

Lexium™ MC12 multi carrier

Hardware Guide

Original instructions

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Safety Information

Important Information

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of this symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER
DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING
WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION
CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE
NOTICE is used to address practices not related to physical injury.

Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

Before You Begin

Do not use this product on machinery lacking effective point-of-operation guarding. Lack of effective point-of-operation guarding on a machine can result in serious injury to the operator of that machine.

⚠ WARNING

UNGUARDED EQUIPMENT

- Do not use this software and related automation equipment on equipment which does not have point-of-operation protection.
- Do not reach into machinery during operation.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

This automation equipment and related software is used to control a variety of industrial processes. The type or model of automation equipment suitable for each application will vary depending on factors such as the control function required, degree of protection required, production methods, unusual conditions, government regulations, etc. In some applications, more than one processor may be required, as when backup redundancy is needed.

Only you, the user, machine builder or system integrator can be aware of all the conditions and factors present during setup, operation, and maintenance of the machine and, therefore, can determine the automation equipment and the related safeties and interlocks which can be properly used. When selecting automation and control equipment and related software for a particular application, you should refer to the applicable local and national standards and regulations. The National Safety Council's Accident Prevention Manual (nationally recognized in the United States of America) also provides much useful information.

In some applications, such as packaging machinery, additional operator protection such as point-of-operation guarding must be provided. This is necessary if the operator's hands and other parts of the body are free to enter the pinch points or other hazardous areas and serious injury can occur. Software products alone cannot protect an operator from injury. For this reason the software cannot be substituted for or take the place of point-of-operation protection.

Ensure that appropriate safeties and mechanical/electrical interlocks related to point-of-operation protection have been installed and are operational before placing the equipment into service. All interlocks and safeties related to point-of-operation protection must be coordinated with the related automation equipment and software programming.

NOTE: Coordination of safeties and mechanical/electrical interlocks for point-of-operation protection is outside the scope of the Function Block Library, System User Guide, or other implementation referenced in this documentation.

Start-up and Test

Before using electrical control and automation equipment for regular operation after installation, the system should be given a start-up test by qualified personnel to verify correct operation of the equipment. It is important that arrangements for such a check are made and that enough time is allowed to perform complete and satisfactory testing.

⚠ WARNING

EQUIPMENT OPERATION HAZARD

- Verify that all installation and set up procedures have been completed.
- Before operational tests are performed, remove all blocks or other temporary holding means used for shipment from all component devices.
- Remove tools, meters, and debris from equipment.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Follow all start-up tests recommended in the equipment documentation. Store all equipment documentation for future references.

Software testing must be done in both simulated and real environments.

Verify that the completed system is free from all short circuits and temporary grounds that are not installed according to local regulations (according to the National Electrical Code in the U.S.A, for instance). If high-potential voltage testing is necessary, follow recommendations in equipment documentation to prevent accidental equipment damage.

Before energizing equipment:

- Remove tools, meters, and debris from equipment.
- Close the equipment enclosure door.
- Remove all temporary grounds from incoming power lines.
- Perform all start-up tests recommended by the manufacturer.

Operation and Adjustments

The following precautions are from the NEMA Standