \sqrt{(1.5 \times 4)^2 - 1.96^2}\ kW = 5.67\ kW$$

25475458955

| | | | |
|---|---|---|---|
| $P_{2\_TPS}$ | = | Effective power of the system | $[P_{2\_TPS}]$ = kW |
| $P_{N\_TPS}$ | = | Rated power of the MOVITRANS® TPS stationary converter | $[P_{N\_TPS}]$ = kW |
| $Q_{tot}$ | = | Track-dependent reactive power of the system | $[Q_{tot}]$ = kvar |
| $P_{2\_TPS\_pk}$ | = | Electrical peak power of the system | $[P_{2\_TPS\_pk}]$ = kW |

The line cable losses for a 60 A line cable current are also lower than in a 85 A system:

$$P_{TLS\_loss} = [l_{tr\_tot} \times (P_{loss} + P_{ind\_loss}) + (x_1 + x_2) \times P_{loss}]\ W$$
$$= [60 \times (13 + 6) + (10 + 2) \times 13]\ W = 1296\ W = 1.3\ kW$$

25482147723

| | | | |
|---|---|---|---|
| $P_{TLS\_loss}$ | = | Power loss of the TLS line cable | $[P_{TLS\_loss}]$ = W |
| $l_{tr\_tot}$ | = | Total length of the transmission path | $[l_{tr\_tot}]$ = m |
| $P_{loss}$ | = | Power loss of the cable per track meter, see section "Ohmic losses" (→ 🗎 127). | $[P_{loss}]$ = W $m^{-1}$ |
| $P_{ind\_loss}$ | = | Power loss of the cable per track meter due to induction, see section "losses due to eddy currents" (→ 🗎 128). | $[P_{ind\_loss}]$ = W $m^{-1}$ |
| $x_1$ | = | Distance supply unit/transmission path | $[x_1]$ = m |
| $x_2$ | = | Distance TCS compensation box/transmission path | $[x_2]$ = m |

The following continuous power or peak power can be transmitted:

$$P_{2\_TLS} = (P_{2\_TPS} - P_{TLS\_loss} - P_{TAS\_loss})\ kW$$
$$= (3.48 - 1.3 - 0.05)\ kW = 2.13\ kW$$

$$P_{2\_TLS\_pk} = (P_{2\_TPS\_pk} - P_{TLS\_loss} - P_{TAS\_loss}]\ kW$$
$$= (5.67 - 1.3 - 0.05)\ kW = 4.32\ kW$$

25477088523

| | | | |
|---|---|---|---|
| $P_{2\_TLS}$ | = | Transmission power of the TLS line cable | $[P_{2\_TLS}]$ = kW |
| $P_{2\_TLS\_pk}$ | = | Peak power of the TLS line cable | $[P_{2\_TLS\_pk}]$ = kW |
| $P_{2\_TPS}$ | = | Effective power of the system | $[P_{2\_TPS}]$ = kW |
| $P_{TLS\_loss}$ | = | Power loss of the TLS line cable | $[P_{TLS\_loss}]$ = kW |
| $P_{TAS\_loss}$ | = | Power loss of the TAS transformer module, see section "TAS transformer module" (→ 🗎 127). | $[P_{TAS\_loss}]$ = kW |

The following power is provided to both vehicles at the output of the mobile MOVITRANS® components in total:

$$P_{2\_veh\_pk} = [P_{2\_TLS\_pk} - (4 \times P_{pickup\_loss}) - (2 \times P_{TPM\_loss})]\ W$$
$$= [4320 - (4 \times 60) - (2 \times 60)]\ W = 3960\ W = 3.96\ kW$$

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| | | | |
|---|---|---|---|
| $P_{2\_veh\_pk}$ | = | Electrical peak power that is available for the vehicles on the transmission path | $[P_{2\_veh\_pk}]$ = W |
| $P_{2\_TLS\_pk}$ | = | Peak power of the TLS line cable | $[P_{2\_TLS\_pk}]$ = W |
| $P_{pickup\_loss}$ | = | Power loss of the pick-up, see section "THM pick-ups" (→ 🗎 127). | $[P_{pickup\_loss}]$ = W |
| $P_{TPM\_loss}$ | = | Power loss of the TPM mobile converter, see section "Mobile converter" (→ 🗎 129). | $[P_{TPM\_loss}]$ = W |

Thus, the electrical peak power $P_{2\_veh\_pk}$ is greater than twice the maximum (electrical) power for the acceleration phase of the vehicle 2 × $P_{veh1\_tot}$ = 2 × 1.73 kW = 3.46 kW.

The calculation shows that both vehicles can accelerate simultaneously.

$$P_{2\_veh} = [P_{2\_TLS} - (4 \times P_{pickup\_loss}) - (2 \times P_{TPM\_loss})]\ W$$
$$= [2130 - (4 \times 60) - (2 \times 60)]\ W = 1770\ W = 1.77\ kW$$

25477097227

| | | | |
|---|---|---|---|
| $P_{2\_veh}$ | = | Electrical effective power that is available for the vehicles on the transmission path | $[P_{veh}]$ = W |
| $P_{2\_TLS}$ | = | Power of the TLS line cable | $[P_{2\_TLS}]$ = W |
| $P_{pickup\_loss}$ | = | Power loss of the pick-up, see section "THM pick-ups" (→ 🗎 127). | $[P_{pickup\_loss}]$ = W |
| $P_{TPM\_loss}$ | = | Power loss of the TPM mobile converter, see section "Mobile converter" (→ 🗎 129). | $[P_{TPM\_loss}]$ = W |

Thus, the electrical effective power $P_{2\_veh}$ is greater than twice the static (electrical) power for constant travel of the vehicle 2 × $P_{veh2\_tot}$ = 2 × 0.46 kW = 0.92 kW.

Thus, the continuous power of both vehicles is also below the transmission power of the MOVITRANS® system.

The mobile MOVITRANS® components in the alternative example are the same ones as in the first example.

The stationary MOVITRANS® components, however, change significantly:

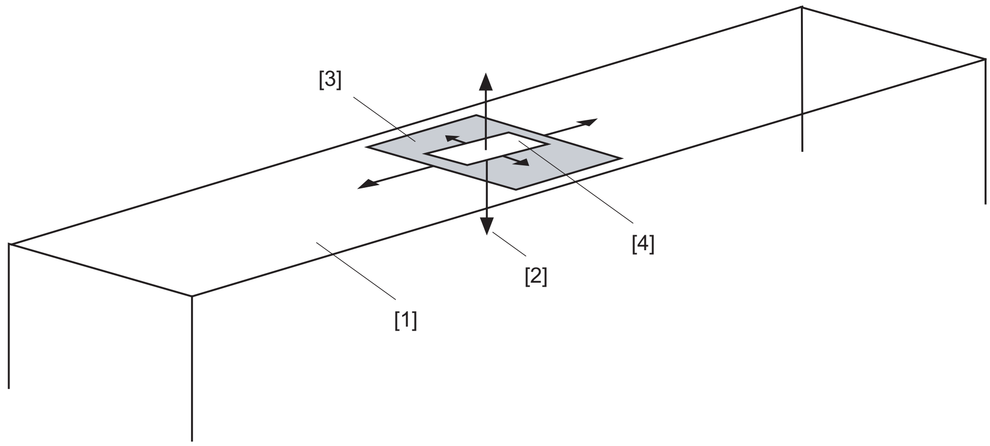
| Quantity | Component | Description | Type designation |
|---|---|---|---|
| 1 | TPS10A stationary converter | Built-in device, IP20, 4 kW<br>Connection AC 380 – 500 V +/-10% | TPS10A040-NF0-503-1 |
| 1 | NF014 line filter<br>(TPS10A accessories) | built-in unit, IP20, 14 A, used for TPS10A040 | NF014-503 |
| 1 | TAS10A transformer module | Built-in device, IP20, 4 kW<br>incl. gyrator, transformer, without<br>Compensation capacitors | TAS10A040-N06-4x1-1 |
| 1 set | TCS compensation capacitors<br>(TAS10A accessories) | 60 A or 85 A<br>Complete set of compensation capacitors for installation in TAS10A | TCS10A-008-XXX-0 |
| 148 m | TLS10E line cable | Floor routing, cable cross section of 25 $mm^2$ | TLS10E025-01-1 |
| 1 | TCS compensation boxes | 60 A capacitive reactance at 25 kHz = 7.1 Ω | TCS10B-E06-090-1 |

# 6 Project planning example for U-shaped THM10C pick-ups

This section describes the project planning using a 3-axis portal as an example. The components with U-shaped THM10C pick-ups are selected on the basis of the sample system.

## 6.1 Technical data

Project planning is to be performed for a 3-axis portal that performs, for example, material handling functions in a production process. The 3-axis portal consists of a hoist, a vehicle for lengthwise motion and a trolley for crosswise motion. The following figure shows the design of the sample system.




369514123

[1] Slide rail for crane bridge
[2] Hoist
[3] Vehicle for moving lengthwise
[4] Trolley for moving crosswise

The MOVITRANS® energy transfer is only provided to the vehicle that contains the entire mobile electronics. Due to the short track, the motor cables for the trolley and the hoist are designed as trailing cable.

The following data is known for project planning:

| | |
|---|---|
| Number of vehicles | 1 (with trolley and hoist) |
| Movement of the axes | • Lengthwise and crosswise motion can be performed simultaneously.<br>• The hoist never moves simultaneously with travel drives. |
| Track length, lengthwise motion | 24 m |
| Track length, crosswise motion | 3 m (trailing cable) |
| Distance track/control cabinet | 5 m |
| Frequency inverter | MOVIDRIVE® B, control of the brakes via BST brake rectifier |
| Gear unit efficiency | 94% |
| Communication | PROFINET data light barrier (DC 24 V/800 mA) |

23545259/EN – 05/2020

## 6.2 Project planning for the vehicles

In order to be able to select the components for the MOVITRANS® system, it is necessary to determine the peak power of the vehicle as exactly as possible.

### INFORMATION

If an exact calculation is not possible, schedule a power reserve.

### 6.2.1 Configuring the hoist

The hoist has the following technical characteristics:

| | |
|---|---|
| Hoist mass (maximum value) m | 530 kg |
| Speed V | 0.35 m s-$^{1}$ |
| Acceleration a | 0.5 m s$^{-2}$ |

The following formulas are used to determine the motor and the electrical peak power:

$$P_{veh1} = \frac{m \times (g + a) \times V}{\eta_G} = \frac{530 \times (9.81 + 0.5) \times 0.35}{0.94} W = 2034\ W \approx 2.03\ kW$$

$$P_{veh2} = \frac{m \times g \times V}{\eta_G} = \frac{530 \times 9.81 \times 0.35}{0.94} W = 1935\ W \approx 1.94\ kW$$

*25485368971*

| | | | |
|---|---|---|---|
| $P_{veh1}$ | = | Required dynamic (mechanical) power for acceleration | $[P_{veh1}]$ = W |
| $P_{veh2}$ | = | Required static (mechanical) power for constant travel | $[P_{veh2}]$ = W |
| m | = | Hoist mass | [m] = kg |
| g | = | Gravitational acceleration | [g] = m s$^{-2}$ |
| a | = | Acceleration | [a] = m s$^{-2}$ |
| V | = | Speed | [V] = m s$^{-1}$ |
| $\eta_G$ | = | Efficiency of the gear unit | $[\eta_G]$ = 1 |

For example, you can use the following motor and frequency inverter based on the calculated power.

- DRN100LS4/BE5 AC motor
- MOVIDRIVE® MDX61B0022-5A3-4-00 frequency inverter

23545259/EN – 05/2020

The required electrical power can be estimated using the consumed power of the frequency inverter at the 400 V supply system. The line current $I_{line}$ of the frequency inverter with a line voltage $U_{line}$ of 3 × AC 400 V is 5 A, see MOVIDRIVE® MDX60B/61B system manual.

$$P_{veh1\_\eta} = \sqrt{3} \times U_{line} \times I_{line} \times \frac{P_{veh1}}{P_N} = \sqrt{3} \times 400 \times 5 \times \frac{2.03}{2.2} W = 3196\,W \approx 3.2\,kW$$

$$P_{veh2\_\eta} = \sqrt{3} \times U_{line} \times I_{line} \times \frac{P_{veh2}}{P_N} = \sqrt{3} \times 400 \times 5 \times \frac{1.94}{2.2} W = 3054\,W \approx 3.05\,kW$$

*25485372811*

| | | | |
|---|---|---|---|
| $P_{veh1\_\eta}$ | = | Required dynamic (electrical) power for acceleration | $[P_{veh1\_\eta}]$ = kW |
| $P_{veh2\_\eta}$ | = | Required static (electrical) power for constant travel | $[P_{veh2\_\eta}]$ = kW |
| $P_{veh1}$ | = | Required dynamic (mechanical) power for acceleration | $[P_{veh1}]$ = W |
| $P_{veh2}$ | = | Required static (mechanical) power for constant travel | $[P_{veh2}]$ = W |
| $P_N$ | = | Rated power of the frequency inverter | $[P_N]$ = W |
| $U_{line}$ | = | Line voltage of the frequency inverter | $[U_{line}]$ = V |
| $I_{line}$ | = | Line current of the frequency inverter | $[I_{line}]$ = A |

23545259/EN – 05/2020

### 6.2.2 Configuring the drive for crosswise motion (trolley)

The drive for crosswise motion (trolley) has the following technical characteristics:

| | |
|---|---|
| Mass (maximum value) m | 1 t |
| Speed V | 0.6 m $s^{-1}$ |
| Acceleration a | 0.4 m $s^{-2}$ |
| Resistance to vehicle motion $F_{tr}$ | 150 N $t^{-1}$ |

The following formulas are used to determine the motor and the electrical peak power:

$$F_{dyn} = m \times F_{tr} = (1 \times 150)\ N = 150\ N$$

$$P_{veh2} = F_{dyn} \times V = (150 \times 0.6)\ \mathrm{W} = 90\ \mathrm{W}$$

$$P_{veh1} = m \times a \times V = (1000 \times 0.4 \times 0.6)\ \mathrm{W} = 240\ \mathrm{W}$$

25485376651

| | | | |
|---|---|---|---|
| $F_{dyn}$ | = | Force applied by the motor to move the drive. | $[F_{dyn}]$ = N |
| m | = | Mass of drive for crosswise motion | [m] = t |
| $F_{tr}$ | = | Force of resistance to vehicle motion | $[F_{tr}]$ = N $t^{-1}$ |
| $P_{veh2}$ | = | Required static (mechanical) power for constant travel | $[P_{veh2}]$ = W |
| V | = | Speed | [V] = m $s^{-1}$ |
| $P_{veh1}$ | = | Required dynamic (mechanical) power for acceleration | $[P_{veh1}]$ = W |
| a | = | Acceleration | [a] = m $s^{-2}$ |

For example, you can use the following motor and frequency inverter based on the calculated power.

- DRN71M4/BE05 AC motor
- MOVIDRIVE® MDX61B00005-5A3-4-00 frequency inverter

The required electrical power can be estimated using the consumed power of the frequency inverter at the 400 V supply system. The line current $I_{line}$ of the frequency inverter with a line voltage $U_{line}$ of 3 × AC 400 V is 1.8 A, see MOVIDRIVE® MDX60B/61B system manual. Due to the short travel distance of the drive for crosswise motion, it is sufficient to consider the maximum power.

$$P_{veh1\_\eta} = \sqrt{3} \times \frac{U_{line} \times I_{line}}{P_N} \times \frac{(P_{veh1} + P_{veh2})}{\eta_G} = \sqrt{3} \times \frac{400 \times 1.8}{550} \times \frac{(240 + 90)}{0.94}\ W = 796\ W$$

25485380235

| | | | |
|---|---|---|---|
| $P_{veh1\_\eta}$ | = | Required dynamic (electrical) power for acceleration | $[P_{veh1\_\eta}]$ = W |
| $P_{veh1}$ | = | Required dynamic (mechanical) power for acceleration | $[P_{veh1}]$ = W |
| $P_{veh2}$ | = | Required static (mechanical) power for constant travel | $[P_{veh2}]$ = W |
| $\eta_G$ | | Efficiency of the gear unit | $[\eta_G]$ = 1 |
| $U_{line}$ | = | Line voltage of the frequency inverter | $[U_{line}]$ = V |
| $I_{line}$ | = | Line current of the frequency inverter | $[I_{line}]$ = A |
| $P_N$ | = | Rated power of the frequency inverter | $[P_N]$ = W |

23545259/EN – 05/2020

### 6.2.3 Configuring the drive for lengthwise motion

The drive for lengthwise motion (trolley) has the following technical characteristics:

| | |
|---|---|
| Mass (maximum value) m | 1.5 t |
| Speed V | 0.6 m $s^{-1}$ |
| Acceleration a | 0.4 m $s^{-2}$ |
| Resistance to vehicle motion $F_{tr}$ | 150 N $t^{-1}$ |

The following formulas are used to determine the motor and the electrical peak power:

$$F_{dyn} = m \times F_{tr} = (1.5 \times 150)\ N = 225\ N$$

$$P_{veh2} = F_{dyn} \times V = (225 \times 0.6)\ \mathrm{W} = 135\ \mathrm{W}$$

$$P_{veh1} = m \times a \times V = (1500 \times 0.4 \times 0.6)\ \mathrm{W} = 360\ \mathrm{W}$$

25485422219

| | | | |
|---|---|---|---|
| $F_{dyn}$ | = | Force applied by the motor to move the chassis. | $[F_{dyn}]$ = N |
| m | = | Mass of drive for lengthwise motion | [m] = t |
| $F_{tr}$ | = | Force of resistance to vehicle motion | $[F_{tr}]$ = N $t^{-1}$ |
| $P_{veh2}$ | = | Required static (mechanical) power for constant travel | $[P_{veh2}]$ = W |
| V | = | Speed | [V] = m $s^{-1}$ |
| $P_{veh1}$ | = | Required dynamic (mechanical) power for acceleration | $[P_{veh1}]$ = W |
| a | = | Acceleration | [a] = m $s^{-2}$ |

For example, you can use the following motor and frequency inverter based on the calculated power.

- DRN80MK4/BE1 AC motor
- MOVIDRIVE® MDX61B00005-5A3-4-00 frequency inverter

The required electrical power can be estimated using the consumed power of the frequency inverter at the 400 V supply system. The line current $I_{line}$ of the frequency inverter with a line voltage $U_{line}$ of 3 × AC 400 V is 1.8 A, see MOVIDRIVE® MDX60B/61B system manual.

Due to the short travel distance of the drive for lengthwise motion, it is sufficient to consider the maximum power.

$$P_{veh1\_\eta} = \sqrt{3} \times \frac{U_{line} \times I_{line}}{P_N} \times \frac{(P_{veh1} + P_{veh2})}{\eta_G} = \sqrt{3} \times \frac{400 \times 1.8}{550} \times \frac{(135 + 360)}{0.94}\ W = 1194\ W \approx 1.19\ kW$$

25485425803

| | | | |
|---|---|---|---|
| $P_{veh1\_\eta}$ | = | Required dynamic (electrical) power for acceleration | $[P_{veh1\_\eta}]$ = W |
| $P_{veh1}$ | = | Required dynamic (mechanical) power for acceleration | $[P_{veh1}]$ = W |
| $P_{veh2}$ | = | Required static (mechanical) power for constant travel | $[P_{veh2}]$ = W |
| $\eta_G$ | | Efficiency of the gear unit | $[\eta_G]$ = 1 |
| $U_{line}$ | = | Line voltage of the frequency inverter | $[U_{line}]$ = V |
| $I_{line}$ | = | Line current of the frequency inverter | $[I_{line}]$ = A |
| $P_N$ | = | Rated power of the frequency inverter | $[P_N]$ = W |

23545259/EN – 05/2020

### 6.2.4 Current demand at the DC 24 V level

When calculating the power on the 24 V level, you must consider the following components:

| | **Current consumption** |
|---|---|
| Sensor technology | 0.5 A |
| Communication | 0.8 A |
| Other/reserve | 0.4 A |
| **Total current demand** | **1.7 A** |
| **Total power demand at the DC 24 V level** | **41 W ≈ 0.04 kW** |

### 6.2.5 Resulting vehicle power

The peak power of the vehicle is determined by the hoist drive. Reason: The total power for lengthwise and crosswise motion of approx. 2 kW is significantly lower than the peak motor power of the hoist.

The peak power demand for the vehicle is calculated as follows:

| | |
|---|---|
| Dynamic (electrical) power, hoist $P_{veh1\_\eta}$ | 3.2 kW |
| Power, DC 24 V level | 0.04 kW |
| Power for brake and BST brake rectifier | 0.08 kW[1)] |
| **Dynamic power demand in total**<br>$P_{veh1\_tot}$ = Maximum (electrical) power to be consumed by the vehicle for operation via MOVITRANS®. | **3.32 kW** |

The static power demand is calculated as follows:

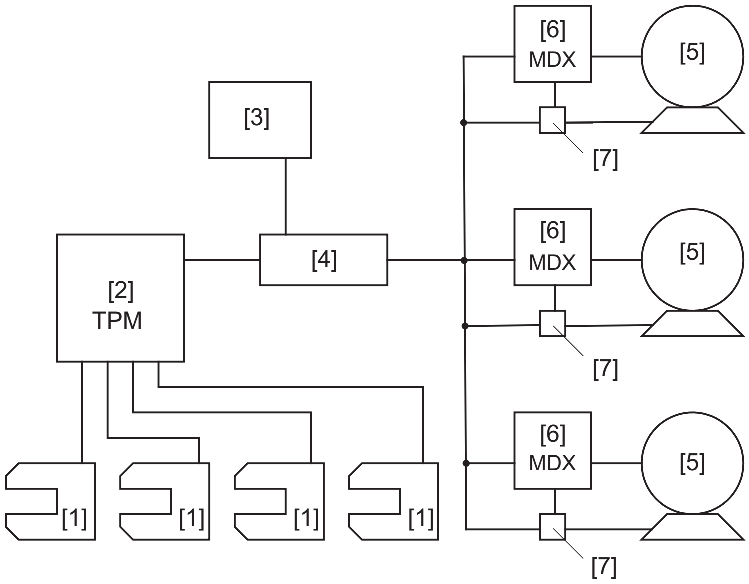
| | |
|---|---|
| Static (electrical) power, hoist $P_{veh2\_\eta}$ | 3.05 kW |
| Power, DC 24 V level | 0.04 kW |
| Power for brake and BST brake rectifier | 0.08 kW[1)] |
| **Static power demand in total**<br>$P_{veh2\_tot}$ = Static (electrical) power to be consumed by the vehicle for constant travel via MOVITRANS®. | **3.17 kW** |

1) For the power losses of the brakes and the BST brake rectifiers, refer to the respective operating instructions and catalog.

23545259/EN – 05/2020

### 6.2.6 Vehicle structure

The following illustration is an example of the schematic structure of the vehicle:

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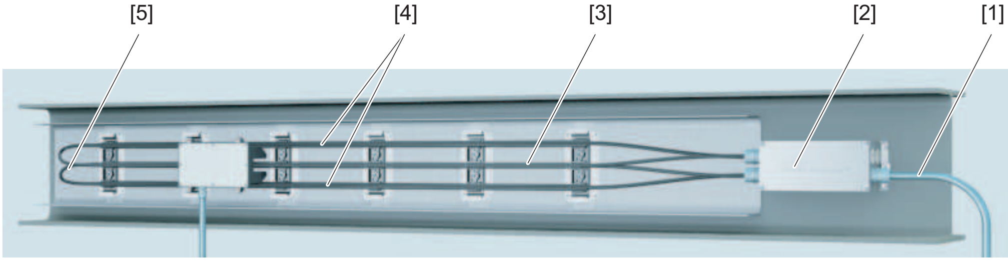
[1] MOVITRANS® THM10C pick-ups
[2] MOVITRANS® TPM mobile converter
[3] Communication
[4] Distributor
[5] Motor
[6] MOVIDRIVE® MDX60B/61B
[7] BST brake rectifiers

## 6.3 Project planning for the track

The track length is unproblematic for this sample project. You can operate the track without any intermediate compensation. In order to provide the power supply, the TLS supply cable and the TVS connection distributor are connected at one end of the track. Another TVS connection distributor may be installed at the other end of the track in order to connect supply and return cable. Alternatively, the TLS line cable can be routed in loops.




369639051

[1] MOVITRANS® TLS supply cable
[2] MOVITRANS® TVS connection distributor
[3] MOVITRANS® TLS line cable (supply cable)
[4] MOVITRANS® TLS line cable (return cable)
[5] Loops

23545259/EN – 05/2020

The TLS line cable (8 mm² cross section) is dual-routed and connected in parallel on the transmission path. Therefore, the length of the TLS line cable to be ordered is at least 4 times the track length plus a reserve for connections. You require at least 4 x 24 m + 2 m = 98 m TLS10E008-01-1 line cable and at least 5 m TLS10E006-06-1 supply cable for the application. Allow for some reserve when planning the length of the line cable and the supply cable.

Only TIS...-P.. rigid profile sections are used for straight track sections. TIS...-P74 profile sections with a height of 74 mm are required for the supply cable. The return cables are routed separately in profile sections, above and underneath the supply cable. TIS...-P33 profile sections with a height of 33 mm are required for the return cables. The number of required profile sections can be determined as follows:

$$n_{TISP\_fl} = \frac{l_{str\_tot}}{l_{TISP}} = \frac{l_{str\_tot}}{3} = \frac{24}{3} = 8$$

$$n_{TISP\_bl} = 2 \times n_{TISP\_fl} = 2 \times 8 = 16$$

25485450891

| | | | |
|---|---|---|---|
| $n_{TISP\_fl}$ | = | Number of rigid TIS...-P.. profile sections for the supply cable | |
| $l_{str\_tot}$ | = | Total length of all track sections | $[l_{str\_tot}]$ = m |
| $l_{TISP}$ | = | Length of the rigid TIS...-P.. profile sections (3 m) | $[l_{TISP}]$ = m |
| $n_{TISP\_bl}$ | = | Number of rigid TIS...-P.. profile sections for the return cable | |

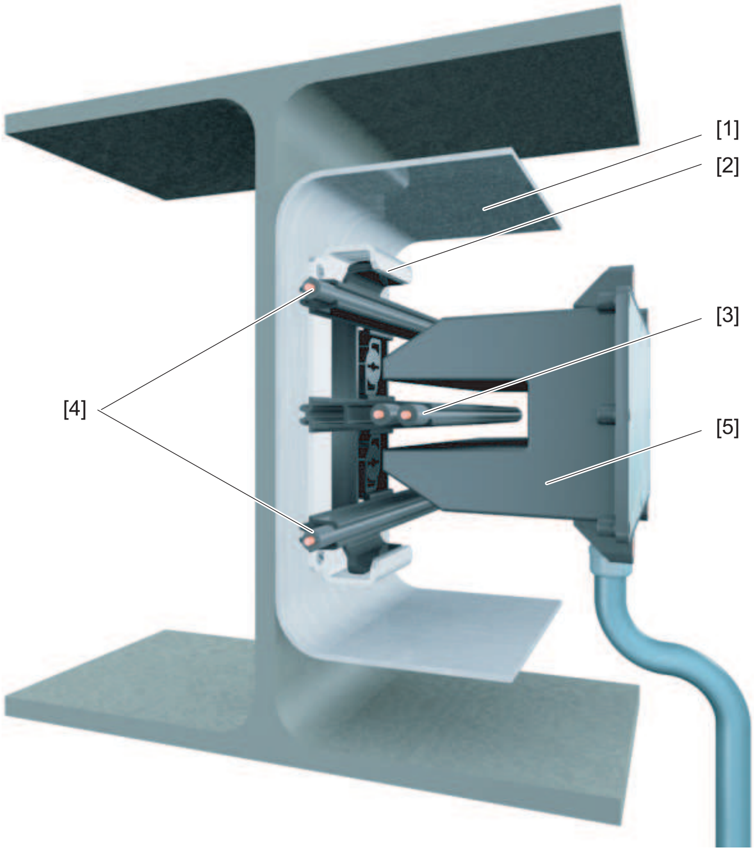
You need 7 holding fixtures (TIS...-H02-.) and 7 retaining plates (TIS...-XH2-.) to fasten each profile section (TIS...-P74-. or TIS...-P33-.). A small expansion gap of approx. 5 mm should remain between the profile sections along the track.

You need 7 × 8 = 56 holding fixtures and as many retaining plates.

If the profile section system is mounted on steel, you must provide for an aluminum shielding plate. The shielding plate is not included in the scope of delivery. Also see section "Shielding plate" (→ 🗎 124).

23545259/EN – 05/2020

The following figure shows the profile section system mounted on steel with a shielding plate:




*369643915*

[1] Shielding plate
[2] MOVITRANS® TIS holding fixture and TIS universal retaining plate
[3] MOVITRANS® TIS profile section for supply cable (74 mm)
[4] MOVITRANS® TIS profile section for return cable (33 mm)
[5] MOVITRANS® THM10C pick-up

## 6.4 Project planning for the power supply

Due to the small dimensions of the track, only one emergency off circuit is configured for the entire track. The MOVITRANS® supply unit must be dimensioned so that there is always sufficient power available on the TLS line cable to ensure the operation of the system. The hoist requires the most energy.

The supply unit is selected so that at least the maximum travel power $P_{veh1\_tot}$ = 3.32 kW can be transmitted. This results in the following values:

| | |
|---|---|
| Supply power | 4 kW |
| TPS10A stationary converter | Size 2 |
| TAS10A transformer module | Size 2 |
| Line cable current | 60 A |

## 6.5 System power and system-related power reduction

You can determine the power that is available at different points under the most unfavorable conditions by performing a control calculation. The control calculation is based on the technical data.

$$Q_{tot} = (400 + 16 \times l_{tr\_tot})\,\text{var} = (400 + 16 \times 24)\,\text{var} = 784\ \text{var} = 0.78\ \text{kvar}$$

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| | | | |
|---|---|---|---|
| $Q_{tot}$ | = | Track-dependent reactive power of the system | $[Q_{\_tot}]$ = var |
| $l_{tr\_tot}$ | = | Total length of the transmission path | $[l_{tr\_tot}]$ = m |

$$P_{2\_TPS} = \sqrt{P_{N\_TPS}^2 - Q_{tot}^2}\ kW = \sqrt{4^2 - 0.78^2}\ kW = 3.92\ kW$$

25485447051

| | | | |
|---|---|---|---|
| $P_{2\_TPS}$ | = | Effective power of the system | $[P_{2\_TPS}]$ = kW |
| $P_{N\_TPS}$ | = | Rated power of the MOVITRANS® TPS stationary converter | $[P_{N\_TPS}]$ = kW |
| $Q_{tot}$ | = | Track-dependent reactive power of the system | $[Q_{tot}]$ = kvar |

$$P_{2\_TPS\_pk} = \sqrt{(1.5 \times P_{N\_TPS})^2 - Q_{tot}^2}\ kW = \sqrt{(1.5 \times 4)^2 - 0.78^2}\ kW = 5.95\ kW$$

31904138635

| | | | |
|---|---|---|---|
| $P_{2\_TPS\_pk}$ | = | Electrical peak power of the system | $[P_{2\_TPS\_pk}]$ = kW |
| $P_{N\_TPS}$ | = | Rated power of the MOVITRANS® TPS stationary converter | $[P_{N\_TPS}]$ = kW |
| $Q_{tot}$ | = | Track-dependent reactive power of the system | $[Q_{tot}]$ = kvar |

The result shows that the system-related power reduction can be neglected during the configuration of this system.

$$P_{TLS\_loss} = [l_{tr\_tot} \times P_{loss} + x_1 \times P_{loss}]\ W = [24 \times 13 + 5 \times 15]\ W = 387\ W \approx 0.39\ kW$$

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| | | | |
|---|---|---|---|
| $P_{TLS\_loss}$ | = | Power loss of the TLS line cable | $[P_{TLS\_loss}]$ = W |
| $l_{tr\_tot}$ | = | Total length of the transmission path | $[l_{tr\_tot}]$ = m |
| $P_{loss}$ | = | Power loss of the cable per track meter, see section "Ohmic losses" (→ 127). | $[P_{loss}]$ = W $m^{-1}$ |
| $x_1$ | = | Distance supply unit/transmission path | $[x_1]$ m |

$$P_{2\_TLS} = (P_{2\_TPS} - P_{TLS\_loss} - P_{TAS\_loss})\ kW = (3.92 - 0.39 - 0.05)\ kW = 3.48\ kW$$

$$P_{2\_TLS\_pk} = (P_{2\_TPS\_pk} - P_{TLS\_loss} - P_{TAS\_loss})\ kW = (5.95 - 0.39 - 0.05)\ kW = 5.51\ kW$$

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| | | | |
|---|---|---|---|
| $P_{2\_TLS}$ | = | Transmission power of the TLS line cable | $[P_{2\_TLS}]$ = kW |
| $P_{2\_TLS\_pk}$ | = | Peak power of the TLS line cable | $[P_{2\_TLS\_pk}]$ = kW |
| $P_{2\_TPS}$ | = | Effective power of the system | $[P_{2\_TPS}]$ = kW |
| $P_{TLS\_loss}$ | = | Power loss of the line cable | $[P_{TLS\_loss}]$ = kW |
| $P_{TAS\_loss}$ | = | Power loss of the TAS line cable, see section "TAS transformer module" (→ 127). | $[P_{TAS\_loss}]$ = kW |
| $P_{2\_TPS\_pk}$ | = | Electrical peak power of the system | $[P_{2\_TPS\_pk}]$ = kW |

$$P_{2\_veh} = [P_{2\_TLS} - (4 \times P_{pickup\_loss}) - P_{TPM\_loss}]\ W$$
$$= [3480 - (4 \times 25) - 120]\ W = 3260\ W = 3.26\ kW$$
$$P_{2\_veh\_pk} = [P_{2\_TLS\_pk} - (4 \times P_{pickup\_loss}) - P_{TPM\_loss}]\ W$$
$$= [5510 - (4 \times 25) - 120]\ W = 5290\ W = 5.29\ kW$$

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| | | | |
|---|---|---|---|
| $P_{2\_veh}$ | = | Electrical effective power that is available for the vehicles on the transmission path | $[P_{veh}]$ = W |
| $P_{2\_veh\_pk}$ | = | Electrical peak power that is available for the vehicles on the transmission path | $[P_{veh\_pk}]$ = W |
| $P_{2\_TLS}$ | = | Transmission power of the TLS line cable | $[P_{2\_TLS}]$ = W |
| $P_{pickup\_loss}$ | = | Power loss of the pick-up, see section "THM pick-ups" (→ 🗎 127). | $[P_{pickup\_loss}]$ = W |
| $P_{TPM\_loss}$ | = | Power loss of the TPM mobile converter, see section "Mobile converter" (→ 🗎 129). | $[P_{TPM\_loss}]$ = W |
| $P_{2\_TLS\_pk}$ | = | Peak power of the TLS line cable | $[P_{2\_TLS\_pk}]$ = W |

The mobile maximum output power is limited to 4 x 0.9 kW = 3.6 kW in this case due to the nominal power of the pick-ups. The maximum output power of the TPM mobile converter is sufficient for the maximum travel power $P_{veh1\_tot}$ = 3.32 kW.

The continuous power of the mobile MOVITRANS® components with 4 x 0.8 kW = 3.2 kW is sufficient for the maximum static travel power $P_{veh2\_tot}$ = 3.17 kW.

## INFORMATION

Check the compensation annually with the "MOVITOOLS® MotionStudio MOVITRANS® parameter tree". This prevents excessive incorrect compensation.

23545259/EN – 05/2020

## 6.6 Component selection

### 6.6.1 Mobile components

The following mobile MOVITRANS® components are required with a maximum travel power of $P_{veh1\_tot}$ = 3.32 kW:

| Quantity | Component | Description | Type designation |
|---|---|---|---|
| 4 | THM10C pick-up | U-shaped pick-up with 0.8 kW | THM10C008-022-076-1 |
| 1 | TPM12B mobile converter | Mobile converter for 4 U-shaped pick-ups | TPM12B036-ENC-5A2-2 |
| 1 | Connection cable<br>TPM12B mobile converter | Hybrid cable with Phoenix T1 plug connector - open at one end with conductor end sleeves (part number 11715073) | – |

23545259/EN – 05/2020

### 6.6.2 Stationary components

The following stationary MOVITRANS® components are required for the 3 axes portal to design the supply and the track:

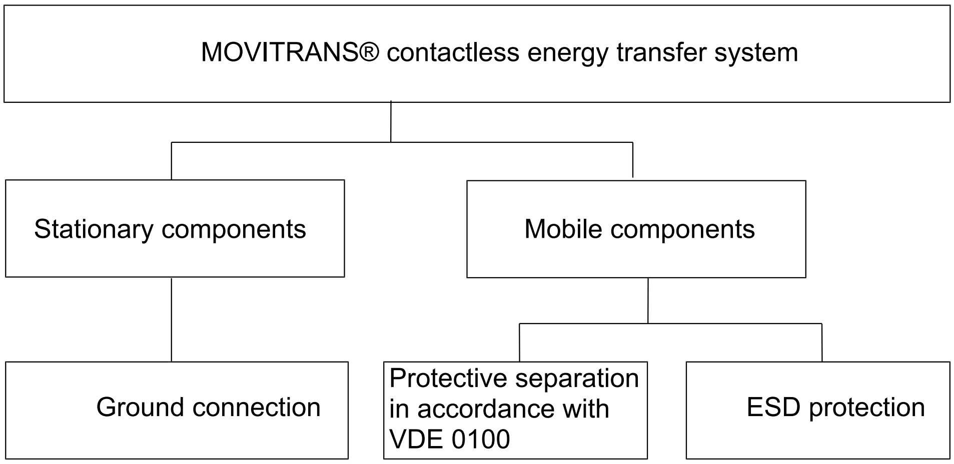
| Quantity | Component | Description | Type designation |
|---|---|---|---|
| 1 | NF014 line filter | Built-in device, IP20, 14 A, used for TPS10A040 | NF014-503 |
| 1 | TPS10A stationary converter | Built-in device, IP20, 4 kW<br>connection AC 380 - 500 V +/-10% | TPS10A040-NF0-503-1 |
| 1 | TAS10A transformer module | Built-in device, IP20, 4 kW<br>incl. gyrator, transformer, without<br>compensation capacitors | TAS10A040-N06-4x1-1 |
| 1 set | TCS Compensation capacitors for TAS10A | 60 A or 85 A<br>Complete set of compensation capacitors for installation in TAS10A | TCS10A-008-xxx-0 |
| 98 m<br>(at least) | TLS10E line cable | Routing in the profile section system,<br>cable cross section of 8 mm² | TLS10E008-01-1 |
| 5 m<br>(at least) | TLS10E supply cable | Supply cable, track for 60 A | TLS10E006-06-1 |
| 1 | TVS10B connection distributor | Connection distributor for 60 A | TVS10B-E06-000-1 |
| 8 | TIS10A installation material | Rigid profile section, installation dimension: 74 mm, length: 3 m, for a cable cross section of 8 mm² | TIS10A008-P74-0 |
| 16 | TIS10A installation material | Rigid profile section, installation dimension: 33 mm, length: 3 m, for a cable cross section of 8 mm² | TIS10A008-P33-0 |
| 56 | TIS10A installation material | Holding fixture for profile sections suitable for universal retaining plate, cable cross section of 8 mm² | TIS10A008-H02-0 |
| 56 | TIS10A installation material | Universal retaining plate for holding fixture TIS10A008-H02-0, cable cross section of 8 mm² | TIS10A008-XH2-0 |

23545259/EN – 05/2020

# 7 Preventive measures against electrical hazards

## 7.1 Overview

The following figure is an overview of the protective measures against electrical hazards:

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Never take the MOVITRANS® components into operation without fully operational protection devices.

- Have an electrically skilled person check if the components are in flawless condition and all protection devices are intact.
- Make sure that ineffective protection devices (e.g. housing, insulation, PE conductor) are immediately maintained by an electrically skilled person.
- Never operate the components without a complete check of the protection devices.
- Never disassemble or jumper the protection devices.

## 7.2 General information

Observe the according information in the operation instructions of the individual units. The following devices must be grounded or connected to an equipotential bonding:

**Stationary components:**

- TPS10A stationary converter
- TAS10A transformer module
- NF line filter

**Mobile components:**

- TPM12B mobile converter
- THM10E pick-up

Use the shortest possible low-impedance, HF compatible cables with the following minimum cross section:

| Supply cable cross section | Grounding cable cross section |
|---|---|
| < 10 $mm^2$ | ≥ 10 $mm^2$ |
| ≥ 10 $mm^2$ | ≥ Supply cable diameter |

The following stationary components are devices of protection class II and do not need to be grounded:

- TVS10B connection distributor
- TCS10B compensation box

## 7.3 Device connection points for grounding and equipotential bonding

The connection points for grounding or equipotential bonding are indicated on the devices by ⏚.

23545259/EN – 05/2020



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## 7.4 Stationary components

It is mandatory to ground the units for use in stationary applications.

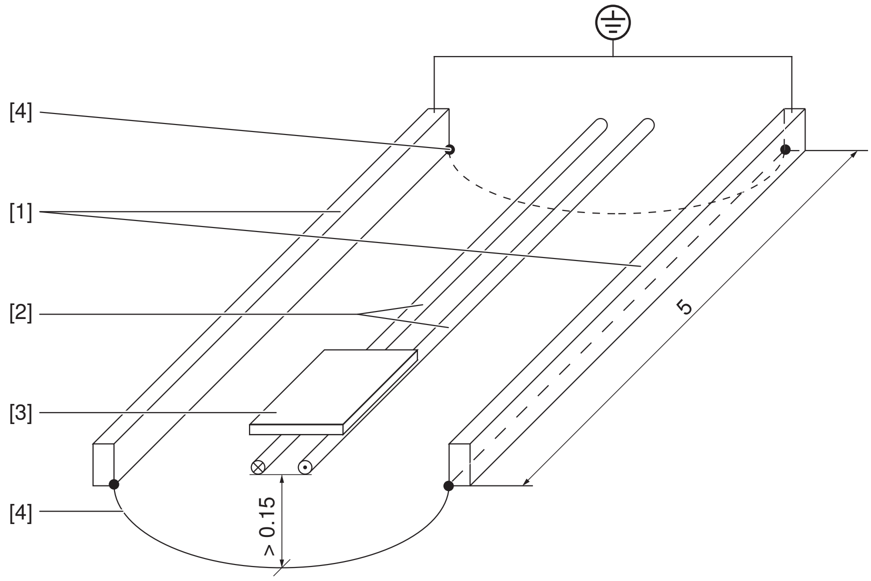
Comply with the following rules:

- Ground the unit using the shortest possible route.
- Use a green/yellow grounding cable.

### 7.4.1 Equipotential bonding for floor rails

For metallic floor rails, high-frequency equipotential bonding must be implemented between the rails at least at the start and end of the track. For long tracks, implement equipotential bonding at least every 5 m. Use a fine-wire cable with a cable cross section of at least 10 mm². Pay special attention to the distance between the equipotential bonding cable and the line cable.

The following illustration shows an example for equipotential bonding for metallic floor rails. All dimensions are specified in m:

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[1] Rails
[2] Line cable
[3] Pick-up
[4] Equipotential bonding

## 7.5 Mobile components

The following preventive measures protect mobile systems with MOVITRANS® contactless energy transfer against electrical hazards:

- Protective separation in accordance with VDE 0100
- ESD protection

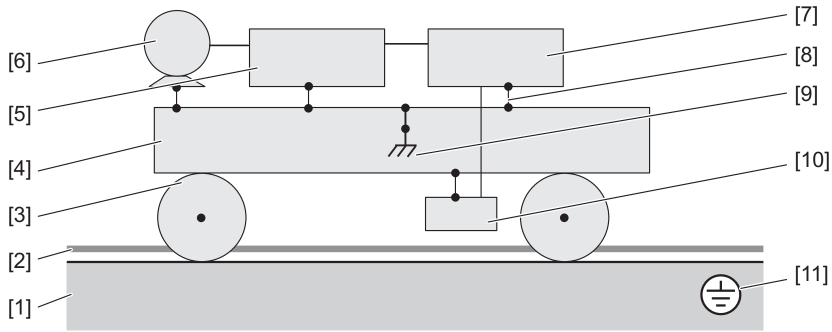
### 7.5.1 Protective separation in accordance with VDE 0100

Compliance with the preventive measure "protective separation" in line with VDE 0100 part 410 nominal voltage ≤ 500 V is ensured by the following measures:

All electrical operating resources on the mobile component, e.g. on a vehicle, must be connected to each other using equipotential bonding.

Use the vehicle support frame (vehicle mass) for the equipotential bonding. The color green-yellow is permitted for the identification of the equipotential bonding cable.

The following figure shows an example of a mobile system with contactless energy transfer with MOVITRANS®:

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| | | | |
|---|---|---|---|
| [1] | Conductive floor coverings or work areas | [7] | Mobile converter |
| [2] | Line cable | [8] | Equipotential bonding |
| [3] | Conductive track rollers or wheels | [9] | Vehicle GND |
| [4] | Vehicle support frame | [10] | Pick-up |
| [5] | Drive and application controller | [11] | Ground |
| [6] | Motor | | |

Certain production steps may lead to a temporary grounding of the vehicle support frame. Example: A load handling device on the vehicle picks up a load that is conductive and grounded.

Observe the following notes:

- All cables must have double basic insulation. Double insulation is also required for the supply cable of the pick-up. These requirements are always met when using MOVITRANS® components.
- Dissipation of electrical charges between vehicle support frame (vehicle mass) and a ground potential (ESD protection/temporary grounding) is permitted.
- It is unlikely that secondary grounding of mobile systems will cause electrical hazards: All scenario cases require at least 3 combined insulation and grounding faults up to an electrical hazard.

Check the insulating strength of the equipment and the effectiveness of the equipotential bonding within the context of cyclical system checks. You must always check mobile components. You must check the overall system only if the overall system is operated on IT systems.

A possible potential transfer to mobile components, e.g. to individual vehicles, via third-party equipment must be ruled out during planning and operation.

## INFORMATION

If you connect several TPM12B mobile converters in parallel, observe the line protection for the consumers, see chapter "Connecting the MOVITRANS TPM12B mobile converter in parallel" (→ 🗎 108).

### 7.5.2 ESD protection

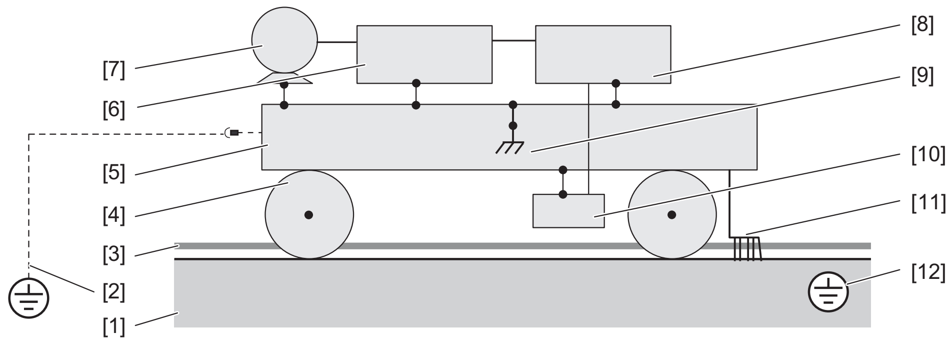
In order to ensure optimal protection against electrostatic discharge (ESD), measures must be taken for all places where non-conductive surfaces rub against one another to ensure that charges are dissipated. This is particularly important for mobile systems such as lifting gears, floor conveyor vehicles, and floor conveyor systems.

You can dissipate charges as follows:

- With conductive components such as combs, brushes, springs, or polishers
- With conductive track rollers or wheels
- With conductive floor coverings or work areas

If it is required in certain production steps, temporary grounding of the vehicle support frame is permitted.

The following figure shows the potential methods for ESD protection:

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| | | | |
|---|---|---|---|
| [1] | Conductive floor coverings or work areas | [7] | Motor |
| [2] | Temporary ground connection | [8] | Mobile converter |
| [3] | Line cable | [9] | Vehicle GND |
| [4] | Conductive track rollers or wheels | [10] | Pick-up |
| [5] | Vehicle frame | [11] | Conductive component part |
| [6] | Drive and application controller | [12] | Ground |

23545259/EN – 05/2020

# 8 Planning information for installation

In the following chapters, you can find planning information about the following topics:

- Connection of the following inverters from SEW-EURODRIVE to MOVITRANS®:
  - MOVIMOT® flexible
  - MOVIMOT®
  - MOVIDRIVE® modular
  - MOVIDRIVE® system
  - MOVIDRIVE® technology
  - MOVIDRIVE® MDX60B/61B
  - MOVITRAC® B
  - MOVIFIT® FC

  MOVITRANS® is optimized for the use with these inverters.
- Overview of suitable brakes/brake rectifiers
- Information on parallel connection of several TPM12B mobile converters
- Planning information on project planning for the DC 24 V level

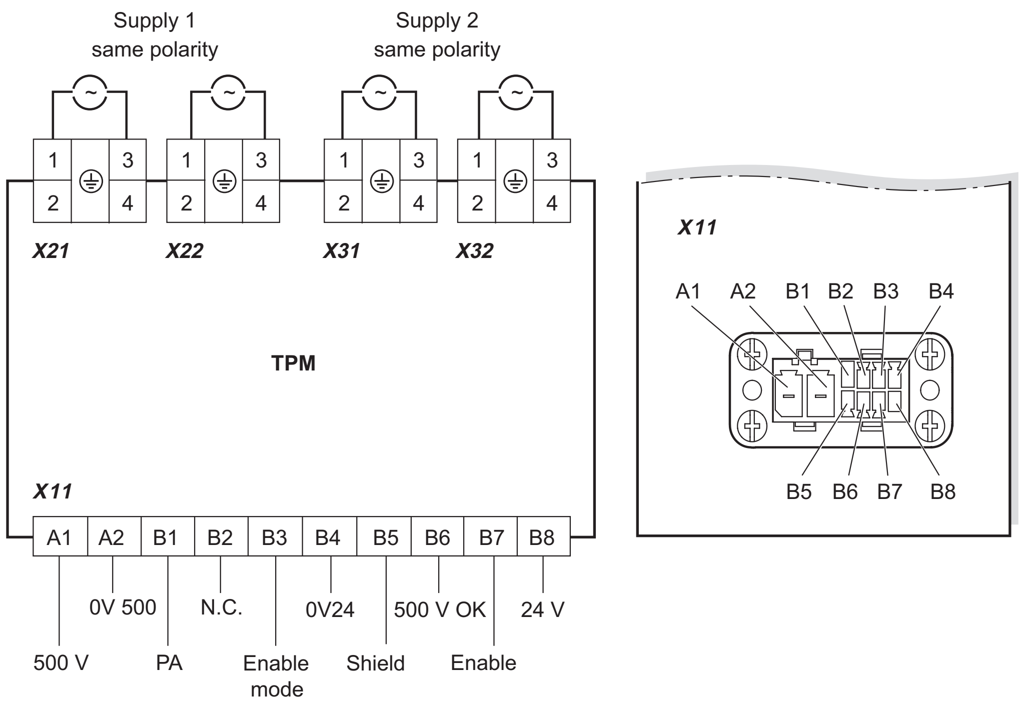
23545259/EN – 05/2020

## 8.1 Connecting the MOVITRANS® TPM12B mobile converter

### 8.1.1 Wiring diagram

The TPM12B mobile converter has a Phoenix plug connector at the output end for the utilization voltages and for control.

The following figure shows the wiring diagram of the TPM12B mobile converter (on the left hand side) and the terminal arrangement on connector X11 (on the right hand side). The terminals of the connector are displayed from outside the device with the heat sink on bottom:

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## INFORMATION

For TPM12B030, the terminals X22 and X32 are not available.

23545259/EN – 05/2020

### 8.1.2 Connector assignment X11

The following table shows the pin assignment of X11:

| Pin assignment | Designation | Function |
|---|---|---|
| X11:A1 (+$U_z$) | 500 V | DC 500 V output voltage |
| X11:A2 (–$U_z$) | 0V500 | Reference potential for the DC 500 V output voltage |
| X11:B1, B5 | PA | Equipotential bonding for line and shield |
| X11:B2 | n.c. | Not assigned |
| X11:B3 | Enable mode | Digital input enable mode (for DC 500 V output voltage only):<br>"0" signal = delayed enable (ramp)<br>"1" signal = instantaneous enable |
| X11:B4 | 0V24 | Reference potential for DC 24 V binary signals |
| X11:B6 | 500 V OK | Digital output 500V OK, "1" signal, if DC 500 V output voltage is present. |
| X11:B7 | Enable | Digital input enable (for DC 500 V output voltage only):<br>"0" signal = DC 0 V output voltage<br>"1" signal = DC 500 V output voltage |
| X11:B8 | 24 V | DC 24 V voltage output (max. 2 A) |

The terminals "Enable" and "Enable mode" only affect the DC 500 V output voltage. The terminal "DC 24 V voltage output" remains unaffected.

23545259/EN – 05/2020



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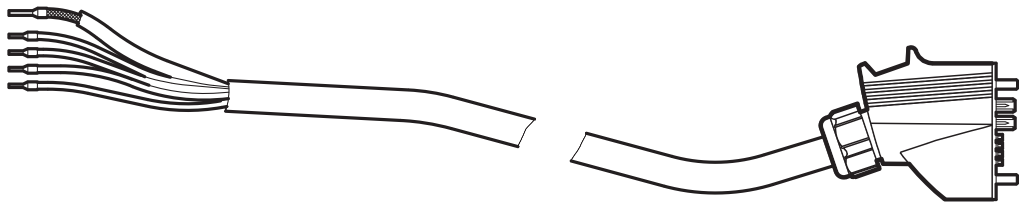
## 8.2 Connection via hybrid cable

### 8.2.1 Prefabricated hybrid cable

For connection to the plug connector, SEW-EURODRIVE provides a prefabricated hybrid cable (part number: 11715073) which houses all the cables in a single sheath.

One cable end is fitted with a plug connector for connection to the TPM12B mobile converter. The other cable end is open and fitted with conductor end sleeves. The cables are available in half-meter lengths from 1 m to 7.5 m.



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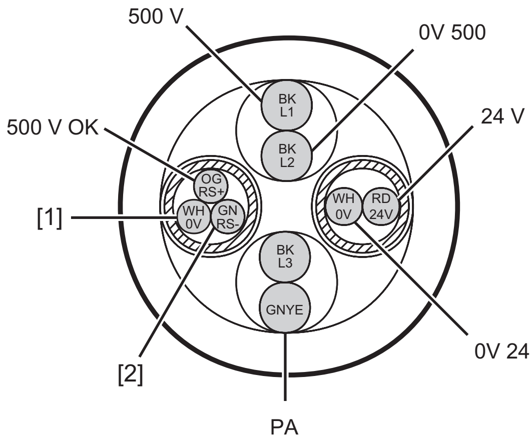
### 8.2.2 Cable cross section

The following illustration shows the cross-section of the open cable end:

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[1] Enable mode

[2] Enable

23545259/EN – 05/2020

### 8.2.3 Connecting the load cable

Observe the following:

- Do not apply external voltage to the terminal "500 V OK".
- Core L3 of the hybrid cable must not be connected.
- The terminals "Enable" and "Enable mode" only affect the DC 500 V output voltage. The DC 24 V voltage output is not affected.
- If the power output on the TPM12B is connected to an energy storage unit, the connection to the energy storage unit must be disconnected or the energy storage unit must be entirely discharged before the load cable is connected.

Proceed as follows to connect the load to the hybrid cable:

1. ⚠ **CAUTION!** Faulty installation. Destruction of the mobile converter, the pick-ups, and the connected load.
   Only connect loads approved by SEW-EURODRIVE. For this purpose, use the prefabricated hybrid cable from SEW-EURODRIVE.
2. Ensure that the pick-ups are not located above the line cable.
3. If the pick-ups are located above the line cable, make sure that the line cable is not energized.
4. Do not connect or disconnect the connection cables of the pick-ups when they are under load.
5. Connect the individual cores of the hybrid cable as described in the table.

| Device connector | Designation | Hybrid cable |
|---|---|---|
| X11:A1 +$U_z$ | 500 V | L1 |
| X11:A2 -$U_z$ | 0V500 | L2 |
| – | – | L3 |
| X11:B1 | PA | GNYE |
| X11:B2 | N.c./not connected | – |
| X11:B3 | Enable mode | WH |
| X11:B4 | 0V24 | WH |
| X11:B5 | PA | Shield |
| X11:B6 | 500 V OK | OG |
| X11:B7 | Enable | GN |
| X11:B8 | 24 V auxiliary voltage | RD |

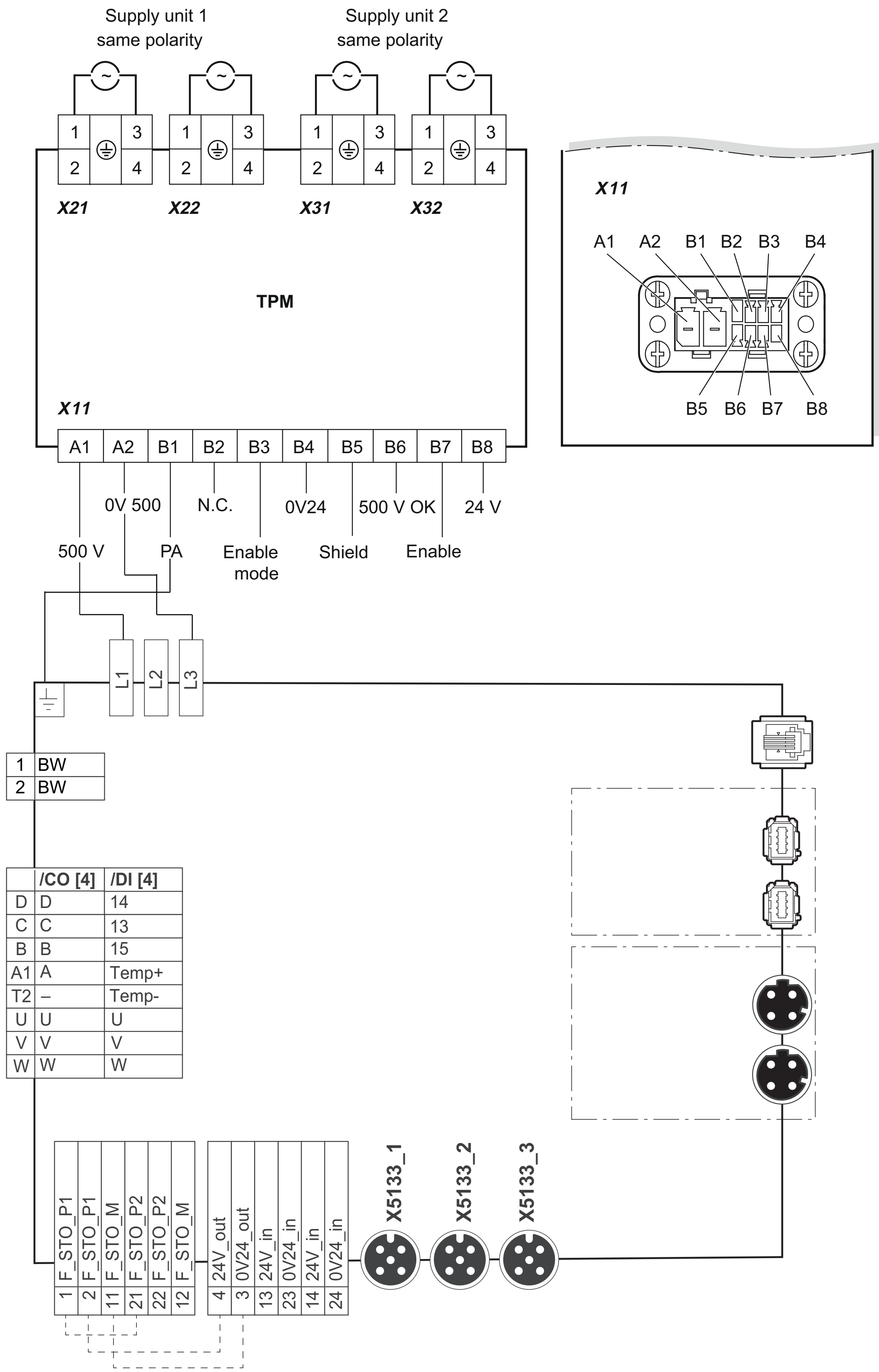
23545259/EN – 05/2020

## 8.3 Connecting MOVIMOT® flexible

### 8.3.1 Wiring diagram

The MOVIMOT® flexible application inverter can be operated directly at the DC voltage output DC 500 V of the TPM12B mobile converter although there are no DC link terminals. The connection to the UZ+ and UZ- potential is established via terminals L1 and L3.

23545259/EN – 05/2020

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23545259/EN – 05/2020

### 8.3.2 Pin assignment

The following table shows the terminal assignment on the connector X11 and the assignment of the cores in the hybrid cable and the MOVIMOT® flexible frequency inverter:

| Pin assignment | Designation | Hybrid cable | MOVIMOT® flexible |
|---|---|---|---|
| X11:A1 (+$U_z$) | 500 V | L1 | L1 |
| X11:A2 (–$U_z$) | 0V500 | L2 | L3 |
| X11:B1 | PA | GNYE | PE |
| X11:B2 | n.c. | – | – |
| X11:B3 | Enable mode | WH | – |
| X11:B4 | 0V24 | WH | – |
| X11:B5 | Shield | | – |
| X11:B6 | 500 V OK | OG | – |
| X11:B7 | Enable | GN | – |
| X11:B8 | 24 V | RD | – |

The terminals "Enable" and "Enable mode" only affect the DC 500 V output voltage. The terminal "DC 24 V voltage output" remains unaffected.

## 8.4 Connecting MOVIMOT®

### 8.4.1 Wiring diagram

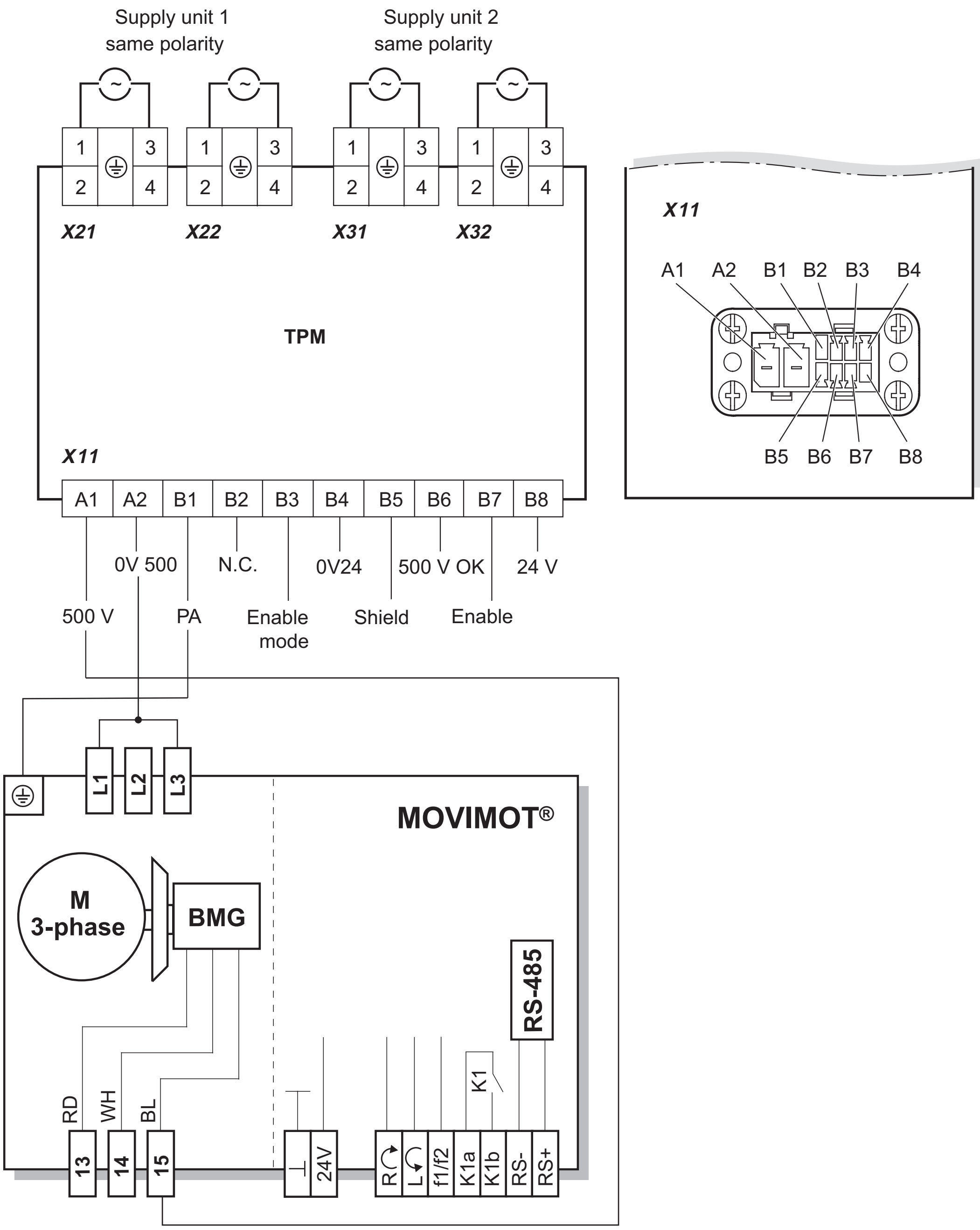
The MOVIMOT® frequency inverter is suitable for simple applications due to its uncomplicated control features and IP65 degree of protection.

With this inverter, the DC link circuit is not directly routed on terminals. Nevertheless, the frequency inverter can be operated at the DC 500 V output of the TPM12B mobile converter.

Terminal 15 is connected directly to the $U_{Z+}$ potential of the DC link. The connection to the $U_{Z-}$ potential is established via the diodes of the input rectifier and terminals L1, L2 and L3.

23545259/EN – 05/2020

The following figure shows the wiring diagram for the connection of the MOVIMOT® to the TPM12B mobile converter:

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23545259/EN – 05/2020

### 8.4.2 Pin assignment

The following table shows the terminal assignment on the connector X11 and the assignment of the cores in the hybrid cable and the MOVIMOT® frequency inverter:

| Pin assignment | Designation | Hybrid cable | MOVIMOT® |
|---|---|---|---|
| X11:A1 (+$U_z$) | 500 V | L1 | 15 |
| X11:A2 (–$U_z$) | 0V500 | L2 | L1/L2/L3 |
| X11:B1 | PA | GNYE | PA |
| X11:B2 | n.c. | – | – |
| X11:B3 | Enable mode | WH | – |
| X11:B4 | 0V24 | WH | – |
| X11:B5 | Shield | | – |
| X11:B6 | 500 V OK | OG | – |
| X11:B7 | Enable | GN | – |
| X11:B8 | 24 V | RD | – |

The terminals "Enable" and "Enable mode" only affect the DC 500 V output voltage. The terminal "DC 24 V voltage output" remains unaffected.

23545259/EN – 05/2020

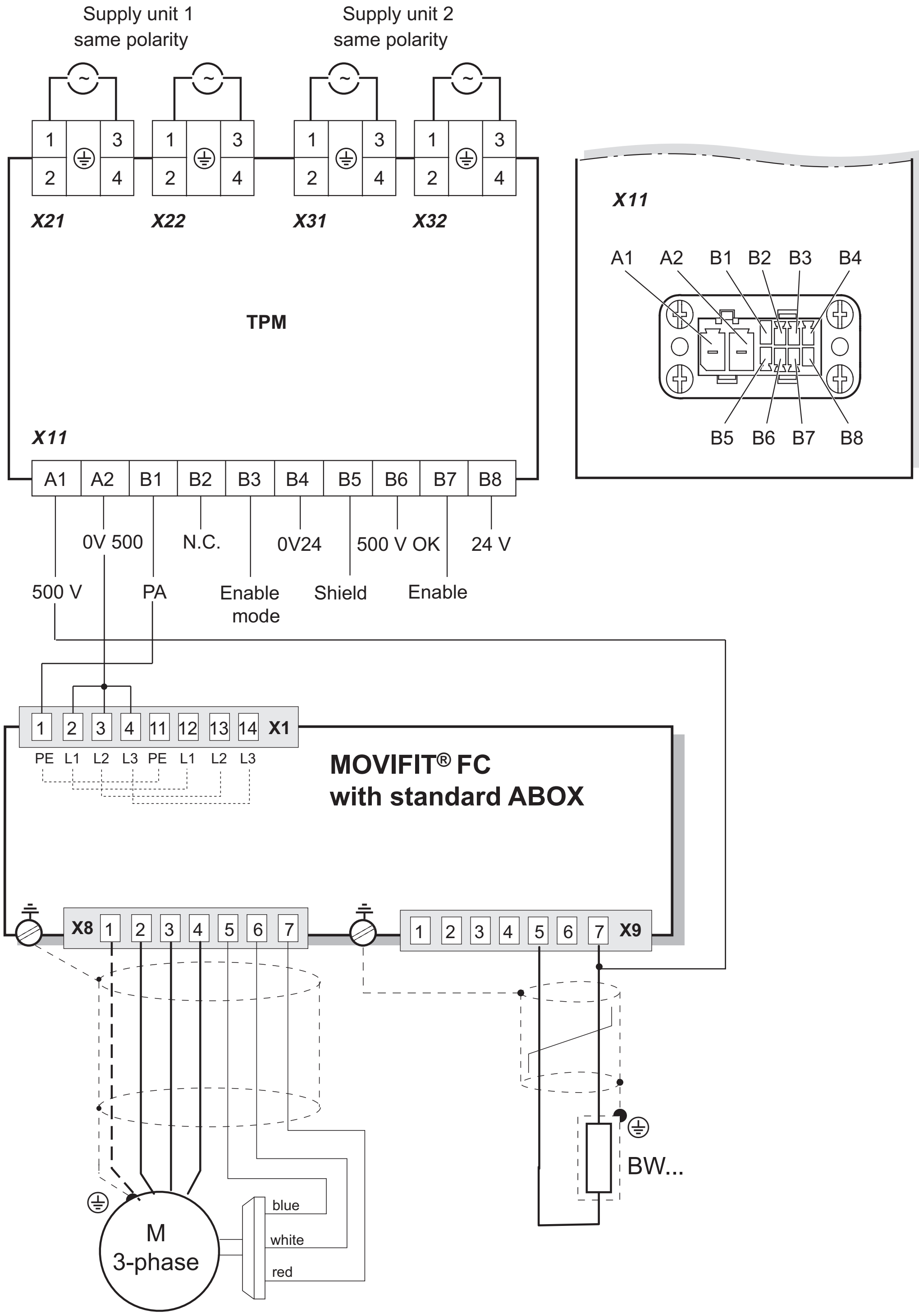
## 8.5 Connecting MOVIFIT® FC

### 8.5.1 Wiring diagram

The MOVIFIT®-FC field distributor for decentralized installation provides more functions than the MOVIMOT® and is therefore also suitable for more complex applications. The device can be operated directly at the DC voltage output DC 500 V of the TPM12B mobile converter although there are no DC link terminals. Terminal X9.7 (+R) is directly connected to the UZ+ potential of the DC link. The connection to the UZ- potential is established via the diodes of the input rectifier and the terminals X1.2, X1.3 and X1.4 (L1, L2 and L3).

23545259/EN – 05/2020

The following figure shows the wiring diagram for the connection of the MOVIFIT® FC to the TPM12B mobile converter:

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23545259/EN – 05/2020

### 8.5.2 Pin assignment

The following table shows the terminal assignment on the connector X11 and the assignment of the cores in the hybrid cable and the MOVIFIT® FC field distributor:

| Pin assignment | Designation | Hybrid cable | MOVIFIT® |
|---|---|---|---|
| X11:A1 (+$U_z$) | 500 V | L1 | X9.7 |
| X11:A2 (–$U_z$) | 0V500 | L2 | X1.2, X1.3, X1.4 |
| X11:B1 | PA | GNYE | X1.1 |
| X11:B2 | n.c. | – | – |
| X11:B3 | Enable mode | WH | – |
| X11:B4 | 0V24 | WH | – |
| X11:B5 | Shield | | – |
| X11:B6 | 500 V OK | OG | – |
| X11:B7 | Enable | GN | – |
| X11:B8 | 24 V | RD | – |

The terminals "Enable" and "Enable mode" only affect the DC 500 V output voltage. The terminal "DC 24 V voltage output" remains unaffected.

23545259/EN – 05/2020

## 8.6 Connecting MOVIDRIVE® MDX60B/61B

### 8.6.1 Wiring diagram

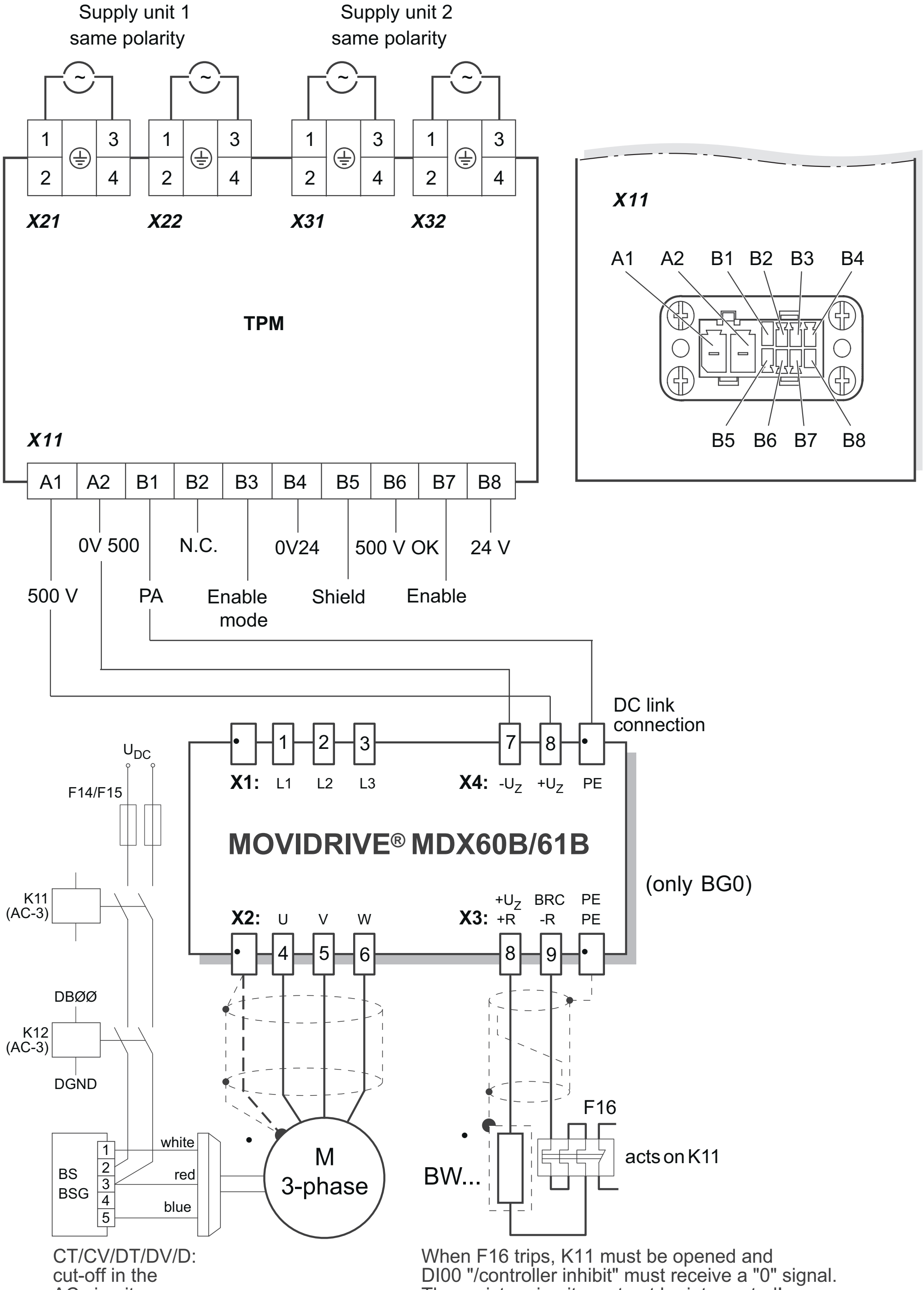
Only MOVIDRIVE® MDX60B/61B application inverters with 3 × AC 400 V input voltage may be connected to the TPM12B mobile converter.

In contrast to MOVIMOT®, MOVIDRIVE® MDX60B/61B has terminals where the DC link is directly routed on. The TPM12B mobile converter can be connected directly.

In this case, terminals L1, L2 and L3 are not used.

23545259/EN – 05/2020

The following figure shows the wiring diagram for the connection of MOVIDRIVE® MDX60B/61B to the TPM12B mobile converter:

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23545259/EN – 05/2020

### 8.6.2 Pin assignment

The following table shows the terminal assignment on the connector X11 and the assignment of the cores in the hybrid cable and the MOVIDRIVE® MDX60B/61B frequency inverter:

| Pin assignment | Designation | Hybrid cable | MOVIDRIVE® |
|---|---|---|---|
| X11:A1 (+$U_z$) | 500 V | L1 | $U_{z+}$ |
| X11:A2 (–$U_z$) | 0V500 | L2 | $U_{z-}$ |
| X11:B1 | PA | GNYE | PE |
| X11:B2 | n.c. | – | – |
| X11:B3 | Enable mode | WH | – |
| X11:B4 | 0V24 | WH | – |
| X11:B5 | Shield | | – |
| X11:B6 | 500 V OK | OG | – |
| X11:B7 | Enable | GN | – |
| X11:B8 | 24 V | RD | – |

The terminals "Enable" and "Enable mode" only affect the DC 500 V output voltage. The terminal "DC 24 V voltage output" remains unaffected.

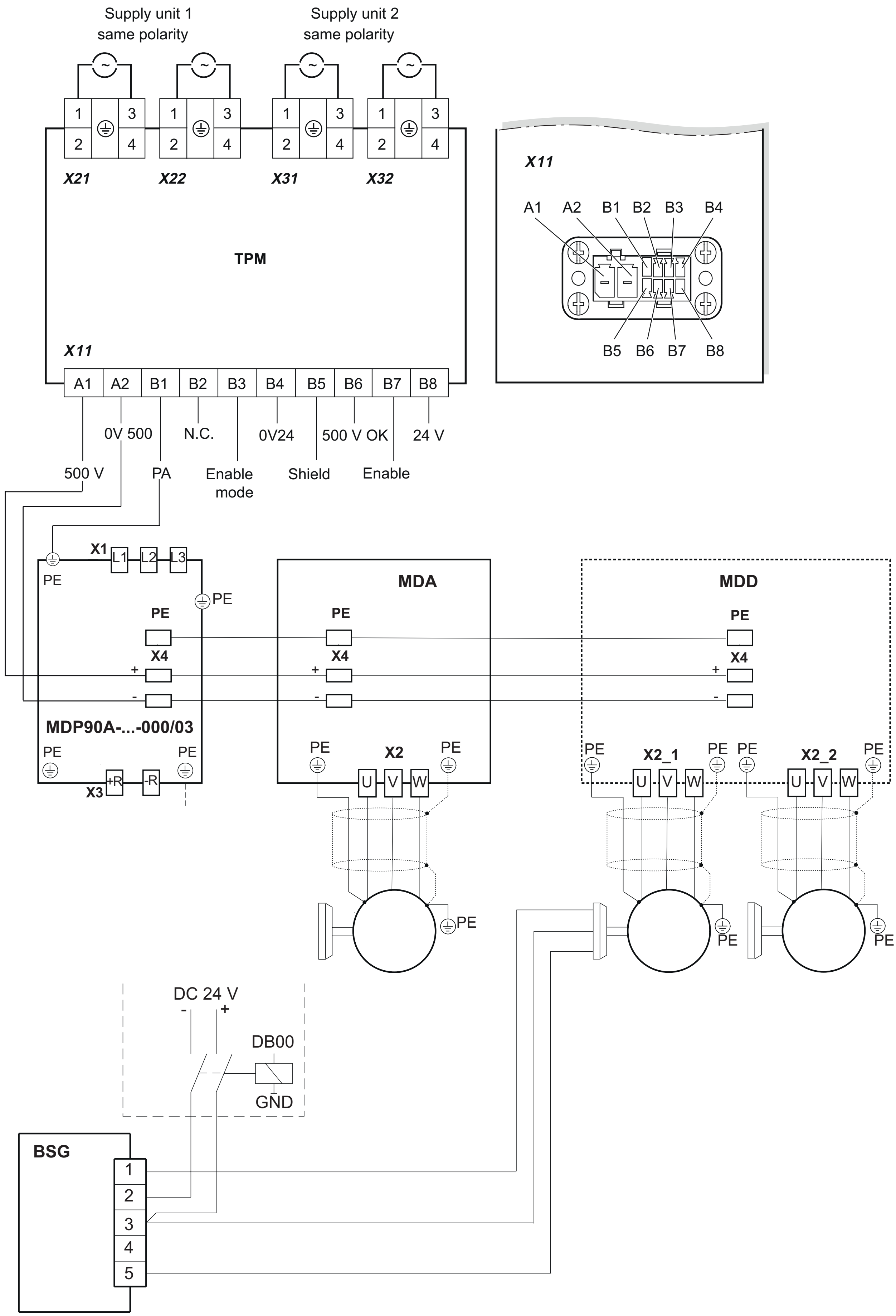
23545259/EN – 05/2020

## 8.7 Connecting MOVIDRIVE® modular

### 8.7.1 Wiring diagram

You can operate the MOVIDRIVE® modular application inverter at the DC voltage output DC 500 V of the TPM12B mobile converter. Use the MPD90A-...-000/03 power supply module. A connection using the standard MDP power supply module is not possible.

23545259/EN – 05/2020




23545259/EN – 05/2020

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### 8.7.2 Pin assignment

The following table shows the terminal assignment on the connector X11 and the assignment of the cores in the hybrid cable and the MOVIDRIVE® modular frequency inverter:

| Pin assignment | Designation | Hybrid cable | MOVIDRIVE® modular |
|---|---|---|---|
| X11:A1 (+$U_z$) | 500 V | L1 | X4+ (at MDP90A) |
| X11:A2 (–$U_z$) | 0V500 | L2 | X4- (at MDP90A) |
| X11:B1 | PA | GNYE | PE |
| X11:B2 | n.c. | – | – |
| X11:B3 | Enable mode | WH | – |
| X11:B4 | 0V24 | WH | – |
| X11:B5 | Shield | | – |
| X11:B6 | 500 V OK | OG | – |
| X11:B7 | Enable | GN | – |
| X11:B8 | 24 V | RD | – |

The terminals "Enable" and "Enable mode" only affect the DC 500 V output voltage. The terminal "DC 24 V voltage output" remains unaffected.

## 8.8 Connecting MOVIDRIVE® system/MOVIDRIVE® technology

### 8.8.1 Wiring diagram

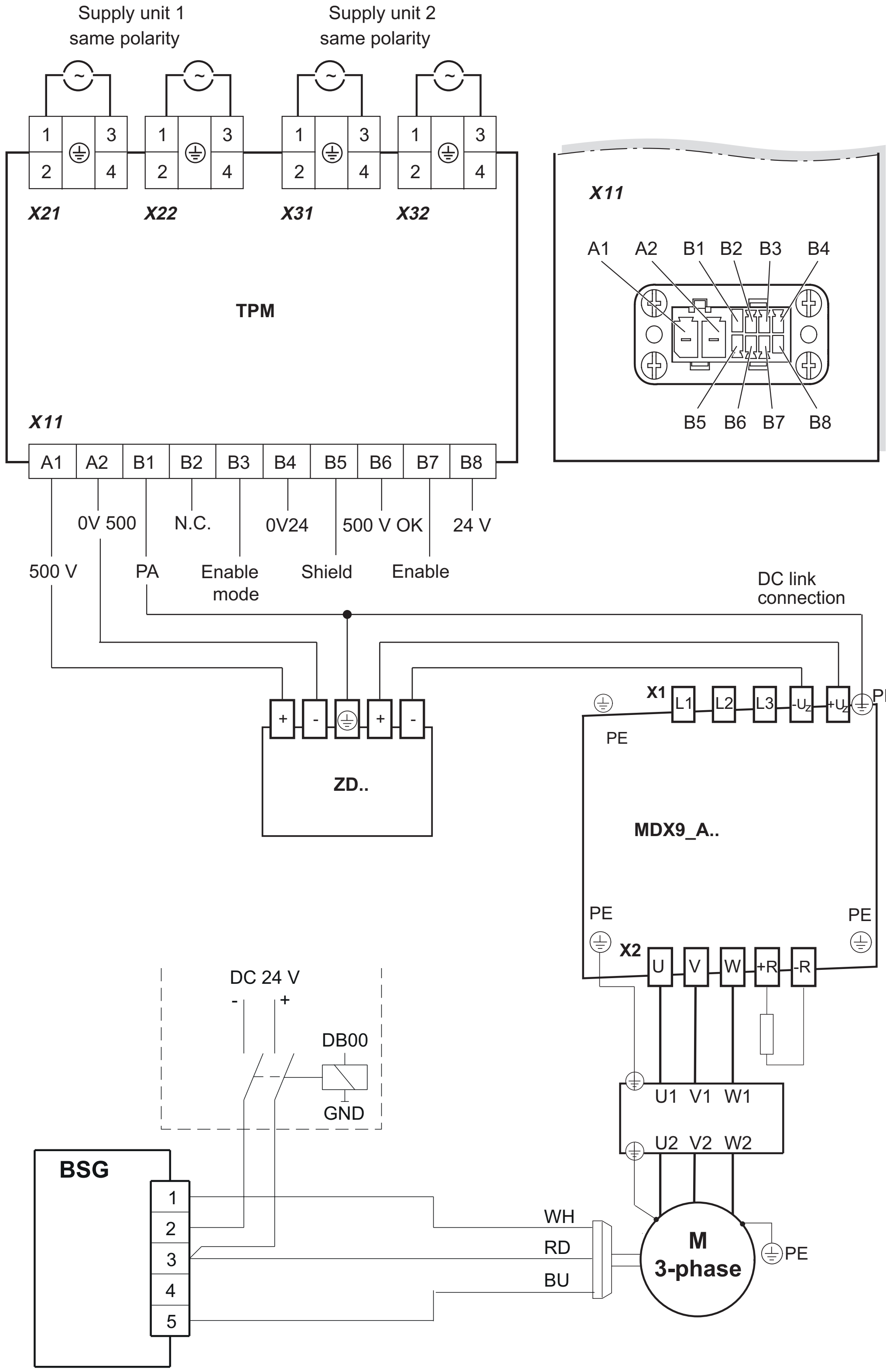
Only application inverters with 3 × AC 400 V input voltage may be connected to the TPM12B mobile converter.

MOVIDRIVE® has terminals where the DC link is directly routed on. The TPM12B mobile converter can be connected using a ZD010 or ZD040 DC link choke.

In this case, terminals L1, L2 and L3 are not used.

23545259/EN – 05/2020

The following figure shows the wiring diagram for the connection of MOVIDRIVE® system or MOVIDRIVE® technology to the TPM12B mobile converter:

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### 8.8.2 Pin assignment

The following table shows the terminal assignment on the connector X11 and the assignment of the cores in the hybrid cable and the MOVIDRIVE® system or MOVIDRIVE® technology application inverter:

| Pin assignment | Designation | Hybrid cable | MOVIDRIVE® |
|---|---|---|---|
| X11:A1 (+$U_z$) | 500 V | L1 | $U_{z+}$ |
| X11:A2 (–$U_z$) | 0V500 | L2 | $U_{z-}$ |
| X11:B1 | PA | GNYE | PE |
| X11:B2 | n.c. | – | – |
| X11:B3 | Enable mode | WH | – |
| X11:B4 | 0V24 | WH | – |
| X11:B5 | Shield | | – |
| X11:B6 | 500 V OK | OG | – |
| X11:B7 | Enable | GN | – |
| X11:B8 | 24 V | RD | – |

The terminals "Enable" and "Enable mode" only affect the DC 500 V output voltage. The terminal "DC 24 V voltage output" remains unaffected.

23545259/EN – 05/2020

## 8.9 Connecting MOVITRAC® B

### 8.9.1 Wiring diagram

The MOVITRAC® B frequency inverter can only be operated as a 3 × AC 400 V device on the MOVITRANS® system.

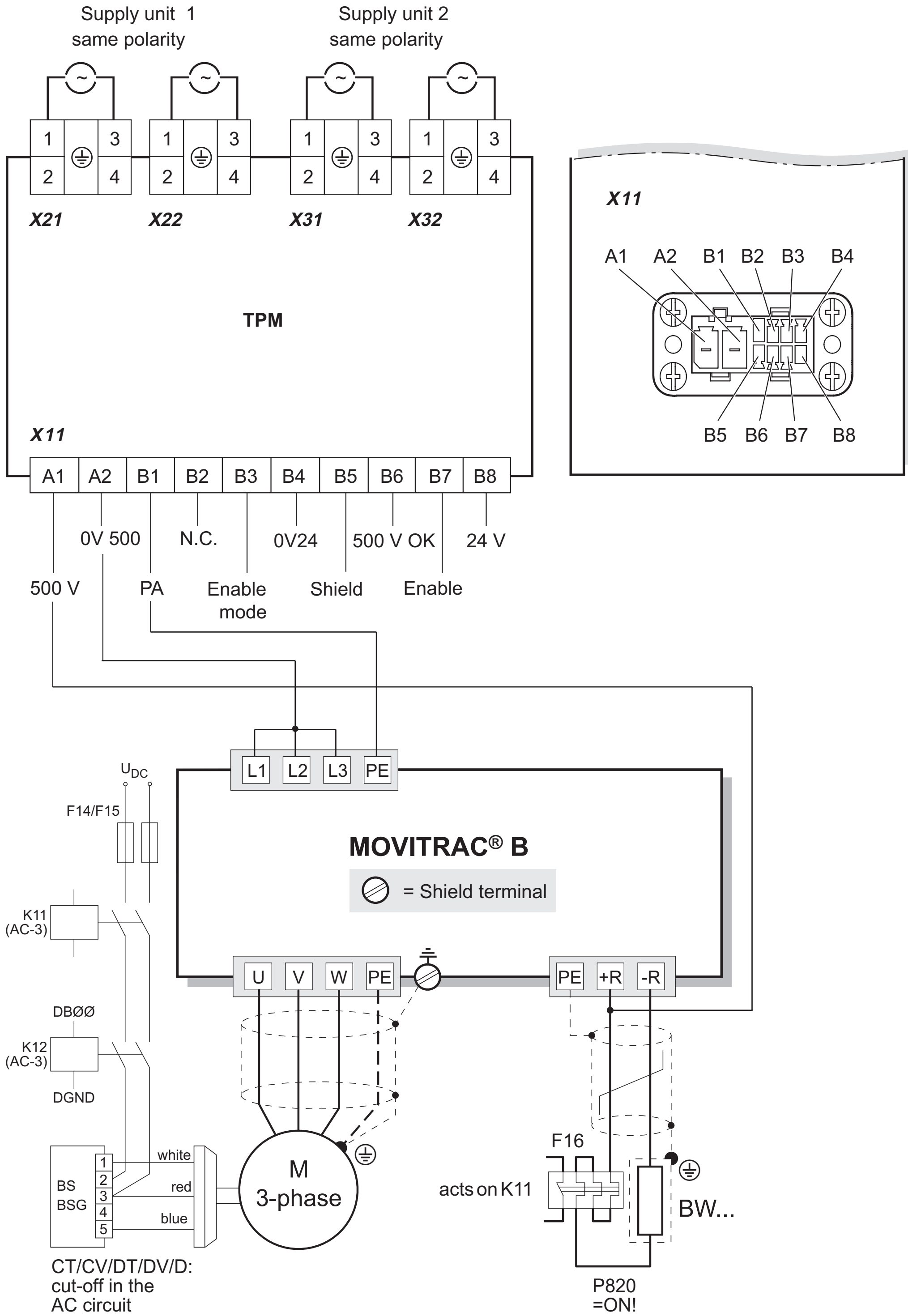
**Operation of the AC 230 V variants is not permitted.**

For MOVITRAC® B frequency inverters, the device size determines the connection technology used:

| Frequency inverter | Size | Connection |
|---|---|---|
| MOVITRAC® B | 0XS, 0S, 0L | Same as for MOVIMOT® |
| | 1, 2S, 2, 3, 4, 5 | Same as for MOVIDRIVE® MDX60B/61B |

23545259/EN – 05/2020

The following figure shows the wiring diagram for the connection of the MOVITRAC® B (size 0) to the TPM12B mobile converter:

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23545259/EN – 05/2020

### 8.9.2 Pin assignment

The following table shows the terminal assignment on the connector X11 and the assignment of the cores in the hybrid cable and the MOVITRAC® B frequency inverter:

| Pin assignment | Designation | Hybrid cable | MOVITRAC® B |
|---|---|---|---|
| X11:A1 (+$U_z$) | 500 V | L1 | +R |
| X11:A2 (–$U_z$) | 0V500 | L2 | L1, L2, L3 |
| X11:B1 | PA | GNYE | PE |
| X11:B2 | n.c. | – | – |
| X11:B3 | Enable mode | WH | – |
| X11:B4 | 0V24 | WH | – |
| X11:B5 | Shield | | – |
| X11:B6 | 500 V OK | OG | – |
| X11:B7 | Enable | GN | – |
| X11:B8 | 24 V | RD | – |

The terminals "Enable" and "Enable mode" only affect the DC 500 V output voltage. The terminal "DC 24 V voltage output" remains unaffected.

23545259/EN – 05/2020

## 8.10 Connection of brakes/brake rectifiers

### 8.10.1 Selecting brakes

Different brakes and brake voltages are used depending on the frequency inverter selected:

| Frequency inverter | Brake voltage |
|---|---|
| MOVIMOT® BG1<br>MOVIMOT® BG2<br>MOVIMOT® flexible | AC 230 V brake<br>AC 120 V brake |
| MOVIFIT® FC | **AC 400 V brake (standard)**<br>but also:<br>AC 230 V brake<br>AC 120 V brake |
| MOVIDRIVE® modular<br>MOVIDRIVE® system<br>MOVIDRIVE® technology<br>MOVIDRIVE® MDX60B/61B | DC 24 V brake<br>AC 230 V brake<br>AC 400 V Brake |
| MOVITRAC® B | DC 24 V brake<br>AC 230 V brake<br>AC 400 V Brake |

**INFORMATION**

For MOVIMOT® frequency inverters and MOVIFIT® FC, the brake is controlled by the inverter itself.

### 8.10.2 DC 24 V brakes

For MOVIDRIVE® MDX60B/61B und MOVITRAC® B, the brake series determines the required current. In general:

- BE05 – BE2 series: Connected directly to DC 24 V
  - Use drive with BS brake rectifier
  - BSG or BMV brake rectifier can be used as an alternative

If you operate the brakes of this series with a BSG brake rectifier, you must use a more powerful DC 24 V power supply unit. The inrush current increases by the factor 4 when the brake is released.

- BE5 – BE20 series: Connection only with BSG brake rectifier

23545259/EN – 05/2020

**BE05 – BE2 series**

The following assignments and braking currents apply to the BE05 – BE2 series with BS brake rectifier:

| BE05 – BE2 series with BS | | | |
|---|---|---|---|
| Motor | DR.71 – DR.80 | DR.71 – DR.90 | DR.80 – DR.100 |
| Brake | BE05 | BE1 | BE2 |
| Braking current in A | 1.17 | 1.17 | 1.53 |

**BE5 – BE20 series**

The following assignments and braking currents apply to the BE5 – BE20 series with BSG brake rectifier:

| BE5 – BE20 series with BSG | | | |
|---|---|---|---|
| Motor | DR.90 – DR.132 | DR.112 – DR.160 | DR.160 – DR.180 |
| Brake | BE5 | BE11 | BE20 |
| Holding current A | 1.67 | 2.67 | 3.32 |
| Inrush current in A[1)] | 9.69 | 17.89 | 24.90 |

1) Duration approx. 120 ms

### 8.10.3 AC 230 V and AC 400 V brakes

The AC 230 V and AC 400 V brakes can be connected using BST brake rectifiers:

| Brake | Brake rectifier | Comments |
|---|---|---|
| AC 230 V brake | BST1.2S-230V-00 | The power of the brake coil must not exceed 120 kW. |
| AC 400 V Brake | BST0.7S-400V-00 | The power of the brake coil must not exceed 120 kW. |

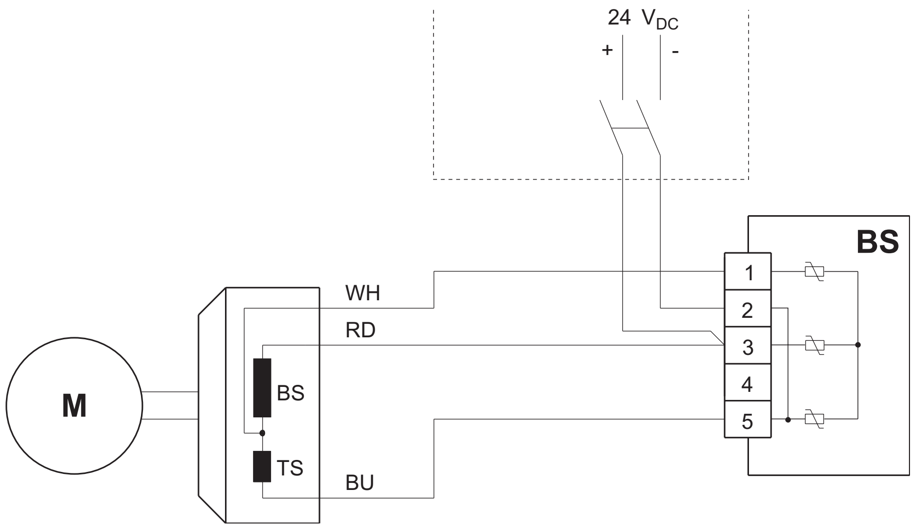
Due to the power limit of the BST, you can use the BE32 at most. You must configure the brakes of larger motors to 24 V.

Apart from the listed wiring diagrams, the BST brake rectifier also allows for a safe disconnection. Refer to the operating instructions for more information.

### 8.10.4 Wiring diagrams

#### DC 24 V brake with BS

The following figure shows the connection of a DC 24 V brake with BS brake rectifier:

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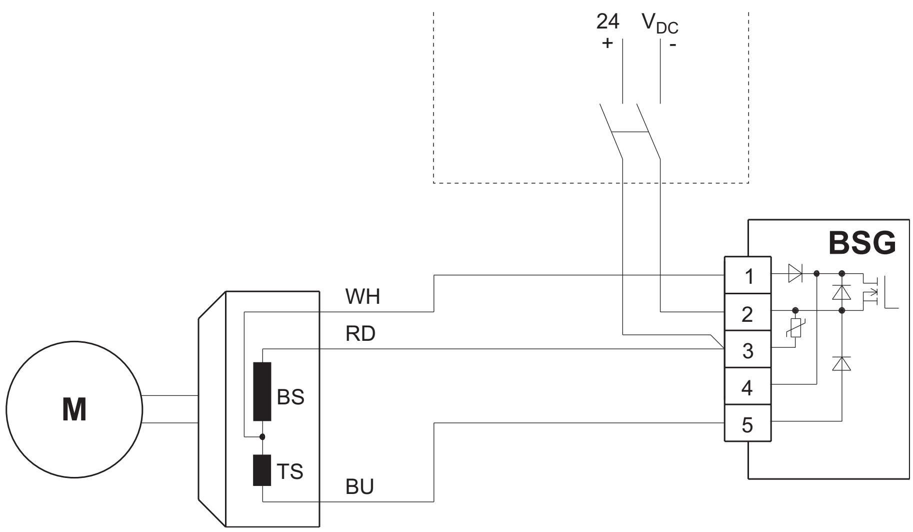
#### DC 24 V brake with BSG

The following figure shows the connection of a DC 24 V brake with BSG brake rectifier:

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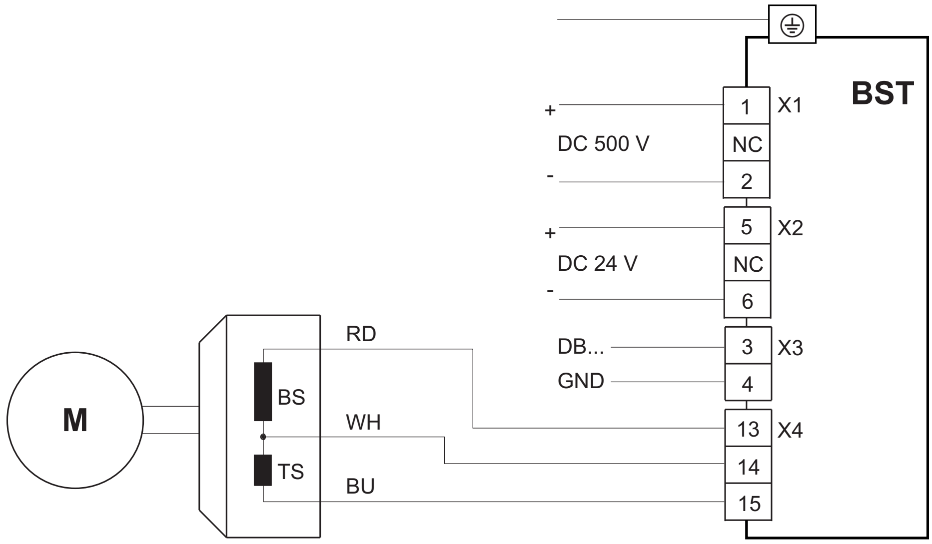
### AC 230 V and AC 400 V brakes with BST

The following figure shows the connection of an AC 230 V and an AC 400 V brake with BST brake rectifier:

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## 8.11 Parallel connection of the MOVITRANS® TPM12B mobile converter

### 8.11.1 Parallel connection

If the power of one TPM12B mobile converter is not sufficient for the respective application, the power can be increased by connecting several mobile converters in parallel.

### 8.11.2 Prerequisites

When doing so, take the following points into account:

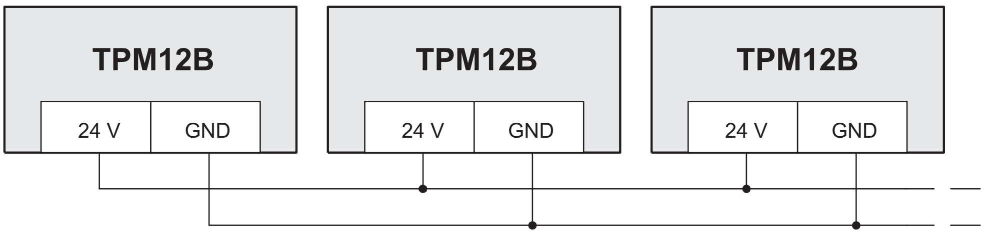
- You can connect any number of mobile converters in parallel, but the total of the individual outputs must not exceed the supply power.

**INFORMATION**

Very accurate project planning is required to ensure that this value is not exceeded. In practice, no more than 3 TPM12B mobile converters should be connected in parallel. If you connect more than 3 mobile converters in parallel, the outputs $U_{z+}$ and $U_{z-}$ of all TPM12B mobile converters must be connected via DC 500 V fuses (10 A).

- The consumers at the DC 24 V level must be distributed over the DC 24 V outputs of the respective mobile converters.

  If this is not possible for technical reasons, the DC 24 V outputs can be connected in parallel:

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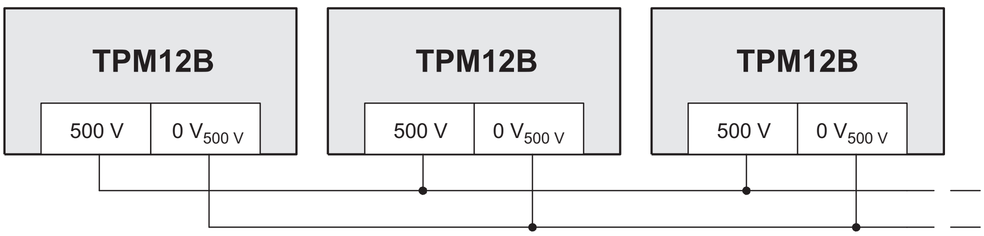
- Route the DC 500 V of the TPM12B mobile converters to 2 collection points:

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23545259/EN – 05/2020

## 8.12 External DC 24 V supply

### 8.12.1 Project planning of the DC 24 V level

During project planning of the DC 24 V level, avoid parallel connection of the DC 24 V voltage sources. Distribute the different consumers over the available voltage sources. This facilitates startup and ensures stable operation.

### 8.12.2 DC 24 V supply

**Influencing factors**

A suitable connection variant is selected depending on the following factors, among others:

- Is a DC 24 V brake installed?
- How high is the consumption for the control?
- How high is the consumption for the sensors?

**Connection variants**

4 connection variants are available. Each variant is suitable for different conditions:

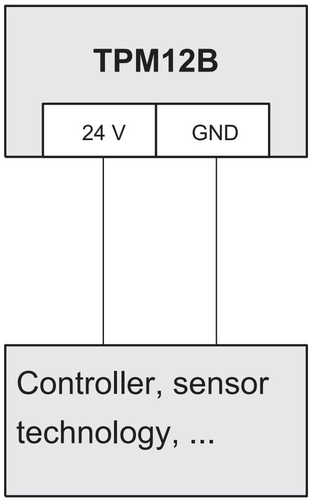
| | Variant 1 | Variant 2 | Variant 3 | Variant 4 |
|---|---|---|---|---|
| DC 24 V brake | No | No | Yes | Yes |
| Power demand | Low | High | Low | High |

23545259/EN – 05/2020

### 8.12.3 Wiring diagrams

The following figures show the wiring diagrams of the 4 variants.

**Variant 1**

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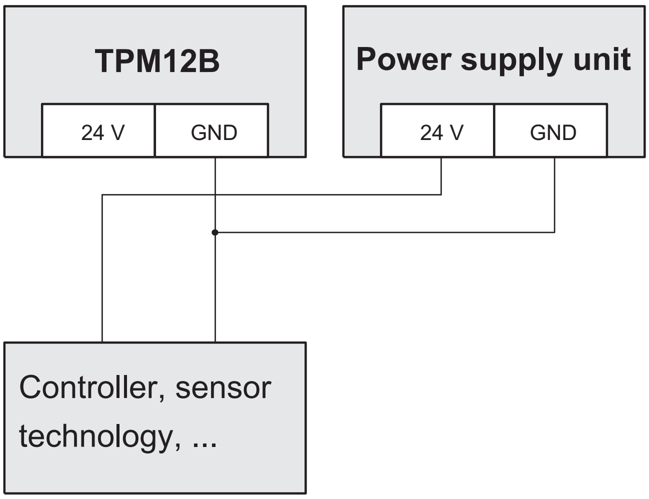
**Variant 2**

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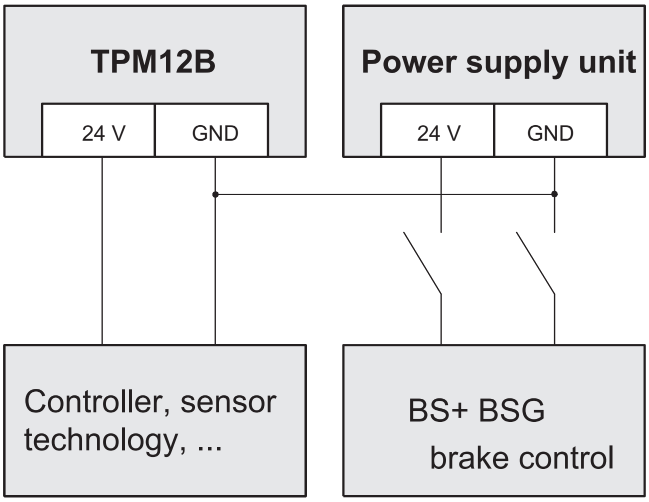
23545259/EN – 05/2020

**Variant 3**

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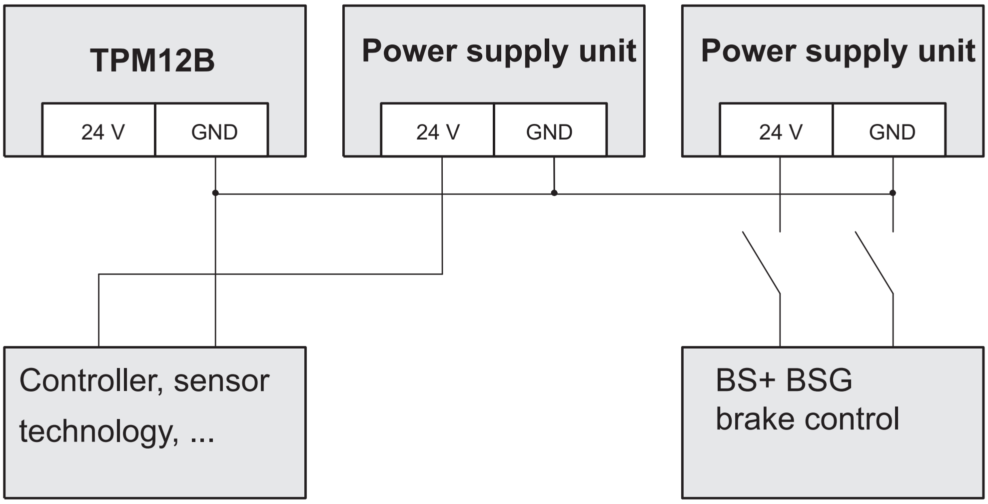
**Variant 4**

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### 8.12.4 DC 24 V power supplies

When selecting the power supply unit, make sure that the selected DC 24 V power supply unit is dimensioned for the maximum required current.

## INFORMATION

DC 500 V must be fed in at the input of the power supply unit. Some power supply units can be overloaded. Observe the data sheets of the respective manufacturer.

# 9 Project planning data

## 9.1 Overview and functions of the MOVITRANS® components

The following tables provide an overview of the MOVITRANS® components and the respective function.

You can find additional information in the two rear columns "Part number" and "SCE". Observe the following notes:

- The indication of the part number alone is not sufficient to describe the component with the optional mount-on components.
- Some of the MOVITRANS® components must be entered into the SCE Configurator. The SCE Configurator is an internal SEW-EURODRIVE tool for configuring the components. The components are selected in the column "SCE".

### 9.1.1 Stationary components

The following table gives an overview of the stationary MOVITRANS® components:

| Device type | Type designation | Power | Functional description | SCE |
|---|---|---|---|---|
| Stationary converter | TPS10A040-NF0-503-1 | 4 kW | Built-in device, IP20, 4 kW/ED 100%, integrated fan, connection AC 380 - 500 V +/-10% | ✓ |
| | TPS10A160-NF0-503-1 | 16 kW | Built-in device, IP20, 16 kW/ED 100%, integrated fan, connection AC 380 - 500 V +/-10% | ✓ |
| Trans-former module | TAS10A040-N06-4x1-1 | 4 kW | Built-in device, IP20, 4 kW/ED 100%, output 60 A/25 kHz, including gyrator, transformer, without compensation capacitors | ✓ |
| | TAS10A040-N08-4x1-1 | 4 kW | Built-in device, IP20, 4 kW/ED 100%, output 85 A/25 kHz, including gyrator, transformer, without compensation capacitors | ✓ |
| | TAS10A160-N06-4x1-1 | 16 kW | Built-in device, IP20, 16 kW/ED 100%, output 60 A/25 kHz, including gyrator, transformer, without compensation capacitors | ✓ |
| | TAS10A160-N08-4x1-1 | 16 kW | Built-in device, IP20, 16 kW/ED 100%, output 85 A/25 kHz, including gyrator, transformer, without compensation capacitors | ✓ |
| Line filter | NF014-503 | 4 kW | Built-in device, IP20, 14 A, used for TPS10A040 | ✓ accessories |
| | NF035-503 | 16 kW | Built-in device, IP20, 35 A, used for TPS10A160 | ✓ accessories |

23545259/EN – 05/2020

| Device type | Type designation | Power | Functional description | SCE |
|---|---|---|---|---|
| Compen-sation ca-pacitor<br>(for TAS10A trans-former module) | TCS10A-008-XXX-0 | 60 A<br>or<br>85 A | Complete set of compensation capacitors for TAS10A to adjust all possible track lengths up to the first com-pensation box. The set includes:<br>1 pc. TCS10A -008-020-0<br>1 pc. TCS10A -008-040-0<br>1 pc. TCS10A -008-080-0<br>1 pc. TCS10A -008-160-0<br>1 pc. TCS10A -008-320-0 | ✓accessories |
| | TCS10A-008-020-0 | 60 A<br>or<br>85 A | Compensation capacitor, capacity 2 uF, with set screw for installation in TAS10A, reactance at 25 kHz = 3.2 Ω | ✓accessories |
| | TCS10A-008-040-0 | 60 A<br>or<br>85 A | Compensation capacitor, capacity 4 uF, with set screw for installation in TAS10A, reactance at 25 kHz = 1.6 Ω | ✓accessories |
| | TCS10A-008-080-0 | 60 A<br>or<br>85 A | Compensation capacitor, capacity 8 uF, with set screw for installation in TAS10A, reactance at 25 kHz = 0.8 Ω | ✓accessories |
| | TCS10A-008-160-0 | 60 A<br>or<br>85 A | Compensation capacitor, capacity 16 uF, with set screw for installation in TAS10A, reactance at 25 kHz = 0.4 Ω | ✓accessories |
| | TCS10A-008-320-0 | 60 A<br>or<br>85 A | Compensation capacitor, capacity 32 uF, with set screw for installation in TAS10A, reactance at 25 kHz = 0.2 Ω | ✓accessories |

23545259/EN – 05/2020

### 9.1.2 Installation material

The following table gives an overview of the available MOVITRANS® installation equipment for floor routing:

| Device type | Type designation | Line cable current | Functional description | Part number | SCE |
|---|---|---|---|---|---|
| Line cable | TLS10E-025-01-1 | 60 A and 85 A | Conductor loop for flat pick-ups,<br>MF litz wire, floor routing, cable cross section of 25 mm², outer diameter of 12.5 mm | 13227769 | |
| | TLS10E-041-01-1 | 85 A | Conductor loop for flat pick-ups,<br>MF litz wire, floor routing for long track length, cable cross section of 41 mm², outer diameter of 15 mm | 13227777 | |
| Supply cable | TLS10E-006-06-1 | 60 A | Supply cable from power cabinet to energy transfer system, fine litz wire, routing in cable duct, cable cross section of 2 × 3 × 6 mm², outer diameter of 20.5 mm | 13227793 | |
| Connection distributor | TVS10B-E06-000-1 | 60 A | Stationary connection component (wiring box) to connect MF cable, protection class 2, flange plate 2 × M32 / 4 × M25 | | ✓ |
| | TVS10B-E08-000-1 | 60 A and 85 A | Stationary connection component (wiring box) to connect MF cable, protection class 2, flange plate 2 × M32 / 4 × M25 | | ✓ |
| | TVS10B-E08-000-2 | 60 A and 80 A | Stationary connection component (wiring box) to connect MF cable, protection class 2, flange plate 2 × M32 / 2 × M32 | | ✓ |
| Compensation box | TCS10B-E06-090-1 | 60 A | Stationary connection component to connect MF cable, protection class 2, capacitive reactance at 25 kHz = 7.1 Ω, flange plate 4 × M25 / 4 × M25 | | ✓ |
| | TCS10B-E08-120-1 | 60 A and 85 A | Stationary connection component to connect MF cable, protection class 2, capacitive reactance at 25 kHz = 5.3 Ω, flange plate 4 × M25 / 4 × M25 | | ✓ |
| | TCS10B-E08-120-3 | 60 A and 85 A | Stationary connection component to connect MF cable, protection class 2, capacitive reactance at 25 kHz = 5.3 Ω, flange plate 2 × M32 / 2 × M32 | | ✓ |

23545259/EN – 05/2020

The following table gives an overview of the available MOVITRANS® installation equipment for the installation in the profile section system:

| Device type | Type designation | Line cable current | Functional description | Part number | SCE |
|---|---|---|---|---|---|
| Line cable | TLS10E-008-01-1 | 30 A (60 A for double installation) | Conductor loop for U-shaped pick-ups, MF litz wire, installation in profile sections TIS10A-008, cable cross section of 8 $mm^2$, outer diameter of 8.6 mm, 2-fold installation (parallel) | 13227742 | |
| Power supply cable | TLS10E-006-06-1 | 60 A | Supply cable from power cabinet to energy transfer system, fine litz wire, routing in cable duct, cable cross section of 2 × 3 × 6 $mm^2$, outer diameter of 20.5 mm | 13227793 | |
| Compensation box | TCS10B-E06-090-1 | 60 A | Stationary connection component to connect MF cable, capacitive reactance at 25 kHz = 7.1 Ω, flange plate 4 × M25 / 4 × M25 | | ✓ |
| Connection distributor | TVS10B-E06-000-1 | 60 A | Stationary connection component (wiring box) to connect MF cable, flange plate 2 × M32 / 4 × M25 | | ✓ |

| Device type | Type designation | Packaging unit | Functional description | Part number | SCE |
|---|---|---|---|---|---|
| Holding fixture | TIS10A008-H02-0 | 1 pc. | Holding fixture with 2 rotary supports, matching Dürr profile 180 and universal holder for profile sections | 11723165 | |
| Profile section | TIS10A008-P33-0 | 1 pc., 3 m | Rigid profile section, installation dimension: 33 mm, length: 3 m, for U-shaped pick-ups, cable cross section of 8 $mm^2$ | 11720743 | |
| | TIS10A008-P74-0 | 1 pc., 3 m | Rigid profile section, installation dimension: 74 mm, length: 3 m, for U-shaped pick-ups, cable cross section of 8 $mm^2$ | 11720735 | |
| | TIS10A008-F33-0 | 1 pc., 2.2 m | Flexible profile section, installation dimension: 33 mm, length: 2.2 m, for U-shaped pick-ups, cable cross section of 8 $mm^2$ | 11721197 | |
| | TIS10A008-F74-0 | 1 pc., 2.2 m | Flexible profile section, installation dimension: 74 mm, length: 2.2 m, for U-shaped pick-ups, cable cross section of 8 $mm^2$ | 11721189 | |
| Cable opening | TIS10A008-A00-0 | 1 pc. | Cable bushing grommet, cable cross section of 8 $mm^2$ | 11721200 | |
| | TIS10A008-A74-0 | 1 pc. | Cable entry frame for profile sections, installation dimension: 74 mm, cable cross section of 8 $mm^2$ | 11720719 | |
| Universal retaining plate | TIS10A008-XH2-0 | 1 pc. | Universal retaining plate for mounting the TIS10A008-H02-0 holding fixture | 11731281 | |

### 9.1.3 Mobile components

The following table shows an overview of the mobile MOVITRANS® components when flat pick-ups are used:

| Device type | Type designation | Power | Functional description | SCE |
|---|---|---|---|---|
| Flat pick-up | THM10E015-009-000-1 | 1.5 kW (with 85 A)<br>0.9 kW (with 60 A) | IP65, 1.5 kW/ED 100%, T (environment) 40 °C, up to 6 m cable (Ölflex-Classic) and Han®Q4/2 connector (specify when ordering) | ✓ |
| Mobile converter | TPM12B030-ENE-5A2-2 | Up to 3 kW | Connection of 1 or 2 flat THM10E pick-ups, IP65, 3 kW/ED 100%, output DC 500 V + DC 24 V to 2 A | ✓ |
| Connection cable, mobile converter | – | – | Hybrid cable with T1 plug connector for connection to TPM12B mobile converter output, cable open at one end with conductor end sleeves (specify cable length in m when ordering) | ✓ |

The following table shows an overview of the mobile MOVITRANS® components when U-shaped pick-ups are used:

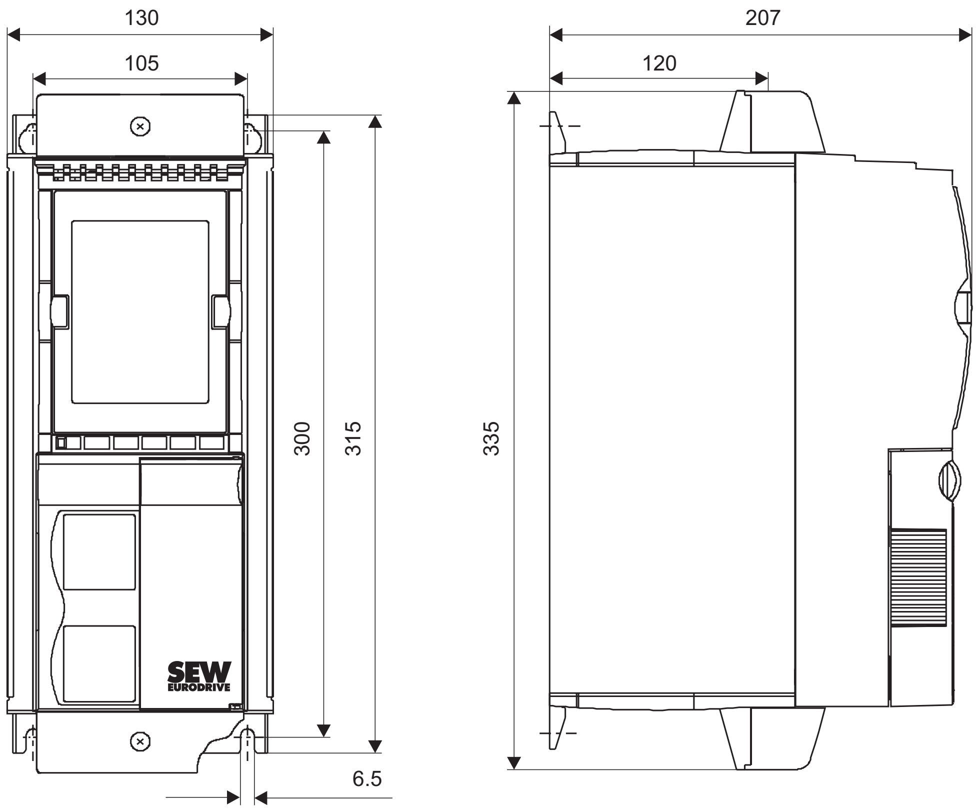
| Device type | Type designation | Power | Functional description | SCE |
|---|---|---|---|---|
| U-shaped pick-up | THM10C008-022-076-1 | 800 W<br>(with 60 A) (900 W peak power) | IP65, 800 W/ED 100%, peak power: 900 W, line cable current: 60 A, T (environment) 50 °C, up to 6 m cable (Ölflex-Classic) and Han®Q4/2 connector<br>(specify when ordering) | ✓ |
| Mobile converter | TPM12B036-ENC-5A2-2 | Up to 3.6 kW | Connection of 2 or 4 U-shaped THM10C pick-ups, IP65, 3.6 kW/ED 100%, output<br>DC 500 V + DC 24 V up to 2 A, no UL approval | ✓ |
| Connection cable, mobile converter | – | – | Hybrid cable with T1 plug connector for connection to TPM12B output, cable open at one end with conductor end sleeves (specify cable length in m when ordering) | ✓ |

## 9.2 Dimension drawings of the MOVITRANS® components

### 9.2.1 Stationary components

**TPS10A040 stationary converter – size 2**

The dimension drawing shows the mechanical dimensions in mm:

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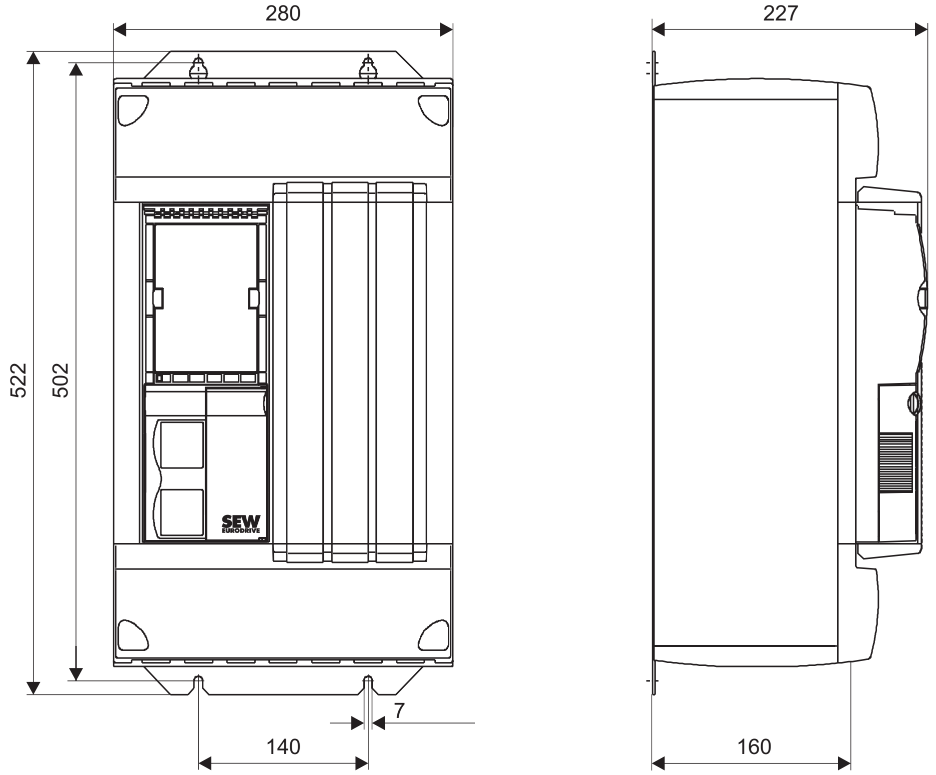
### TPS10A160 stationary converter – size 4

The dimension drawing shows the mechanical dimensions in mm:

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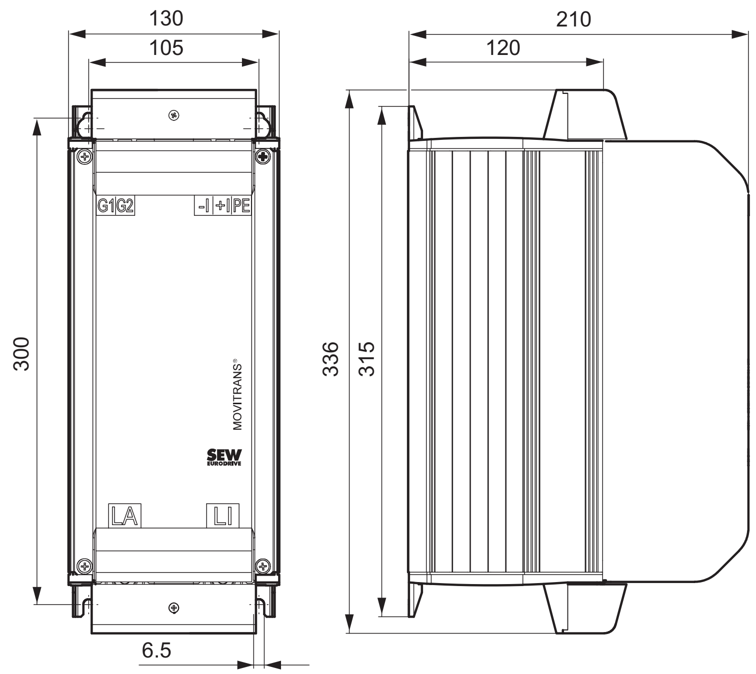
### TAS10A040 transformer module – size 2

The dimension drawing shows the mechanical dimensions in mm:

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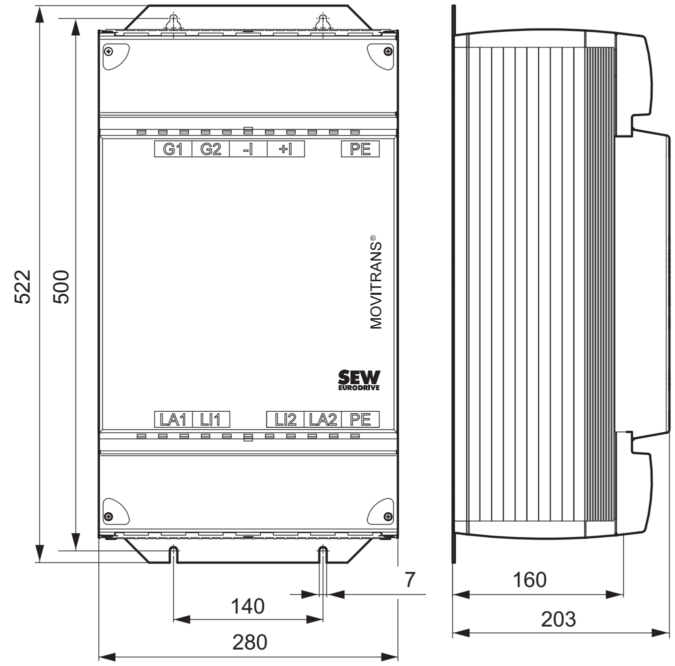
23545259/EN – 05/2020

### TAS10A160 transformer module – size 4

The dimension drawing shows the mechanical dimensions in mm:

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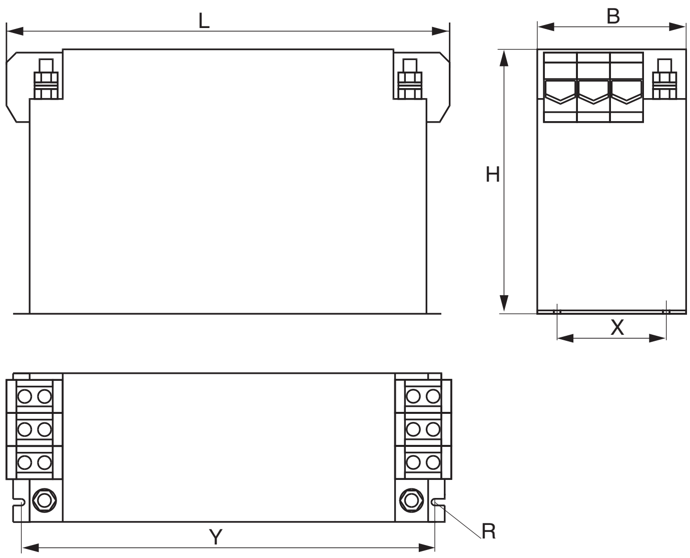
### Line filter - 4 kW or 16 kW

The dimension drawing shows the mechanical dimensions in mm:




*155536395*

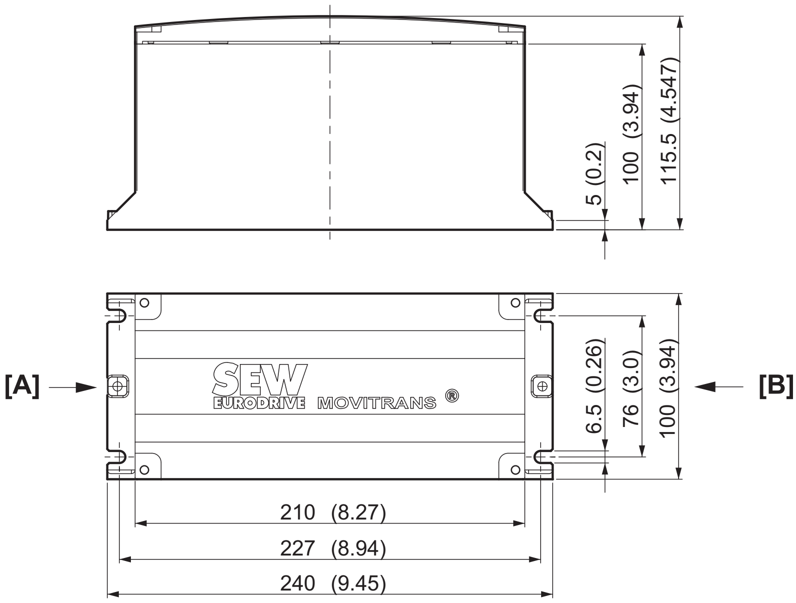
| Type<br>Part number | $L_{max}$<br>mm | $H_{max}$<br>mm | $B_{max}$<br>mm | X<br>mm | Y<br>mm | R<br>mm | Current<br>A |
|---|---|---|---|---|---|---|---|
| NF 014-503 | 225 | 80 | 55 | 20 | 210 | 5.5 | 14 |
| NF 035-503 | 275 | 100 | 60 | 30 | 255 | 5.5 | 35 |

23545259/EN – 05/2020

### 9.2.2 Installation material

#### TCS10B compensation box

The following figure shows the dimension drawing of the TCS10A / TCS10B compensation box, dimensions in mm (in):



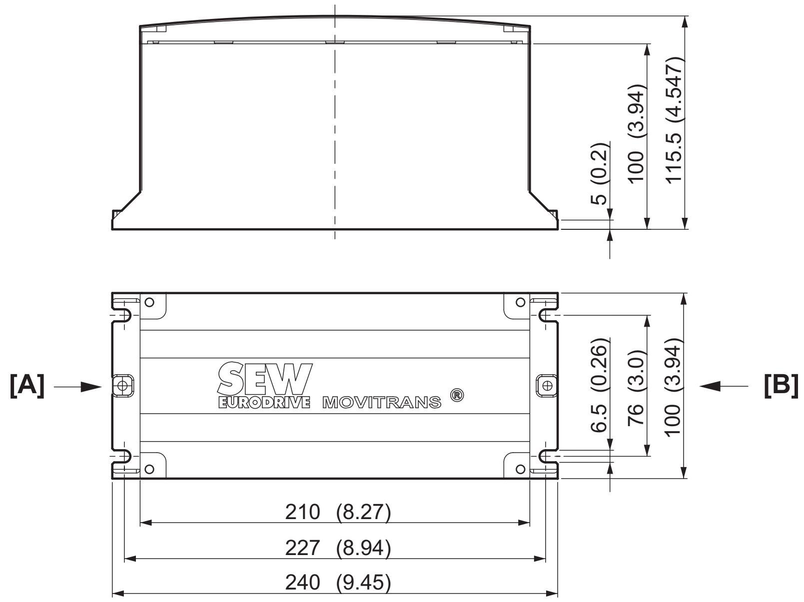

*1759953163*

| | |
|---|---|
| [A] | Flange plate 1 |
| [B] | Flange plate 2 |

23545259/EN – 05/2020

### TVS10B connection distributor

The following figure shows the dimension drawing of the TVS10A / TVS10B connection distributor, dimensions in mm (in):



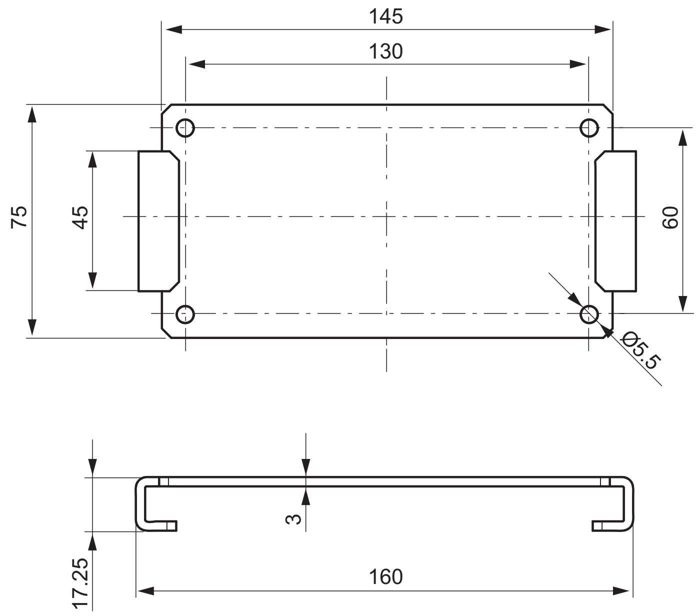

1759953163

| | |
|---|---|
| [A] | Flange plate 1 |
| [B] | Flange plate 2 |

### TIS10A008-XH2-0 universal retaining plate

The dimension drawing shows the mechanical dimensions in mm:

The TIS10A008-XH2-0 universal retaining plate is suitable for the TIS10A008-H02-0 holding fixture.



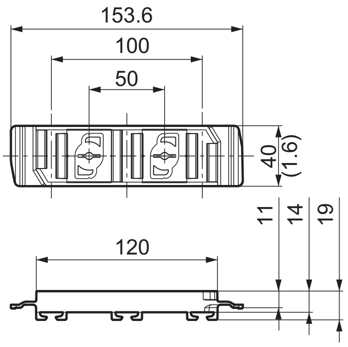

18014398679416203

23545259/EN – 05/2020

### TIS10A008-H02-0 universal holding fixture

The dimension drawing shows the mechanical dimensions in mm:

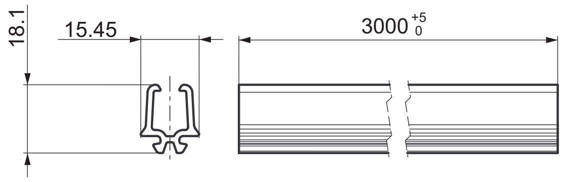
The TIS10A008-H02-0 holding fixture is suitable for the Dürr profile 180 and the universal retaining plate.




*18014398679604875*

### TIS10A008-P33-0 profile section

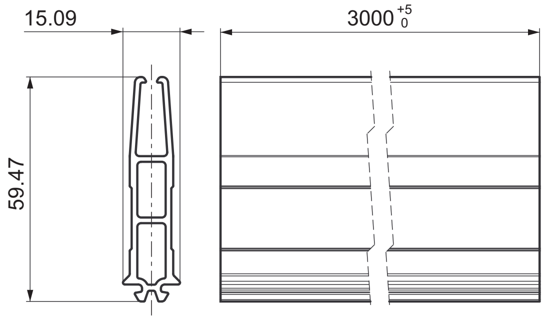
The dimension drawing shows the mechanical dimensions in mm:




*18014398679611403*

### TIS10A008-P74-0 profile section

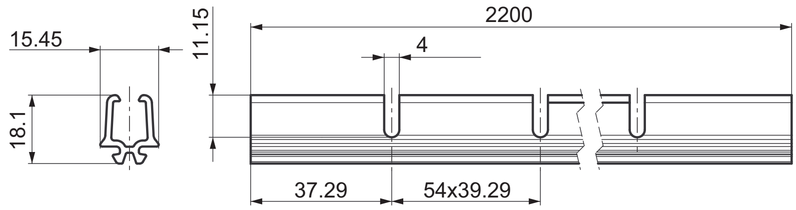
The dimension drawing shows the mechanical dimensions in mm:




*18014398679613579*

### TIS10A008-F33-0 profile section

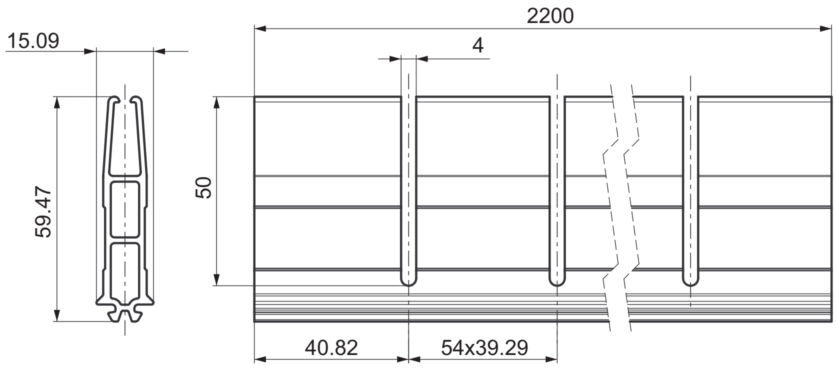
The dimension drawing shows the mechanical dimensions in mm:




*18014398679593483*

### TIS10A008-F74-0 profile section

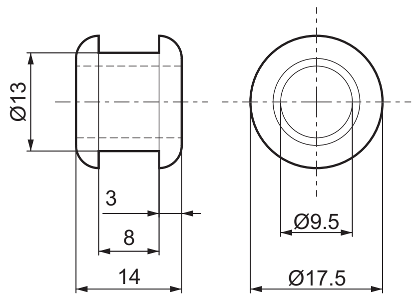
The dimension drawing shows the mechanical dimensions in mm:




*24422225035*

### Cable bushing grommet TIS10A008-A00-0

The dimension drawing shows the mechanical dimensions in mm:

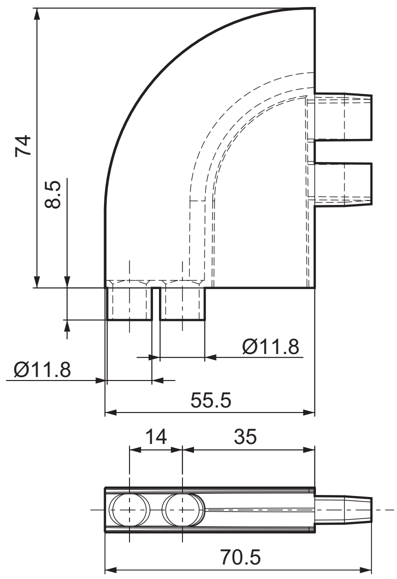



*24422288523*

23545259/EN – 05/2020

**TIS10A008-A74-0 cable bushing frame**

The dimension drawing shows the mechanical dimensions in mm:

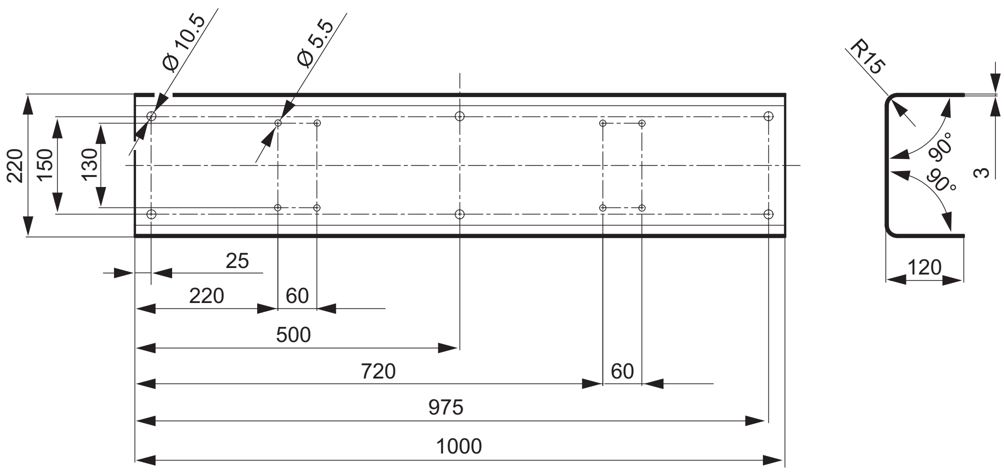



*24422668683*

**Shielding plate**

The shielding plate is not included in the scope of delivery. The shielding plate must be made of aluminum.

The dimension drawing shows the mechanical dimensions in mm:



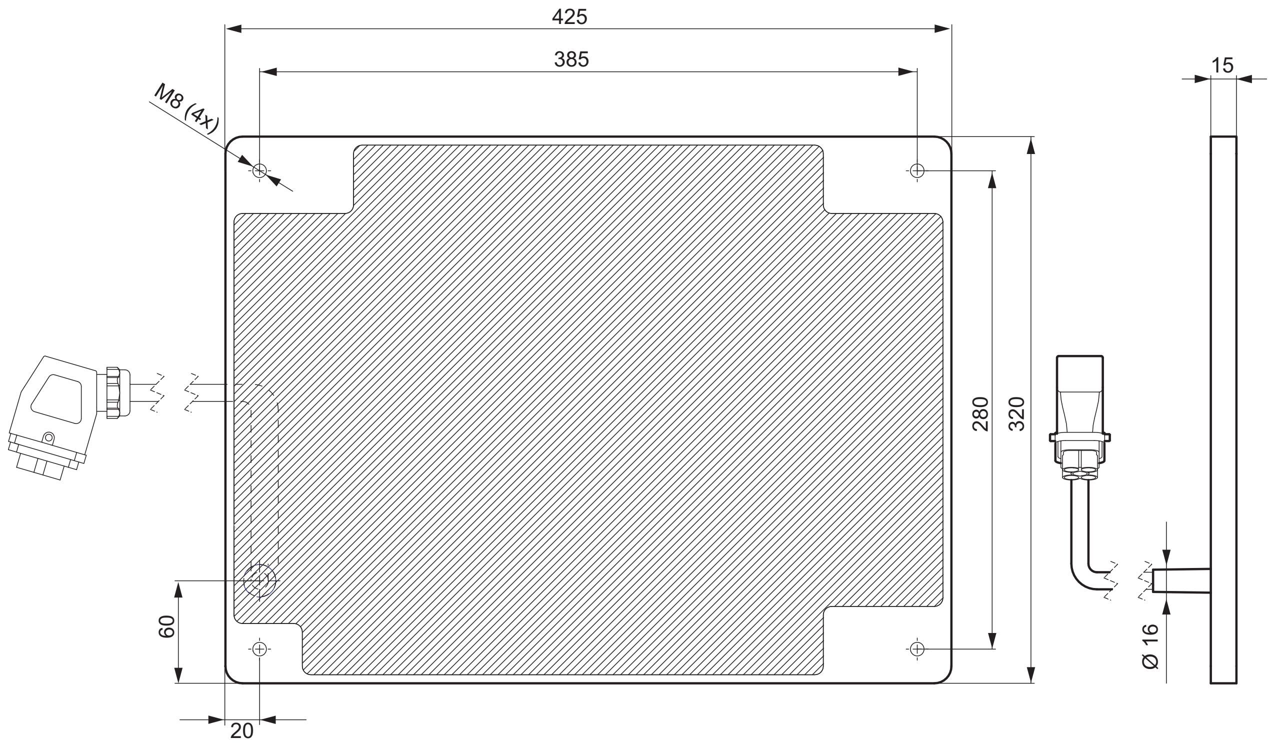

*18014398679422731*

23545259/EN – 05/2020

### 9.2.3 Mobile components

#### THM10E pick-up – flat design

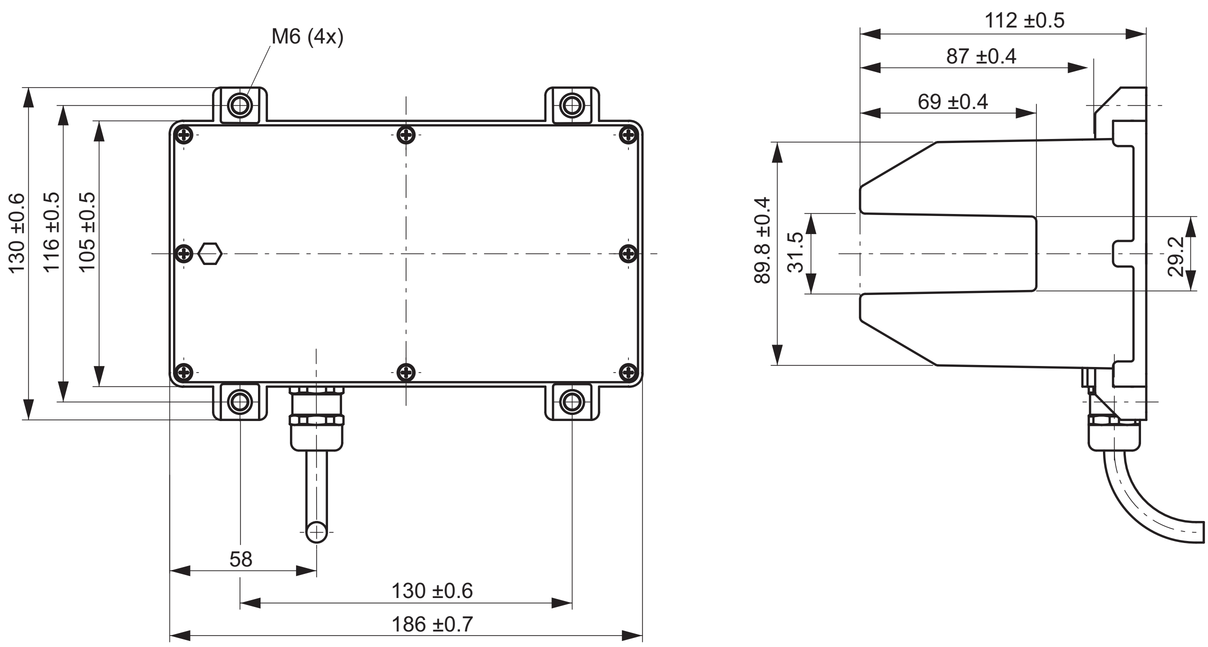
The dimension drawing shows the mechanical dimensions in mm:




*152245643*

#### THM10C pick-up – U-shaped design

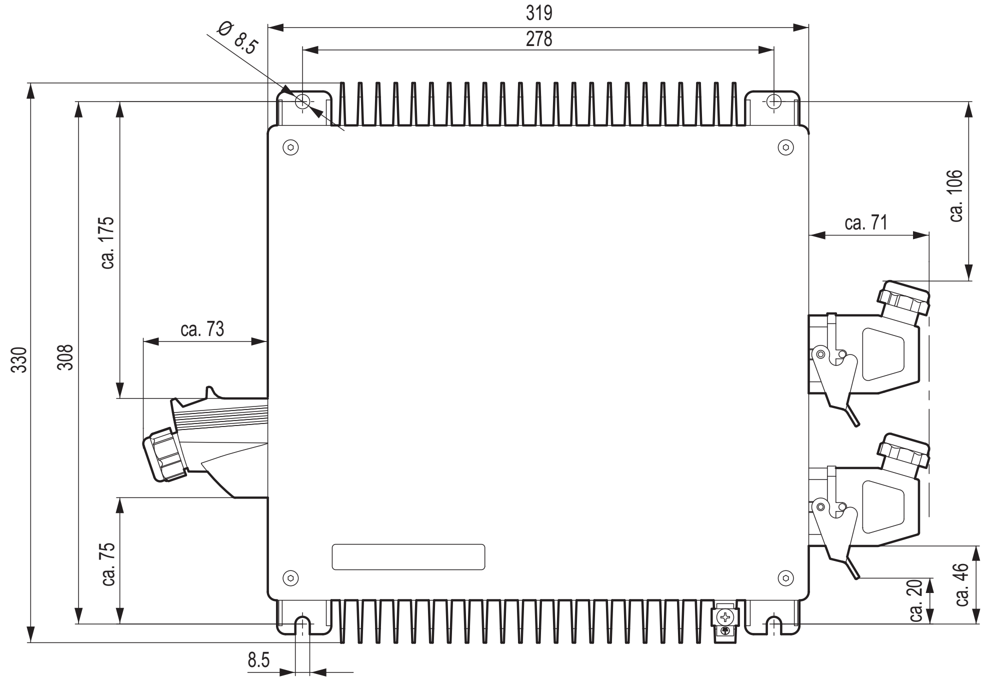
The dimension drawing shows the mechanical dimensions in mm:




*9007199629370635*

### TPM12B mobile converter

The dimension drawing shows the mechanical dimensions in mm:




*152239115*

## 9.3 System-related power reduction of the MOVITRANS® components

### 9.3.1 TAS transformer module

The power losses of the TAS transformer module depend on whether there is a 4 kW or 16 kW supply:

| TAS10A transformer module | TAS10A040 | | TAS10A160 | |
|---|---|---|---|---|
| | N06-4X1-1 | N08-4X1-1 | N06-4X1-1 | N08-4X1-1 |
| Power loss $P_{TAS\_loss}$ at $P_N$ | 50 W | | 200 W | |

### 9.3.2 THM pick-ups

The power losses of the THM pick-ups depend on the design and the line cable current:

| THM10E pick-ups | THM10E | THM10C |
|---|---|---|
| | 015-009-000-1 | 008-022-076-1 |
| Maximum power loss $P_{pickup\_loss}$ | 60 W | 25 W |

### 9.3.3 Line cables and supply cables

The electrical and mechanical characteristics of the TLS line cables and the TLS supply cables affect the system performance.

#### Ohmic losses

Both the transmission path and the supply cable to the track must be taken into account to determine the ohmic losses in the TLS line cable.

Determine the ohmic losses in the TLS line cable depending on the line cable current and the used cable type in accordance with the following table:

| Cable designation | Cross section<br>$mm^2$ | Line cable current<br>A | Power loss<br>$W\ m^{-1}$ |
|---|---|---|---|
| TLS10E-008-01-1 | (2 × 8) 16 | 60 | 13 |
| TLS10E-025-01-1 | 25 | 60 | 13 |
| | | 85 | 25 |
| TLS10E-041-01-1 | 41 | 85 | 15 |
| TLS10E-006-06-1 | 2 × 3 × 6 | 60 | 15 |

The specified values refer to the track lengths:

**1 m track = 2 m line cable**

23545259/EN – 05/2020

### losses due to eddy currents

The following inductive losses occur with floor routing of the TLS line cables close to reinforcing irons:

| Distance between line cable and reinforcing iron<br>cm | 60 A system<br>W/track meter | 85 A system<br>W/track meter |
|---|---|---|
| 8 | 8 | 16 |
| 10 | 6 | 12 |
| 12 | 5 | 9 |
| 15 | 3 | 6 |

### Bending radius

Also observe the cable cross sections and bending radii of the TLS line cables and TLS supply cable:

| Cable designation | Cross section<br>$mm^2$ | Outer diameter<br>mm | Bending radius<br>mm | |
|---|---|---|---|---|
| | | | Fixed installation | Installation in cable carrier |
| TLS10E-008-01-1 | 8 | 8.6 | 35 | |
| TLS10E-025-01-1 | 25 | 12.5 | 45 | |
| TLS10E-041-01-1 | 41 | 15 | 60 | |
| TLS10E-006-06-1 | 2 × 3 × 6 | 20.5 | 80 | 110 (minimum)<br>200 (optimal) |

23545259/EN – 05/2020

### 9.3.4 Mobile converter

The power losses of the TPM mobile converter depend on the number of connected THM pick-ups and the status of enable 500 V:

| TPM12B mobile converter | 030-ENE-5A2-2 | | | | 036-ENC-5A2-2 | |
|---|---|---|---|---|---|---|
| Current in line cable $I_1$ (at input frequency $f_1$ = 25 kHz) | AC 60 A | | AC 85 A | | AC 60 A | |
| Input frequency $f_1$ | 25 kHz | | | | | |
| Pick-up power rating [1] $P_{2\_pickup}$ | 950 W | | 1500 W | | 800 W | |
| Number of connected pick-ups | 2 | 1 | 2 | 1 | 4 | 2 |
| Design of pick-up | flat | | | | U-shaped | |
| Nominal output power[2] $P_N$. | 1.9 kW | 0.95 kW | 3.0 kW | 1.5 kW | 3.2 kW | 1.6 kW |
| Output power $P_{2\_TPM}$ of the DC 24 V supply | 24 W | 12 W | 48 W | 24 W | 48 W | 24 W |
| Power loss $P_{TPM\_loss}$ (X11:B5 has "1" signal) | 60 W | 30 W | 120 W | 60 W | 120 W | 60 W |
| Power loss $P_{TPM\_loss}$ (X11:B5 has "0" signal) | 12 W | 6 W | 15 W | 8 W | 15 W | 8 W |

1) Measured at the output of the TPM12B

2) The power ratings of the connected pick-ups are decisive for the nominal output power

## 9.4 Selection tables for MOVITRANS® TCS compensation boxes

The table contents highlighted in gray represent the track lengths that are usually connected to the corresponding supply.

The contents that are not highlighted in gray represent track lengths that may lead to significant power reduction on the mobile component in conjunction with the corresponding supply.

### 9.4.1 Number of compensation boxes (floor routing 60 A)

The following table is used to determine the number of TCS10B-E06-090-1 compensation boxes for floor routing of the TLS line cable with 60 A:

| Floor routing (60 A) | | | | | | |
|---|---|---|---|---|---|---|
| | 4 kW supply | | | 16 kW supply | | |
| Track length l in m | Number of compensation boxes | $X_L$ to be compensated in the TAS in Ω | Suggestions regarding startup / installation in TAS | Number of compensation boxes | $X_L$ to be compensated in the TAS in Ω | Suggestions regarding startup / installation in TAS |
| 5 | 0 | 0.4 | 1 × 16 µF | 0 | 0 | – |
| 10 | 0 | 1.5 | 1 × 4 µF | 0 | 0 | – |
| 15 | 0 | 2.7 | 1 × 4 µF, 1 × 8 µF, 1 × 16 µF | 0 | 0.2 | 1 × 32 µF |
| 20 | 0 | 3.9 | 1 × 2 µF, 1 × 16 µF, 1 × 32 µF | 0 | 1.4 | 1 × 8 µF, 1 × 16 µF, 1 × 32 µF |
| 25 | 0 | 5.1 | 1 × 2 µF, 1 × 4 µF, 1 × 32 µF | 0 | 2.6 | 1 × 4 µF, 1 × 8 µF, 1 × 32 µF |
| 30 | 0 | 6.2 | 2 × 2 µF | 0 | 3.7 | 1 × 2 µF, 1 × 16 µF, 1 × 32 µF |
| 35 | 1 | 0.4 | 1 × 16 µF | 0 | 4.9 | 1 × 2 µF, 1 × 4 µF, 1 × 32 µF |
| 40 | 1 | 1.5 | 1 × 4 µF | 0 | 6.1 | 1 × 2 µF, 1 × 4 µF, 1 × 8 µF, 1 × 16 µF |
| 45 | 1 | 2.7 | 1 × 4 µF, 1 × 8 µF, 1 × 16 µF | 1 | 0.2 | 1 × 32 µF |
| 50 | 1 | 3.9 | 1 × 2 µF, 1 × 16 µF, 1 × 32 µF | 1 | 1.4 | 1 × 8 µF, 1 × 16 µF, 1 × 32 µF |
| 60 | 1 | 6.2 | 2 × 2 µF | 1 | 3.7 | 1 × 2 µF, 1 × 16 µF, 1 × 32 µF |
| 70 | 2 | 1.5 | 1 × 4 µF | 1 | 6.1 | 1 × 2 µF, 1 × 4 µF, 1 × 8 µF, 1 × 16 µF |
| 80 | 2 | 3.9 | 1 × 2 µF, 1 × 16 µF, 1 × 32 µF | 2 | 1.4 | 1 × 8 µF, 1 × 16 µF, 1 × 32 µF |
| 90 | – | – | – | 2 | 3.7 | 1 × 2 µF, 1 × 16 µF, 1 × 32 µF |
| 100 | – | – | – | 2 | 6.1 | 1 × 2 µF, 1 × 4 µF, 1 × 8 µF, 1 × 16 µF |

23545259/EN – 05/2020



SEW EURODRIVE

| Floor routing (60 A) | | | | | | |
|---|---|---|---|---|---|---|
| | 4 kW supply | | | 16 kW supply | | |
| Track length l in m | Number of compensation boxes | $X_L$ to be compensated in the TAS in Ω | Suggestions regarding startup / installation in TAS | Number of compensation boxes | $X_L$ to be compensated in the TAS in Ω | Suggestions regarding startup / installation in TAS |
| 110 | – | – | – | 3 | 1.4 | 1 × 8 µF, 1 × 16 µF, 1 × 32 µF |
| 120 | – | – | – | 3 | 3.7 | 1 × 2 µF, 1 × 16 µF, 1 × 32 µF |
| 130 | – | – | – | 3 | 6.1 | 1 × 2 µF, 1 × 4 µF, 1 × 8 µF, 1 × 16 µF |
| 140 | – | – | – | 4 | 1.4 | 1 × 8 µF, 1 × 16 µF, 1 × 32 µF |
| 150 | – | – | – | 4 | 3.7 | 1 × 2 µF, 1 × 16 µF, 1 × 32 µF |
| 160 | – | – | – | 4 | 6.1 | 1 × 2 µF, 1 × 4 µF, 1 × 8 µF, 1 × 16 µF |
| 170 | – | – | – | 5 | 1.4 | 1 × 8 µF, 1 × 16 µF, 1 × 32 µF |
| 180 | – | – | – | 5 | 3.7 | 1 × 2 µF, 1 × 16 µF, 1 × 32 µF |
| 190 | – | – | – | 5 | 6.1 | 1 × 2 µF, 1 × 4 µF, 1 × 8 µF, 1 × 16 µF |
| 200 | – | | – | 6 | 1.4 | 1 × 8 µF, 1 × 16 µF, 1 × 32 µF |

### 9.4.2 Number of compensation boxes (floor routing 85 A)

The following table is used to determine the number of compensation boxes (TCS10B-E08-120-1 or TCS10B-E08-120-3) for floor routing of the TLS line cable with 85 A:

| Floor routing (85 A) | | | | | | |
|---|---|---|---|---|---|---|
| | 4 kW supply | | | 16 kW supply | | |
| Track length l in m | Number of compensation boxes | $X_L$ to be compensated in the TAS in Ω | Suggestions regarding startup / installation in TAS | Number of compensation boxes | $X_L$ to be compensated in the TAS in Ω | Suggestions regarding startup / installation in TAS |
| 5 | 0 | 0.7 | 1 × 8 µF | 0 | 0 | – |
| 10 | 0 | 1.9 | 1 × 4 µF, 1 × 16 µF | 0 | 0.7 | 1 × 8 µF |
| 15 | 0 | 3.1 | 1 × 2 µF | 0 | 1.9 | 1 × 4 µF, 1 × 32 µF |
| 20 | 0 | 4.2 | 1 × 2 µF, 1 × 8 µF, 1 × 32 µF | 0 | 3.1 | 1 × 4 µF, 1 × 8 µF, 1 × 16 µF, 1 × 32 µF |
| 25 | 0 | 5.5 | 1 × 2 µF, 1 × 4 µF, 1 × 8 µF | 0 | 4.2 | 1 × 2 µF, 1 × 8 µF, 1 × 32 µF |
| 30 | 1 | 1.3 | 1 × 8 µF, 1 × 16 µF, 1 × 32 µF | 0 | 5.4 | 1 × 2 µF, 1 × 4 µF, 1 × 16 µF, 1 × 32 µF |
| 35 | 1 | 2.5 | 1 × 4 µF, 1 × 8 µF, 1 × 32 µF | 1 | 1.3 | 1 × 8 µF, 1 × 16 µF |
| 40 | 1 | 3.7 | 1 × 2 µF, 1 × 16 µF | 1 | 2.5 | 1 × 4 µF, 1 × 8 µF |
| 45 | 1 | 4.8 | 1 × 2 µF, 1 × 4 µF | 1 | 3.7 | 1 × 2 µF, 1 × 16 µF |
| 50 | 2 | 0.8 | 1 × 8 µF | 1 | 4.8 | 1 × 2 µF, 1 × 4 µF |
| 60 | – | – | – | 2 | 1.9 | 1 × 4 µF, 1 × 32 µF |
| 70 | – | – | – | 2 | 4.2 | 1 × 2 µF, 1 × 8 µF, 1 × 32 µF |
| 80 | – | – | – | 3 | 1.3 | 1 × 8 µF, 1 × 16 µF, 1 × 32 µF |
| 90 | – | – | – | 3 | 3.7 | 1 × 2 µF, 1 × 16 µF |
| 100 | – | – | – | 4 | 0.7 | 1 × 8 µF |
| 110 | – | – | – | 4 | 3.1 | 1 × 4 µF, 1 × 8 µF, 1 × 16 µF, 1 × 32 µF |
| 120 | – | – | – | 4 | 5.4 | 1 × 2 µF, 1 × 4 µF, 1 × 16 µF, 1 × 32 µF |
| 130 | – | – | – | 5 | 2.5 | 1 × 4 µF, 1 × 8 µF |
| 140 | – | – | – | 5 | 4.8 | 1 × 2 µF, 1 × 4 µF |
| 150 | – | – | – | 6 | 1.9 | 1 × 4 µF, 1 × 32 µF |
| 160 | – | – | – | 6 | 4.2 | 1 × 2 µF, 1 × 8 µF, 1 × 32 µF |
| 170 | – | – | – | 7 | 1.3 | 1 × 8 µF, 1 × 16 µF, 1 × 32 µF |

23545259/EN – 05/2020

| Floor routing (85 A) | | | | | | |
|---|---|---|---|---|---|---|
| | 4 kW supply | | | 16 kW supply | | |
| **Track length l in m** | **Number of compensation boxes** | **$X_L$ to be compensated in the TAS in Ω** | **Suggestions regarding startup / installation in TAS** | **Number of compensation boxes** | **$X_L$ to be compensated in the TAS in Ω** | **Suggestions regarding startup / installation in TAS** |
| 180 | – | – | – | 7 | 3.7 | 1 × 2 µF, 1 × 16 µF |
| 190 | – | – | – | 8 | 0.7 | 1 × 8 µF |
| 200 | – | – | – | 8 | 3.1 | 1 × 4 µF, 1 × 8 µF, 1 × 16 µF, 1 × 32 µF |

### 9.4.3 Number of compensation boxes (routing in the 60 A profile section system)

The following table is used to determine the number of TCS10B-E06-090-1 compensation boxes for routing the TLS line cable in the profile section system with 60 A:

| Routing in the profile section system (60 A) | | | | | | |
|---|---|---|---|---|---|---|
| | 4 kW supply | | | 16 kW supply | | |
| Track length l in m | Number of compensation boxes | $X_L$ to be compensated in the TAS in Ω | Suggestions regarding startup / installation in TAS | Number of compensation boxes | $X_L$ to be compensated in the TAS in Ω | Suggestions regarding startup / installation in TAS |
| 5 | 0 | 0 | – | 0 | 0 | – |
| 10 | 0 | 0.6 | 1 × 16 µF, 1 × 32 µF | 0 | 0 | – |
| 15 | 0 | 1.4 | 1 × 8 µF, 1 × 16 µF, 1 × 32 µF | 0 | 0 | – |
| 20 | 0 | 2.1 | 1 × 4 µF, 1 × 16 µF | 0 | 0 | – |
| 25 | 0 | 2.8 | 1 × 4 µF, 1 × 8 µF, 1 × 16 µF | 0 | 0.3 | 1 × 16 µF |
| 30 | 0 | 3.5 | 1 × 2 µF, 1 × 16 µF | 0 | 1 | 1 × 8 µF, 1 × 32 µF |
| 35 | 0 | 4.3 | 1 × 2 µF, 1 × 8 µF, 1 × 32 µF | 0 | 1.8 | 1 × 4 µF, 1 × 32 µF |
| 40 | 0 | 5 | 1 × 2 µF, 1 × 4 µF, 1 × 32 µF | 0 | 2.5 | 1 × 4 µF, 1 × 8 µF |
| 45 | 0 | 5.7 | 1 × 2 µF, 1 × 4 µF, 1 × 8 µF | 0 | 3.2 | 1 × 2 µF |
| 50 | 0 | 6.4 | 2 × 2 µF | 0 | 3.9 | 1 × 2 µF, 1 × 8 µF |
| 60 | 1 | 0.8 | 1 × 8 µF | 0 | 5.4 | 1 × 2 µF, 1 × 4 µF, 1 × 16 µF |
| 70 | 1 | 2.3 | 1 × 4 µF, 1 × 16 µF, 1 × 32 µF | 0 | 6.9 | 2 × 2 µF, 1 × 16 µF |
| 80 | 1 | 3.7 | 1 × 2 µF, 1 × 16 µF, 1 × 32 µF | 1 | 1.2 | 1 × 8 µF, 1 × 16 µF |
| 90 | 1 | 5.2 | 1 × 2 µF, 1 × 4 µF, 1 × 16 µF | 1 | 2.7 | 1 × 4 µF, 1 × 8 µF, 1 × 32 µF |
| 100 | 1 | 6.6 | 2 × 2 µF, 1 × 32 µF | 1 | 4.1 | 1 × 2 µF, 1 × 8 µF, 1 × 32 µF |
| 110 | 2 | 1 | 1 × 8 µF, 1 × 32 µF | 1 | 5.6 | 1 × 2 µF, 1 × 4 µF, 1 × 8 µF |
| 120 | 2 | 2.5 | 1 × 4 µF, 1 × 8 µF | 1 | 7 | 2 × 2 µF, 1 × 16 µF, 1 × 32 µF |
| 130 | 2 | 3.9 | 1 × 2 µF, 1 × 8 µF | 2 | 1.4 | 1 × 8 µF, 1 × 16 µF, 1 × 32 µF |
| 140 | 2 | 5.4 | 1 × 2 µF, 1 × 4 µF, 1 × 16 µF | 2 | 2.9 | 1 × 4 µF, 1 × 8 µF, 1 × 16 µF |
| 150 | 2 | 6.8 | 2 × 2 µF, 1 × 16 µF | 2 | 4.3 | 1 × 2 µF, 1 × 8 µF, 1 × 16 µF |

23545259/EN – 05/2020

| Routing in the profile section system (60 A) | | | | | | |
|---|---|---|---|---|---|---|
| | 4 kW supply | | | 16 kW supply | | |
| **Track length l in m** | **Number of compensation boxes** | **$X_L$ to be compensated in the TAS in Ω** | **Suggestions regarding startup / installation in TAS** | **Number of compensation boxes** | **$X_L$ to be compensated in the TAS in Ω** | **Suggestions regarding startup / installation in TAS** |
| 160 | – | – | – | 2 | 5.8 | 1 × 2 µF, 1 × 4 µF, 1 × 8 µF, 1 × 32 µF |
| 170 | – | – | – | 3 | 0.2 | 1 × 32 µF |
| 180 | – | – | – | 3 | 1.6 | 1 × 4 µF |
| 190 | – | – | – | 3 | 3.1 | 1 × 4 µF, 1 × 8 µF, 1 × 16 µF, 1 × 32 µF |
| 200 | – | – | – | 3 | 4.5 | 1 × 2 µF, 1 × 8 µF, 1 × 16 µF, 1 × 32 µF |

23545259/EN – 05/2020

# 10 Service

## 10.1 Maintenance

### 10.1.1 Introduction

The MOVITRANS® system for contactless energy transfer by SEW-EURODRIVE is a wear-free system.

Nevertheless, SEW-EURODRIVE recommends performing preventive checks at regular intervals. Check the following components once per year:

### 10.1.2 Compensation

The MOVITRANS® TLS line cables in the system are compensated using capacitors. The capacity of these capacitors changes slightly depending on the length of service life. After a while, the track compensation is no longer optimal, which may result in an increased energy consumption, among other things.

For this reason, you must check the compensation. You can check and optimize the current settings using the MOVITOOLS® MotionStudio software package.

### 10.1.3 Line cable connections

A constant current (60 A or 85 A) flows through the MOVITRANS® TLS line cable. If screws at the connection points become loose over time, this can cause increased transition resistances. These resistances result in power losses and excessive heat.

Therefore, check the screw connections on the connection points. You can also check the connections during operation using IR temperature measurements. A value of T < 80 °C is correct.

### 10.1.4 Equipotential bonding

Equipotential bonding between the electrical components on the vehicles of the system can be adversely affected by vibrations. Vibrations are caused by movements of the vehicles, for example.

For this reason, you must check the equipotential bonding. Checking the equipotential bonding maintains the preventive measures for the vehicles.

### 10.1.5 ESD protection

Protection against electromagnetic discharge can be performed in a number of different ways. The variants (copper band, brushes, etc.) are subject to different levels of mechanical wear depending on the design.

To ensure protection against electrostatic charging in the long term, check the condition of the ESD protection. If mechanical wear occurs, replace the ESD protection immediately.

23545259/EN – 05/2020

# 11 Appendix

## 11.1 Formula symbol

| Formula symbol | Meaning | Unit |
|---|---|---|
| $a$ | Acceleration | m $s^{-2}$ |
| $f_1$ | Input frequency, pick-ups | Hz |
| $F_{dyn}$ | Force applied by the motor to move the vehicle. | N |
| $F_{tr}$ | Force of resistance to vehicle motion | N |
| $l_{curve\_tot}$ | Total length of all curves | m |
| $l_{str\_tot}$ | Total length of all straight track sections | m |
| $l_{TCS}$ | Line cable length after which a TCS compensation box must be installed. | m |
| $l_{TISF}$ | Length of the TIS...-F.. flexible profile section | m |
| $l_{TISP}$ | Length of the TIS...-P.. rigid profile section | m |
| $l_{TLS\_tot}$ | Total length of the line cable | m |
| $l_{TLS}$ | Length of the line cable | m |
| $l_{tr\_tot}$ | Total length of the transmission path | m |
| $n_{TCS}$ | Number of TCS compensation boxes | Piece |
| $n_{TISF\_fl}$ | Number of flexible profile sections (supply cable) | Piece |
| $n_{TISF\_bl}$ | Number of flexible profile sections (return cable) | Piece |
| $n_{TISP\_fl}$ | Number of rigid profile sections (supply cable) | Piece |
| $n_{TISP\_bl}$ | Number of rigid profile sections (return cable) | Piece |
| $P_{1\_TPM}$ | Available power in the TPM mobile converter | W |
| $P_{2\_pickup}$ | Output of the pick-up | W |
| $P_{2\_TLS}$ | Transmission power of the TLS line cable | W |
| $P_{2\_TLS\_pk}$ | Peak power of the TLS line cable | W |
| $P_{2\_TPS}$ | Effective power of the system | W |
| $P_{2\_TPS\_pk}$ | Electrical peak power of the system | W |
| $P_{2\_veh}$ | Electrical effective power that is available for the vehicles on the transmission path. | W |
| $P_{2\_veh\_pk}$ | Electrical peak power that is available for the vehicles on the transmission path. | W |
| $P_{2\_TPM}$ | Output power of the TPM mobile converter | W |
| $P_{ind\_loss}$ | Cable power loss per track meter due to induction | W $m^{-1}$ |
| $P_{loss}$ | Cable power loss per track meter | W $m^{-1}$ |
| $P_N$ | Rated power | W |
| $P_{N\_TPS}$ | Rated power of the MOVITRANS® TPS stationary converter | W |
| $P_{pickup\_loss}$ | Power loss of the pick-up | W |
| $P_{TAS\_loss}$ | Power loss of the TAS transformer module | W |

| Formula symbol | Meaning | Unit |
|---|---|---|
| $P_{TPM\_loss}$ | Power loss of the TPM mobile converter | W |
| $P_{TLS\_loss}$ | Power loss of the TLS line cable | W |
| $P_{veh1}$ | Required dynamic (mechanical) power for acceleration | W |
| $P_{veh2}$ | Required static (mechanical) power for constant travel | W |
| $P_{veh1\_tot}$ | Maximum (electrical) power to be consumed by the vehicle for operation via MOVITRANS®. | W |
| $P_{veh2\_tot}$ | Static (electrical) power to be consumed by the vehicle for constant travel via MOVITRANS®. | W |
| $Q_{C\_fix}$ | Track-independent reactive power<br>(affected by the quantification of the capacitor capacities) | var |
| $Q_{tot}$ | Track-dependent reactive power of the system | var |
| $Q_{var}$ | Track-dependent reactive power<br>(affected by the track-related component tolerances) | var $m^{-1}$ |
| V | Speed | m $s^{-1}$ |
| $x_1$ | Distance supply unit/transmission path | m |
| $x_2$ | Distance TCS compensation box/transmission path | m |
| $X_L$ | Inductive resistance | Ω |
| $\eta_G$ | Efficiency of the gear unit | – |

## 11.2 Questionnaire – Project planning for MOVITRANS®

### INFORMATION

To be properly prepared for project planning of the MOVITRANS® system components, fill out the following questionnaire. Send the questionnaire to the responsible contact persons from SEW-EURODRIVE.

23545259/EN – 05/2020

# Questionnaire for MOVITRANS® – Project planning

SEW EURODRIVE

**Important note:**
Please send your filled-in project inquiry including any other documents (functional description, Workbench file, sketch, drawing, layout, etc.) to the following e-mail address: **movitrans@sew-eurodrive.de**

## Contact person

**Ordering party** (company, place)

SEW-EURODRIVE customer no.

**Industry sector**

**Contact person** (name)

**Phone**

**E-mail**

**Date**

## Application type

**Application type (please tick the appropriate answer)**

- ☐ Storage/retrieval system
- ☐ Conveyor trolley
- ☐ Skillet with lift table
- ☐ Electrified monorail system
- ☐ Floor conveyor system
- ☐ Conveyor system in logistics centers
- ☐ Other, please enter

## Mobile power supply (vehicle)

**Number of drives:**

| | | | | | | |
|---|---|---|---|---|---|---|
| **Drive 1** | Nominal drive power | | kW | Peak drive power | | kW |
| **Drive 2** | Nominal drive power | | kW | Peak drive power | | kW |
| **Drive 3** | Nominal drive power | | kW | Peak drive power | | kW |
| **Drive 4** | Nominal drive power | | kW | Peak drive power | | kW |

2268 1264 / 0720

## Mobile power supply (vehicle)

**Consumer**

Motor with inverter from SEW-EURODRIVE ☐ Motor with third-party inverter ☐

DC converter (24 V) ☐ No ☐ Yes, power rating

Other:

**24 V level**

☐ Sensor technology A ☐ Controller A ☐ Motor brake A

Other: A

## Stationary power supply (supply unit and track)

Track length m

Number of track sections (e.g. emergency off areas)

Number of mobile consumers per track section

Concurrency factor: How many vehicles drive and accelerate simultaneously on the travel section?

**Environment**

Distance, line cable/pick-up mm

Is there ferromagnetic material in the vicinity of the line cable? ☐ No ☐ Yes, distance cm

Ambient temperature from °C to °C

More

(e.g. explosion-protected area, chemical influence, etc.)

**Line cable**

Routing in the floor ☐ Routing in a guide profile ☐

Other information

Send to SEW-EURODRIVE

# 12 Address list

| | | | |
|---|---|---|---|
| **Argentina** | | | |
| Assembly<br>Sales | Buenos Aires | SEW EURODRIVE ARGENTINA S.A.<br>Ruta Panamericana Km 37.5, Lote 35<br>(B1619IEA) Centro Industrial Garín<br>Prov. de Buenos Aires | Tel. +54 3327 4572-84<br>Fax +54 3327 4572-21<br>http://www.sew-eurodrive.com.ar<br>sewar@sew-eurodrive.com.ar |
| **Australia** | | | |
| Assembly<br>Sales<br>Service | Melbourne | SEW-EURODRIVE PTY. LTD.<br>27 Beverage Drive<br>Tullamarine, Victoria 3043 | Tel. +61 3 9933-1000<br>Fax +61 3 9933-1003<br>http://www.sew-eurodrive.com.au<br>enquires@sew-eurodrive.com.au |
| | Sydney | SEW-EURODRIVE PTY. LTD.<br>9, Sleigh Place, Wetherill Park<br>New South Wales, 2164 | Tel. +61 2 9725-9900<br>Fax +61 2 9725-9905<br>enquires@sew-eurodrive.com.au |
| **Austria** | | | |
| Assembly<br>Sales<br>Service | Vienna | SEW-EURODRIVE Ges.m.b.H.<br>Richard-Strauss-Straße 24<br>1230 Wien | Tel. +43 1 617 55 00-0<br>Fax +43 1 617 55 00-30<br>http://www.sew-eurodrive.at<br>sew@sew-eurodrive.at |
| **Bangladesh** | | | |
| Sales | Bangladesh | SEW-EURODRIVE INDIA PRIVATE LIMITED<br>345 DIT Road<br>East Rampura<br>Dhaka-1219, Bangladesh | Tel. +88 01729 097309<br>salesdhaka@seweurodrivebangladesh.com |
| **Belarus** | | | |
| Sales | Minsk | Foreign unitary production enterprise SEW-EURODRIVE<br>RybalkoStr. 26<br>220033 Minsk | Tel. +375 17 298 47 56 / 298 47 58<br>Fax +375 17 298 47 54<br>http://www.sew.by<br>sales@sew.by |
| **Belgium** | | | |
| Assembly<br>Sales<br>Service | Brussels | SEW-EURODRIVE n.v./s.a.<br>Researchpark Haasrode 1060<br>Evenementenlaan 7<br>3001 Leuven | Tel. +32 16 386-311<br>Fax +32 16 386-336<br>http://www.sew-eurodrive.be<br>info@sew-eurodrive.be |
| Service Competence Center | Industrial Gears | SEW-EURODRIVE n.v./s.a.<br>Rue du Parc Industriel, 31<br>6900 Marche-en-Famenne | Tel. +32 84 219-878<br>Fax +32 84 219-879<br>http://www.sew-eurodrive.be<br>info@sew.be |
| **Brazil** | | | |
| Production<br>Sales<br>Service | São Paulo | SEW-EURODRIVE Brasil Ltda.<br>Estrada Municipal José Rubim, 205 – Rodovia Santos Dumont Km 49<br>Indaiatuba – 13347-510 – SP | Tel. +55 19 3835-8000<br>sew@sew.com.br |
| Assembly<br>Sales<br>Service | Rio Claro | SEW-EURODRIVE Brasil Ltda.<br>Rodovia Washington Luiz, Km 172<br>Condomínio Industrial Conpark<br>Caixa Postal: 327<br>13501-600 – Rio Claro / SP | Tel. +55 19 3522-3100<br>Fax +55 19 3524-6653<br>montadora.rc@sew.com.br |
| | Joinville | SEW-EURODRIVE Brasil Ltda. Jvl / Ind<br>Rua Dona Francisca, 12.346 – Pirabeiraba<br>89239-270 – Joinville / SC | Tel. +55 47 3027-6886<br>Fax +55 47 3027-6888<br>filial.sc@sew.com.br |
| **Bulgaria** | | | |
| Sales | Sofia | BEVER-DRIVE GmbH<br>Bogdanovetz Str.1<br>1606 Sofia | Tel. +359 2 9151160<br>Fax +359 2 9151166<br>bever@bever.bg |

23545259/EN – 05/2020

| | | | |
|---|---|---|---|
| **Cameroon** | | | |
| Sales | Douala | SEW-EURODRIVE S.A.R.L.<br>Ancienne Route Bonabéri<br>P.O. Box<br>B.P 8674<br>Douala-Cameroun | Tel. +237 233 39 02 10<br>Fax +237 233 39 02 10<br>sew@sew-eurodrive-cm |
| **Canada** | | | |
| Assembly<br>Sales<br>Service | Toronto | SEW-EURODRIVE CO. OF CANADA LTD.<br>210 Walker Drive<br>Bramalea, ON L6T 3W1 | Tel. +1 905 791-1553<br>Fax +1 905 791-2999<br>http://www.sew-eurodrive.ca<br>l.watson@sew-eurodrive.ca |
| | Vancouver | SEW-EURODRIVE CO. OF CANADA LTD.<br>Tilbury Industrial Park<br>7188 Honeyman Street<br>Delta, BC V4G 1G1 | Tel. +1 604 946-5535<br>Fax +1 604 946-2513<br>b.wake@sew-eurodrive.ca |
| | Montreal | SEW-EURODRIVE CO. OF CANADA LTD.<br>2001 Ch. de l'Aviation<br>Dorval<br>Quebec H9P 2X6 | Tel. +1 514 367-1124<br>Fax +1 514 367-3677<br>n.paradis@sew-eurodrive.ca |
| **Chile** | | | |
| Assembly<br>Sales<br>Service | Santiago de Chile | SEW-EURODRIVE CHILE LTDA<br>Las Encinas 1295<br>Parque Industrial Valle Grande<br>LAMPA<br>Santiago de Chile<br>P.O. Box<br>Casilla 23 Correo Quilicura - Santiago - Chile | Tel. +56 2 2757 7000<br>Fax +56 2 2757 7001<br>http://www.sew-eurodrive.cl<br>ventas@sew-eurodrive.cl |
| **China** | | | |
| Production<br>Assembly<br>Sales<br>Service | Tianjin | SEW-EURODRIVE (Tianjin) Co., Ltd.<br>No. 78, 13th Avenue, TEDA<br>Tianjin 300457 | Tel. +86 22 25322612<br>Fax +86 22 25323273<br>http://www.sew-eurodrive.cn<br>info@sew-eurodrive.cn |
| Assembly<br>Sales<br>Service | Suzhou | SEW-EURODRIVE (Suzhou) Co., Ltd.<br>333, Suhong Middle Road<br>Suzhou Industrial Park<br>Jiangsu Province, 215021 | Tel. +86 512 62581781<br>Fax +86 512 62581783<br>suzhou@sew-eurodrive.cn |
| | Guangzhou | SEW-EURODRIVE (Guangzhou) Co., Ltd.<br>No. 9, JunDa Road<br>East Section of GETDD<br>Guangzhou 510530 | Tel. +86 20 82267890<br>Fax +86 20 82267922<br>guangzhou@sew-eurodrive.cn |
| | Shenyang | SEW-EURODRIVE (Shenyang) Co., Ltd.<br>10A-2, 6th Road<br>Shenyang Economic Technological Develop-ment Area<br>Shenyang, 110141 | Tel. +86 24 25382538<br>Fax +86 24 25382580<br>shenyang@sew-eurodrive.cn |
| | Taiyuan | SEW-EURODRIVE (Taiyuan) Co,. Ltd.<br>No.3, HuaZhang Street,<br>TaiYuan Economic & Technical Development Zone<br>ShanXi, 030032 | Tel. +86-351-7117520<br>Fax +86-351-7117522<br>taiyuan@sew-eurodrive.cn |
| | Wuhan | SEW-EURODRIVE (Wuhan) Co., Ltd.<br>10A-2, 6th Road<br>No. 59, the 4th Quanli Road, WEDA<br>430056 Wuhan | Tel. +86 27 84478388<br>Fax +86 27 84478389<br>wuhan@sew-eurodrive.cn |
| | Xi'An | SEW-EURODRIVE (Xi'An) Co., Ltd.<br>No. 12 Jinye 2nd Road<br>Xi'An High-Technology Industrial Development Zone<br>Xi'An 710065 | Tel. +86 29 68686262<br>Fax +86 29 68686311<br>xian@sew-eurodrive.cn |
| Sales<br>Service | Hong Kong | SEW-EURODRIVE LTD.<br>Unit No. 801-806, 8th Floor<br>Hong Leong Industrial Complex<br>No. 4, Wang Kwong Road<br>Kowloon, Hong Kong | Tel. +852 36902200<br>Fax +852 36902211<br>contact@sew-eurodrive.hk |

23545259/EN – 05/2020

| Colombia | | | |
|---|---|---|---|
| Assembly<br>Sales<br>Service | Bogota | SEW-EURODRIVE COLOMBIA LTDA.<br>Calle 17 No. 132-18<br>Interior 2 Bodega 6, Manzana B<br>Santafé de Bogotá | Tel. +57 1 54750-50<br>Fax +57 1 54750-44<br>http://www.sew-eurodrive.com.co<br>sew@sew-eurodrive.com.co |

| Croatia | | | |
|---|---|---|---|
| Sales<br>Service | Zagreb | KOMPEKS d. o. o.<br>Zeleni dol 10<br>10 000 Zagreb | Tel. +385 1 4613-158<br>Fax +385 1 4613-158<br>kompeks@inet.hr |

| Czech Republic | | | |
|---|---|---|---|
| Assembly<br>Sales<br>Service | Hostivice | SEW-EURODRIVE CZ s.r.o.<br>Floriánova 2459<br>253 01 Hostivice | Tel. +420 255 709 601<br>Fax +420 235 350 613<br>http://www.sew-eurodrive.cz<br>sew@sew-eurodrive.cz |

| Denmark | | | |
|---|---|---|---|
| Assembly<br>Sales<br>Service | Copenhagen | SEW-EURODRIVEA/S<br>Geminivej 28-30<br>2670 Greve | Tel. +45 43 95 8500<br>Fax +45 43 9585-09<br>http://www.sew-eurodrive.dk<br>sew@sew-eurodrive.dk |
| Service | Vejle | SEW-EURODRIVE A/S<br>Bødkervej 2<br>7100 Vejle | Tel. +45 43 9585 00<br>http://www.sew-eurodrive.dk<br>sew@sew-eurodrive.dk |

| Egypt | | | |
|---|---|---|---|
| Sales<br>Service | Cairo | Copam Egypt<br>for Engineering & Agencies<br>Building 10, Block 13005, First Industrial Zone,<br>Obour City Cairo | Tel. +202 44812673 / 79 (7 lines)<br>Fax +202 44812685<br>http://www.copam-egypt.com<br>copam@copam-egypt.com |

| Estonia | | | |
|---|---|---|---|
| Sales | Tallin | ALAS-KUUL AS<br>Loomäe tee 1, Lehmja küla<br>75306 Rae vald Harjumaa | Tel. +372 6593230<br>Fax +372 6593231<br>http://www.alas-kuul.ee<br>info@alas-kuul.ee |

| Finland | | | |
|---|---|---|---|
| Assembly<br>Sales<br>Service | Hollola | SEW-EURODRIVE OY<br>Vesimäentie 4<br>15860 Hollola | Tel. +358 201 589-300<br>Fax +358 3 780-6211<br>http://www.sew-eurodrive.fi<br>sew@sew.fi |
| Service | Hollola | SEW-EURODRIVE OY<br>Keskikankaantie 21<br>15860 Hollola | Tel. +358 201 589-300<br>Fax +358 3 780-6211<br>http://www.sew-eurodrive.fi<br>sew@sew.fi |
| | Tornio | SEW-EURODRIVE Oy<br>Lossirannankatu 5<br>95420 Tornio | Tel. +358 201 589 300<br>Fax +358 3 780 6211<br>http://www.sew-eurodrive.fi<br>sew@sew.fi |
| Production<br>Assembly | Karkkila | SEW Industrial Gears Oy<br>Santasalonkatu 6, PL 8<br>03620 Karkkila, 03601 Karkkila | Tel. +358 201 589-300<br>Fax +358 201 589-310<br>http://www.sew-eurodrive.fi<br>sew@sew.fi |

| France | | | |
|---|---|---|---|
| Production<br>Sales<br>Service | Hagenau | SEW USOCOME<br>48-54 route de Soufflenheim<br>B. P. 20185<br>67506 Haguenau Cedex | Tel. +33 3 88 73 67 00<br>Fax +33 3 88 73 66 00<br>http://www.usocome.com<br>sew@usocome.com |
| Production | Forbach | SEW USOCOME<br>Zone industrielle<br>Technopôle Forbach Sud<br>B. P. 30269<br>57604 Forbach Cedex | Tel. +33 3 87 29 38 00 |
| | Brumath | SEW USOCOME<br>1 Rue de Bruxelles<br>67670 Mommenheim Cedex | Tel. +33 3 88 37 48 00 |

| France | | | |
|---|---|---|---|
| Assembly<br>Sales<br>Service | Bordeaux | SEW USOCOME<br>Parc d'activités de Magellan<br>62 avenue de Magellan – B. P. 182<br>33607 Pessac Cedex | Tel. +33 5 57 26 39 00<br>Fax +33 5 57 26 39 09 |
| | Lyon | SEW USOCOME<br>75 rue Antoine Condorcet<br>38090 Vaulx-Milieu | Tel. +33 4 74 99 60 00<br>Fax +33 4 74 99 60 15 |
| | Nantes | SEW USOCOME<br>Parc d’activités de la forêt<br>4 rue des Fontenelles<br>44140 Le Bignon | Tel. +33 2 40 78 42 00<br>Fax +33 2 40 78 42 20 |
| | Paris | SEW USOCOME<br>Zone industrielle<br>2 rue Denis Papin<br>77390 Verneuil I'Étang | Tel. +33 1 64 42 40 80<br>Fax +33 1 64 42 40 88 |

| Gabon |
|---|
| Representation: Cameroon |

| Germany | | | |
|---|---|---|---|
| Headquarters<br>Production<br>Sales | Bruchsal | SEW-EURODRIVE GmbH & Co KG<br>Ernst-Blickle-Straße 42<br>76646 Bruchsal | Tel. +49 7251 75-0<br>Fax +49 7251 75-1970<br>http://www.sew-eurodrive.de<br>sew@sew-eurodrive.de |
| Production / Industrial Gears | Bruchsal | SEW-EURODRIVE GmbH & Co KG<br>Christian-Pähr-Str. 10<br>76646 Bruchsal | Tel. +49 7251 75-0<br>Fax +49 7251 75-2970 |
| Production / Precision Gear Units | Bruchsal | SEW-EURODRIVE GmbH & Co KG<br>Ernst-Blickle-Straße 42<br>76646 Bruchsal | Tel. +49 7251 75-0<br>Fax +49 7251 75-1970<br>sew@sew-eurodrive.de |
| Production | Graben | SEW-EURODRIVE GmbH & Co KG<br>Ernst-Blickle-Straße 1<br>76676 Graben-Neudorf | Tel. +49 7251 75-0<br>Fax +49 7251-2970 |
| Service Competence Center | Mechanics / Mechatronics | SEW-EURODRIVE GmbH & Co KG<br>Ernst-Blickle-Straße 1<br>76676 Graben-Neudorf | Tel. +49 7251 75-1710<br>Fax +49 7251 75-1711<br>scc-mechanik@sew-eurodrive.de |
| | Electronics | SEW-EURODRIVE GmbH & Co KG<br>Christian-Pähr-Straße 12<br>76646 Bruchsal | Tel. +49 7251 75-1780<br>Fax +49 7251 75-1769<br>scc-elektronik@sew-eurodrive.de |
| | MAXOLUTION® Factory Automation | SEW-EURODRIVE GmbH & Co KG<br>Eisenbahnstraße 11<br>76646 Bruchsal | Tel. +49 7251 75-0<br>Fax +49 7251 75-1970<br>sew@sew-eurodrive.de |
| Drive Technology Center | North | SEW-EURODRIVE GmbH & Co KG<br>Alte Ricklinger Straße 43<br>30823 Garbsen (Hannover) | Tel. +49 5137 8798-30<br>Fax +49 5137 8798-55<br>dtc-nord@sew-eurodrive.de |
| | East | SEW-EURODRIVE GmbH & Co KG<br>Dänkritzer Weg 1<br>08393 Meerane (Zwickau) | Tel. +49 3764 7606-0<br>Fax +49 3764 7606-20<br>dtc-ost@sew-eurodrive.de |
| | South | SEW-EURODRIVE GmbH & Co KG<br>Domagkstraße 5<br>85551 Kirchheim (München) | Tel. +49 89 909551-21<br>Fax +49 89 909551-50<br>dtc-sued@sew-eurodrive.de |
| | West | SEW-EURODRIVE GmbH & Co KG<br>Siemensstraße 1<br>40764 Langenfeld (Düsseldorf) | Tel. +49 2173 8507-10<br>Fax +49 2173 8507-50<br>dtc-west@sew-eurodrive.de |
| Drive Center | Berlin | SEW-EURODRIVE GmbH & Co KG<br>Alexander-Meißner-Straße 44<br>12526 Berlin | Tel. +49 306331131-30<br>Fax +49 306331131-36<br>dc-berlin@sew-eurodrive.de |
| | Hamburg | SEW-EURODRIVE GmbH & Co KG<br>Hasselbinnen 44<br>22869 Schenefeld | Tel. +49 40298109-60<br>Fax +49 40298109-70<br>dc-hamburg@sew-eurodrive.de |
| | Ludwigshafen | SEW-EURODRIVE GmbH & Co KG<br>c/o BASF SE<br>c/o BASF SE Gebäude W130<br>67056 Ludwigshafen | Tel. +49 7251 75 3759<br>Fax +49 7251 75 503759<br>dc-ludwigshafen@sew-eurodrive.de |

23545259/EN – 05/2020

| Germany | | | |
|---|---|---|---|
| | Saarland | SEW-EURODRIVE GmbH & Co KG<br>Gottlieb-Daimler-Straße 4<br>66773 Schwalbach Saar – Hülzweiler | Tel. +49 6831 48946 10<br>Fax +49 6831 48946 13<br>dc-saarland@sew-eurodrive.de |
| | Ulm | SEW-EURODRIVE GmbH & Co KG<br>Dieselstraße 18<br>89160 Dornstadt | Tel. +49 7348 9885-0<br>Fax +49 7348 9885-90<br>dc-ulm@sew-eurodrive.de |
| | Würzburg | SEW-EURODRIVE GmbH & Co KG<br>Nürnbergerstraße 118<br>97076 Würzburg-Lengfeld | Tel. +49 931 27886-60<br>Fax +49 931 27886-66<br>dc-wuerzburg@sew-eurodrive.de |
| Drive Service Hotline / 24 Hour Service | | | 0 800 SEWHELP<br>0 800 7394357 |
| **Great Britain** | | | |
| Assembly<br>Sales<br>Service | Normanton | SEW-EURODRIVE Ltd.<br>DeVilliers Way<br>Trident Park<br>Normanton<br>West Yorkshire<br>WF6 1GX | Tel. +44 1924 893-855<br>Fax +44 1924 893-702<br>http://www.sew-eurodrive.co.uk<br>info@sew-eurodrive.co.uk |
| **Greece** | | | |
| Sales | Athens | Christ. Boznos & Son S.A.<br>12, K. Mavromichali Street<br>P.O. Box 80136<br>18545 Piraeus | Tel. +30 2 1042 251-34<br>Fax +30 2 1042 251-59<br>http://www.boznos.gr<br>info@boznos.gr |
| **Hungary** | | | |
| Sales<br>Service | Budapest | SEW-EURODRIVE Kft.<br>Csillaghegyí út 13.<br>1037 Budapest | Tel. +36 1 437 06-58<br>Fax +36 1 437 06-50<br>http://www.sew-eurodrive.hu<br>office@sew-eurodrive.hu |
| **Iceland** | | | |
| Sales | Reykjavik | Varma & Vélaverk ehf.<br>Knarrarvogi 4<br>104 Reykjavík | Tel. +354 585 1070<br>Fax +354 585)1071<br>https://vov.is/<br>vov@vov.is |
| **India** | | | |
| Registered Office<br>Assembly<br>Sales<br>Service | Vadodara | SEW-EURODRIVE India Private Limited<br>Plot No. 4, GIDC<br>POR Ramangamdi • Vadodara - 391 243<br>Gujarat | Tel. +91 265 3045200<br>Fax +91 265 3045300<br>http://www.seweurodriveindia.com<br>salesvadodara@seweurodriveindia.com |
| Assembly<br>Sales<br>Service | Chennai | SEW-EURODRIVE India Private Limited<br>Plot No. K3/1, Sipcot Industrial Park Phase II<br>Mambakkam Village<br>Sriperumbudur - 602105<br>Kancheepuram Dist, Tamil Nadu | Tel. +91 44 37188888<br>Fax +91 44 37188811<br>saleschennai@seweurodriveindia.com |
| | Pune | SEW-EURODRIVE India Private Limited<br>Plant: Plot No. D236/1,<br>Chakan Industrial Area Phase- II,<br>Warale, Tal- Khed,<br>Pune-410501, Maharashtra | Tel. +91 21 35 628700<br>Fax +91 21 35 628715<br>salespune@seweurodriveindia.com |
| Sales<br>Service | Gurgaon | SEW-EURODRIVE India Private Limited<br>Drive Center Gurugram<br>Plot no 395, Phase-IV, UdyogVihar<br>Gurugram , 122016 Haryana | Tel. +91 99588 78855<br>salesgurgaon@seweurodriveindia.com |
| **Indonesia** | | | |
| Sales | Medan | PT. Serumpun Indah Lestari<br>Jl.Pulau Solor no. 8, Kawasan Industri Medan II<br>Medan 20252 | Tel. +62 61 687 1221<br>Fax +62 61 6871429 / +62 61 6871458 / +62 61 30008041<br>sil@serumpunindah.com<br>serumpunindah@yahoo.com<br>http://www.serumpunindah.com |

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| **Indonesia** | | | |
| | Jakarta | PT. Cahaya Sukses Abadi<br>Komplek Rukan Puri Mutiara Blok A no 99, Sunter<br>Jakarta 14350 | Tel. +62 21 65310599<br>Fax +62 21 65310600<br>csajkt@cbn.net.id |
| | Jakarta | PT. Agrindo Putra Lestari<br>JL.Pantai Indah Selatan, Komplek Sentra Industri Terpadu, Pantai indah Kapuk Tahap III, Blok E No. 27<br>Jakarta 14470 | Tel. +62 21 2921-8899<br>Fax +62 21 2921-8988<br>aplindo@indosat.net.id<br>http://www.aplindo.com |
| | Surabaya | PT. TRIAGRI JAYA ABADI<br>Jl. Sukosemolo No. 63, Galaxi Bumi Permai G6 No. 11<br>Surabaya 60111 | Tel. +62 31 5990128<br>Fax +62 31 5962666<br>sales@triagri.co.id<br>http://www.triagri.co.id |
| | Surabaya | CV. Multi Mas<br>Jl. Raden Saleh 43A Kav. 18<br>Surabaya 60174 | Tel. +62 31 5458589<br>Fax +62 31 5317220<br>sianhwa@sby.centrin.net.id<br>http://www.cvmultimas.com |
| **Ireland** | | | |
| Sales<br>Service | Dublin | Alperton Engineering Ltd.<br>48 Moyle Road<br>Dublin Industrial Estate<br>Glasnevin, Dublin 11 | Tel. +353 1 830-6277<br>Fax +353 1 830-6458<br>http://www.alperton.ie<br>info@alperton.ie |
| **Israel** | | | |
| Sales | Tel Aviv | Liraz Handasa Ltd.<br>Ahofer Str 34B / 228<br>58858 Holon | Tel. +972 3 5599511<br>Fax +972 3 5599512<br>http://www.liraz-handasa.co.il<br>office@liraz-handasa.co.il |
| **Italy** | | | |
| Assembly<br>Sales<br>Service | Milan | SEW-EURODRIVE S.a.s. di SEW S.r.l. & Co.<br>Via Bernini,12<br>20020 Solaro (Milano) | Tel. +39 02 96 980229<br>Fax +39 02 96 980 999<br>http://www.sew-eurodrive.it<br>milano@sew-eurodrive.it |
| **Ivory Coast** | | | |
| Sales | Abidjan | SEW-EURODRIVE SARL<br>Ivory Coast<br>Rue des Pêcheurs, Zone 3<br>26 BP 916 Abidjan 26 | Tel. +225 21 21 81 05<br>Fax +225 21 25 30 47<br>info@sew-eurodrive.ci<br>http://www.sew-eurodrive.ci |
| **Japan** | | | |
| Assembly<br>Sales<br>Service | Iwata | SEW-EURODRIVE JAPAN CO., LTD<br>250-1, Shimoman-no,<br>Iwata<br>Shizuoka 438-0818 | Tel. +81 538 373811<br>Fax +81 538 373814<br>http://www.sew-eurodrive.co.jp<br>sewjapan@sew-eurodrive.co.jp |
| **Kazakhstan** | | | |
| Sales<br>Service | Almaty | SEW-EURODRIVE LLP<br>291-291A, Tole bi street<br>050031, Almaty | Tel. +7 (727) 350 5156<br>Fax +7 (727) 350 5156<br>http://www.sew-eurodrive.kz<br>sew@sew-eurodrive.kz |
| | Tashkent | Representative Office SEW-EURODRIVE<br>Representative office in Uzbekistan<br>95A Amir Temur ave, office 401/3<br>100084 Tashkent | Tel. +998 97 134 01 99<br>Fax<br>http://www.sew-eurodrive.uz<br>sew@sew-eurodrive.uz |
| | Ulaanbaatar | IM Trading LLC<br>Olympic street 28B/3<br>Sukhbaatar district,<br>Ulaanbaatar 14230, MN | Tel. +976-77109997<br>Fax +976-77109997<br>imt@imt.mn |
| **Latvia** | | | |
| Sales | Riga | SIA Alas-Kuul<br>Katlakalna 11C<br>1073 Riga | Tel. +371 6 7139253<br>Fax +371 6 7139386<br>http://www.alas-kuul.lv<br>info@alas-kuul.com |

23545259/EN – 05/2020

| Lebanon | | | |
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| Sales (Lebanon) | Beirut | Gabriel Acar & Fils sarl<br>B. P. 80484<br>Bourj Hammoud, Beirut | Tel. +961 1 510 532<br>Fax +961 1 494 971<br>ssacar@inco.com.lb |
| Sales (Jordan, Kuwait , Saudi Arabia, Syria) | Beirut | Middle East Drives S.A.L. (offshore)<br>Sin El Fil.<br>B. P. 55-378<br>Beirut | Tel. +961 1 494 786<br>Fax +961 1 494 971<br>http://www.medrives.com<br>info@medrives.com |

| Lithuania | | | |
|---|---|---|---|
| Sales | Alytus | UAB Irseva<br>Statybininku 106C<br>63431 Alytus | Tel. +370 315 79204<br>Fax +370 315 56175<br>http://www.irseva.lt<br>irmantas@irseva.lt |

| Luxembourg |
|---|
| Representation: Belgium |

| Macedonia | | | |
|---|---|---|---|
| Sales | Skopje | Boznos DOOEL<br>Dime Anicin 2A/7A<br>1000 Skopje | Tel. +389 23256553<br>Fax +389 23256554<br>http://www.boznos.mk |

| Malaysia | | | |
|---|---|---|---|
| Assembly<br>Sales<br>Service | Johor | SEW-EURODRIVE SDN BHD<br>No. 95, Jalan Seroja 39, Taman Johor Jaya<br>81000 Johor Bahru, Johor<br>West Malaysia | Tel. +60 7 3549409<br>Fax +60 7 3541404<br>sales@sew-eurodrive.com.my |

| Mexico | | | |
|---|---|---|---|
| Assembly<br>Sales<br>Service | Quéretaro | SEW-EURODRIVE MEXICO S.A. de C.V.<br>SEM-981118-M93<br>Tequisquiapan No. 102<br>Parque Industrial Quéretaro<br>C.P. 76220<br>Querétaro, México | Tel. +52 442 1030-300<br>Fax +52 442 1030-301<br>http://www.sew-eurodrive.com.mx<br>scmexico@seweurodrive.com.mx |
| Sales<br>Service | Puebla | SEW-EURODRIVE MEXICO S.A. de C.V.<br>Calzada Zavaleta No. 3922 Piso 2 Local 6<br>Col. Santa Cruz Buenavista<br>C.P. 72154<br>Puebla, México | Tel. +52 (222) 221 248<br>http://www.sew-eurodrive.com.mx<br>scmexico@seweurodrive.com.mx |

| Mongolia | | | |
|---|---|---|---|
| Technical Office | Ulaanbaatar | IM Trading LLC<br>Olympic street 28B/3<br>Sukhbaatar district,<br>Ulaanbaatar 14230, MN | Tel. +976-77109997<br>Tel. +976-99070395<br>Fax +976-77109997<br>http://imt.mn/<br>imt@imt.mn |

| Morocco | | | |
|---|---|---|---|
| Sales<br>Service<br>Assembly | Bouskoura | SEW-EURODRIVE Morocco SARL<br>Parc Industriel CFCIM, Lot. 55/59<br>27182 Bouskoura<br>Grand Casablanca | Tel. +212 522 88 85 00<br>Fax +212 522 88 84 50<br>http://www.sew-eurodrive.ma<br>sew@sew-eurodrive.ma |

| Namibia | | | |
|---|---|---|---|
| Sales | Swakopmund | DB MINING & INDUSTRIAL SUPPLIES CC<br>Einstein Street<br>Strauss Industrial Park<br>Unit1<br>Swakopmund | Tel. +264 64 462 738<br>Fax +264 64 462 734<br>anton@dbminingnam.com |

| Netherlands | | | |
|---|---|---|---|
| Assembly<br>Sales<br>Service | Rotterdam | SEW-EURODRIVE B.V.<br>Industrieweg 175<br>3044 AS Rotterdam<br>Postbus 10085<br>3004 AB Rotterdam | Tel. +31 10 4463-700<br>Fax +31 10 4155-552<br>Service: 0800-SEWHELP<br>http://www.sew-eurodrive.nl<br>info@sew-eurodrive.nl |

23545259/EN – 05/2020

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| **New Zealand** | | | |
| Assembly<br>Sales<br>Service | Auckland | SEW-EURODRIVE NEW ZEALAND LTD.<br>P.O. Box 58-428<br>82 Greenmount drive<br>East Tamaki Auckland | Tel. +64 9 2745627<br>Fax +64 9 2740165<br>http://www.sew-eurodrive.co.nz<br>sales@sew-eurodrive.co.nz |
| | Christchurch | SEW-EURODRIVE NEW ZEALAND LTD.<br>30 Lodestar Avenue, Wigram<br>Christchurch | Tel. +64 3 384-6251<br>Fax +64 3 384-6455<br>sales@sew-eurodrive.co.nz |
| **Nigeria** | | | |
| Sales | Lagos | Greenpeg Nig. Ltd<br>Plot 296A, Adeyemo Akapo Str. Omole GRA<br>Ikeja Lagos-Nigeria | Tel. +234-701-821-9200-1<br>http://www.greenpegltd.com<br>sales@greenpegltd.com |
| **Norway** | | | |
| Assembly<br>Sales<br>Service | Moss | SEW-EURODRIVE A/S<br>Solgaard skog 71<br>1599 Moss | Tel. +47 69 24 10 20<br>Fax +47 69 24 10 40<br>http://www.sew-eurodrive.no<br>sew@sew-eurodrive.no |
| **Pakistan** | | | |
| Sales | Karachi | Industrial Power Drives<br>Al-Fatah Chamber A/3, 1st Floor Central Commercial Area,<br>Sultan Ahmed Shah Road, Block 7/8,<br>Karachi | Tel. +92 21 452 9369<br>Fax +92-21-454 7365<br>seweurodrive@cyber.net.pk |
| **Paraguay** | | | |
| Sales | Fernando de la Mora | SEW-EURODRIVE PARAGUAY S.R.L<br>De la Victoria 112, Esquina nueva Asunción<br>Departamento Central<br>Fernando de la Mora, Barrio Bernardino | Tel. +595 991 519695<br>Fax +595 21 3285539<br>sewpy@sew-eurodrive.com.py |
| **Peru** | | | |
| Assembly<br>Sales<br>Service | Lima | SEW EURODRIVE DEL PERU S.A.C.<br>Los Calderos, 120-124<br>Urbanizacion Industrial Vulcano, ATE, Lima | Tel. +51 1 3495280<br>Fax +51 1 3493002<br>http://www.sew-eurodrive.com.pe<br>sewperu@sew-eurodrive.com.pe |
| **Philippines** | | | |
| Sales | Makati | P.T. Cerna Corporation<br>4137 Ponte St., Brgy. Sta. Cruz<br>Makati City 1205 | Tel. +63 2 519 6214<br>Fax +63 2 890 2802<br>mech_drive_sys@ptcerna.com<br>http://www.ptcerna.com |
| **Poland** | | | |
| Assembly<br>Sales<br>Service | Łódź | SEW-EURODRIVE Polska Sp.z.o.o.<br>ul. Techniczna 5<br>92-518 Łódź | Tel. +48 42 293 00 00<br>Fax +48 42 293 00 49<br>http://www.sew-eurodrive.pl<br>sew@sew-eurodrive.pl |
| | Service | Tel. +48 42 293 0030<br>Fax +48 42 293 0043 | 24 Hour Service<br>Tel. +48 602 739 739 (+48 602 SEW SEW)<br>serwis@sew-eurodrive.pl |
| **Portugal** | | | |
| Assembly<br>Sales<br>Service | Coimbra | SEW-EURODRIVE, LDA.<br>Av. da Fonte Nova, n.º 86<br>3050-379 Mealhada | Tel. +351 231 20 9670<br>Fax +351 231 20 3685<br>http://www.sew-eurodrive.pt<br>infosew@sew-eurodrive.pt |
| **Romania** | | | |
| Sales<br>Service | Bucharest | Sialco Trading SRL<br>str. Brazilia nr. 36<br>011783 Bucuresti | Tel. +40 21 230-1328<br>Fax +40 21 230-7170<br>http://www.sialco.ro<br>sialco@sialco.ro |

23545259/EN – 05/2020

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| **Russia** | | | |
| Assembly<br>Sales<br>Service | St. Petersburg | ЗАО «СЕВ-ЕВРОДРАЙФ»<br>188660, Russia, Leningrad Region, Vse-volozhsky District, Korabselki, Aleksandra Nevskogo str.<br>building 4, block 1<br>P.O. Box 36<br>195220 St. Petersburg | Tel. +7 812 3332522 / +7 812 5357142<br>Fax +7 812 3332523<br>http://www.sew-eurodrive.ru<br>sew@sew-eurodrive.ru |
| **Senegal** | | | |
| Sales | Dakar | SENEMECA<br>Mécanique Générale<br>Km 8, Route de Rufisque<br>B.P. 3251, Dakar | Tel. +221 338 494 770<br>Fax +221 338 494 771<br>http://www.senemeca.com<br>senemeca@senemeca.sn |
| **Serbia** | | | |
| Sales | Belgrade | DIPAR d.o.o.<br>Ustanicka 128a<br>PC Košum, IV floor<br>11000 Beograd | Tel. +381 11 347 3244 / +381 11 288 0393<br>Fax +381 11 347 1337<br>office@dipar.rs |
| **Singapore** | | | |
| Assembly<br>Sales<br>Service | Singapore | SEW-EURODRIVE PTE. LTD.<br>No 9, Tuas Drive 2<br>Jurong Industrial Estate<br>Singapore 638644 | Tel. +65 68621701<br>Fax +65 68612827<br>http://www.sew-eurodrive.com.sg<br>sewsingapore@sew-eurodrive.com |
| **Slovakia** | | | |
| Sales | Bernolákovo | SEW-Eurodrive SK s.r.o.<br>Priemyselná ulica 6267/7<br>900 27 Bernolákovo | Tel.+421 2 33595 202, 217, 201<br>Fax +421 2 33595 200<br>http://www.sew-eurodrive.sk<br>sew@sew-eurodrive.sk |
| **Slovenia** | | | |
| Sales<br>Service | Celje | Pakman - Pogonska Tehnika d.o.o.<br>UI. XIV. divizije 14<br>3000 Celje | Tel. +386 3 490 83-20<br>Fax +386 3 490 83-21<br>pakman@siol.net |
| **South Africa** | | | |
| Assembly<br>Sales<br>Service | Johannesburg | SEW-EURODRIVE (PROPRIETARY) LIMITED<br>Eurodrive House<br>Cnr. Adcock Ingram and Aerodrome Roads<br>Aeroton Ext. 2<br>Johannesburg 2013<br>P.O.Box 90004<br>Bertsham 2013 | Tel. +27 11 248-7000<br>Fax +27 11 248-7289<br>http://www.sew.co.za<br>info@sew.co.za |
| | Cape Town | SEW-EURODRIVE (PROPRIETARY) LIMITED<br>Rainbow Park<br>Cnr. Racecourse & Omuramba Road<br>Montague Gardens<br>Cape Town<br>P.O.Box 36556<br>Chempet 7442 | Tel. +27 21 552-9820<br>Fax +27 21 552-9830<br>Telex 576 062<br>bgriffiths@sew.co.za |
| | Durban | SEW-EURODRIVE (PROPRIETARY) LIMITED<br>48 Prospecton Road<br>Isipingo<br>Durban<br>P.O. Box 10433, Ashwood 3605 | Tel. +27 31 902 3815<br>Fax +27 31 902 3826<br>cdejager@sew.co.za |
| | Nelspruit | SEW-EURODRIVE (PROPRIETARY) LIMITED<br>7 Christie Crescent<br>Vintonia<br>P.O.Box 1942<br>Nelspruit 1200 | Tel. +27 13 752-8007<br>Fax +27 13 752-8008<br>robermeyer@sew.co.za |
| **South Korea** | | | |
| Assembly<br>Sales<br>Service | Ansan | SEW-EURODRIVE Korea Co., Ltd.<br>7, Dangjaengi-ro,<br>Danwon-gu,<br>Ansan-si, Gyeonggi-do, Zip 425-839 | Tel. +82 31 492-8051<br>Fax +82 31 492-8056<br>http://www.sew-eurodrive.kr<br>master.korea@sew-eurodrive.com |

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| **South Korea** | | | |
| | Busan | SEW-EURODRIVE Korea Co., Ltd.<br>28, Noksansandan 262-ro 50beon-gil,<br>Gangseo-gu,<br>Busan, Zip 618-820 | Tel. +82 51 832-0204<br>Fax +82 51 832-0230 |
| Assembly<br>Service | Siheung | SEW-EURODRIVE Korea Co., Ltd.<br>35, Emtibeui 26-ro 58beon-gil,<br>Siheung-si, Gyeonggi-do | http://www.sew-eurodrive.kr |
| **Spain** | | | |
| Assembly<br>Sales<br>Service | Bilbao | SEW-EURODRIVE ESPAÑA, S.L.<br>Parque Tecnológico, Edificio, 302<br>48170 Zamudio (Vizcaya) | Tel. +34 94 43184-70<br>http://www.sew-eurodrive.es<br>sew.spain@sew-eurodrive.es |
| **Sri Lanka** | | | |
| Sales | Colombo | SM International (Pte) Ltd<br>254, Galle Raod<br>Colombo 4, Sri Lanka | Tel. +94 1 2584887<br>Fax +94 1 2582981 |
| **Swaziland** | | | |
| Sales | Manzini | C G Trading Co. (Pty) Ltd<br>Simunye street<br>Matsapha, Manzini | Tel. +268 7602 0790<br>Fax +268 2 518 5033<br>charles@cgtrading.co.sz<br>www.cgtradingswaziland.com |
| **Sweden** | | | |
| Assembly<br>Sales<br>Service | Jönköping | SEW-EURODRIVE AB<br>Gnejsvägen 6-8<br>553 03 Jönköping<br>Box 3100 S-550 03 Jönköping | Tel. +46 36 34 42 00<br>Fax +46 36 34 42 80<br>http://www.sew-eurodrive.se<br>jonkoping@sew.se |
| **Switzerland** | | | |
| Assembly<br>Sales<br>Service | Basel | Alfred Imhof A.G.<br>Jurastrasse 10<br>4142 Münchenstein bei Basel | Tel. +41 61 417 1717<br>Fax +41 61 417 1700<br>http://www.imhof-sew.ch<br>info@imhof-sew.ch |
| **Taiwan** | | | |
| Sales | Taipei | Ting Shou Trading Co., Ltd.<br>6F-3, No. 267, Sec. 2<br>Tung Huw S. Road<br>Taipei | Tel. +886 2 27383535<br>Fax +886 2 27368268<br>Telex 27 245<br>sewtwn@ms63.hinet.net<br>http://www.tingshou.com.tw |
| | Nan Tou | Ting Shou Trading Co., Ltd.<br>No. 55 Kung Yeh N. Road<br>Industrial District<br>Nan Tou 540 | Tel. +886 49 255353<br>Fax +886 49 257878<br>sewtwn@ms63.hinet.net<br>http://www.tingshou.com.tw |
| **Tanzania** | | | |
| Sales | Daressalam | SEW-EURODRIVE PTY LIMITED TANZANIA<br>Plot 52, Regent Estate<br>PO Box 106274<br>Dar Es Salaam | Tel. +255 0 22 277 5780<br>Fax +255 0 22 277 5788<br>http://www.sew-eurodrive.co.tz<br>info@sew.co.tz |
| **Thailand** | | | |
| Assembly<br>Sales<br>Service | Chonburi | SEW-EURODRIVE (Thailand) Ltd.<br>700/456, Moo.7, Donhuaroh<br>Muang<br>Chonburi 20000 | Tel. +66 38 454281<br>Fax +66 38 454288<br>sewthailand@sew-eurodrive.com |
| **Tunisia** | | | |
| Sales | Tunis | T. M.S. Technic Marketing Service<br>Zone Industrielle Mghira 2<br>Lot No. 39<br>2082 Fouchana | Tel. +216 79 40 88 77<br>Fax +216 79 40 88 66<br>http://www.tms.com.tn<br>tms@tms.com.tn |

23545259/EN – 05/2020

| Turkey | | | |
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| Assembly<br>Sales<br>Service | Kocaeli-Gebze | SEW-EURODRIVE Ana Merkez<br>Gebze Organize Sanayi Böl. 400 Sok No. 401<br>41480 Gebze Kocaeli | Tel. +90 262 9991000 04<br>Fax +90 262 9991009<br>http://www.sew-eurodrive.com.tr<br>sew@sew-eurodrive.com.tr |

| Ukraine | | | |
|---|---|---|---|
| Assembly<br>Sales<br>Service | Dnipropetrovsk | SEW-EURODRIVE, LLC<br>Robochya str., bld. 23-B, office 409<br>49008 Dnipro | Tel. +380 56 370 3211<br>Fax +380 56 372 2078<br>http://www.sew-eurodrive.ua<br>sew@sew-eurodrive.ua |

| United Arab Emirates | | | |
|---|---|---|---|
| Drive Technology Center | Dubai | SEW-EURODRIVE FZE<br>PO Box 263835<br>Jebel Ali Free Zone – South,<br>P.O. Box<br>Dubai, United Arab Emirates | Tel. +971 (0)4 8806461<br>Fax +971 (0)4 8806464<br>info@sew-eurodrive.ae |

| Uruguay | | | |
|---|---|---|---|
| Assembly<br>Sales | Montevideo | SEW-EURODRIVE Uruguay, S. A.<br>Jose Serrato 3569 Esqina Corumbe<br>CP 12000 Montevideo | Tel. +598 2 21181-89<br>Fax +598 2 21181-90<br>sewuy@sew-eurodrive.com.uy |

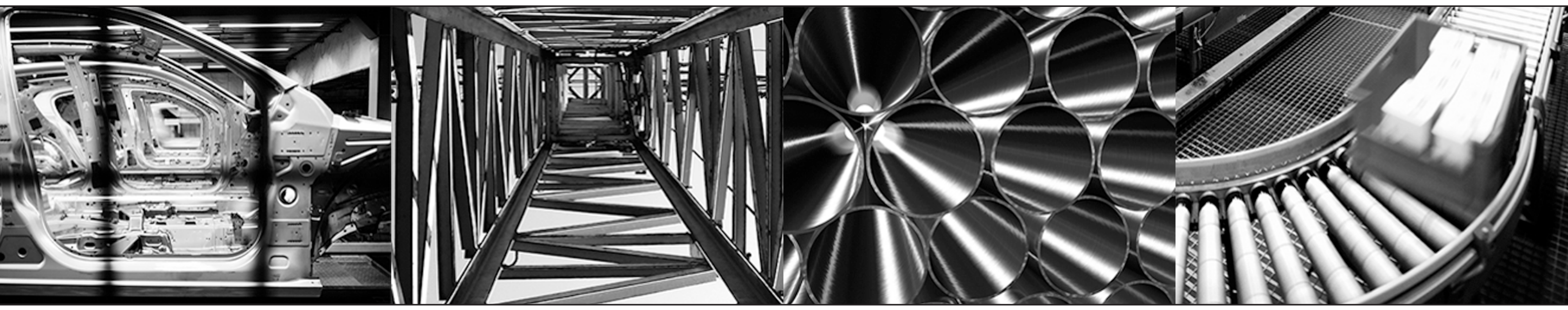
| USA | | | |
|---|---|---|---|
| Production<br>Assembly<br>Sales<br>Service | Southeast Region | SEW-EURODRIVE INC.<br>1295 Old Spartanburg Highway<br>P.O. Box 518<br>Lyman, S.C. 29365 | Tel. +1 864 439-7537<br>Fax Sales +1 864 439-7830<br>Fax Production +1 864 439-9948<br>Fax Assembly +1 864 439-0566<br>Fax Confidential/HR +1 864 949-5557<br>http://www.seweurodrive.com<br>cslyman@seweurodrive.com |
| Assembly<br>Sales<br>Service | Northeast Region | SEW-EURODRIVE INC.<br>Pureland Ind. Complex<br>2107 High Hill Road, P.O. Box 481<br>Bridgeport, New Jersey 08014 | Tel. +1 856 467-2277<br>Fax +1 856 845-3179<br>csbridgeport@seweurodrive.com |
| | Midwest Region | SEW-EURODRIVE INC.<br>2001 West Main Street<br>Troy, Ohio 45373 | Tel. +1 937 335-0036<br>Fax +1 937 332-0038<br>cstroy@seweurodrive.com |
| | Southwest Region | SEW-EURODRIVE INC.<br>3950 Platinum Way<br>Dallas, Texas 75237 | Tel. +1 214 330-4824<br>Fax +1 214 330-4724<br>csdallas@seweurodrive.com |
| | Western Region | SEW-EURODRIVE INC.<br>30599 San Antonio St.<br>Hayward, CA 94544 | Tel. +1 510 487-3560<br>Fax +1 510 487-6433<br>cshayward@seweurodrive.com |
| | Wellford | SEW-EURODRIVE INC.<br>148/150 Finch Rd.<br>Wellford, S.C. 29385 | Tel. +1 864 439-7537<br>Fax +1 864 661 1167<br>IGOrders@seweurodrive.com |
| | Additional addresses for service provided on request! | | |

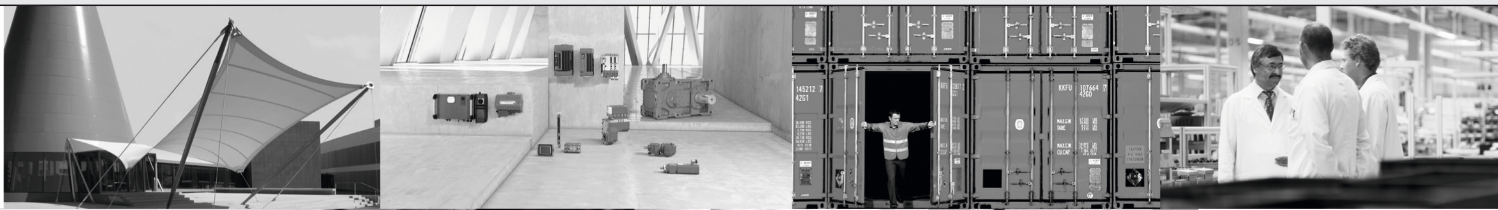
| Vietnam | | | |
|---|---|---|---|
| Sales | Ho Chi Minh City | SEW-EURODRIVE PTE. LTD. RO at Hochiminh City<br>Floor 8, KV I, Loyal building, 151-151 Bis Vo Thi Sau street, ward 6, District 3, Ho Chi Minh City, Vietnam | Tel. +84 937 299 700<br>huytam.phan@sew-eurodrive.com |
| | Hanoi | MICO LTD<br>Quảng Trị - North Vietnam / All sectors except Construction Materials<br>8th Floor, Ocean Park Building, 01 Dao Duy Anh St, Ha Noi, Viet Nam | Tel. +84 4 39386666<br>Fax +84 4 3938 6888<br>nam_ph@micogroup.com.vn<br>http://www.micogroup.com.vn |

| Zambia |
|---|
| Representation: South Africa |

23545259/EN – 05/2020

# Index





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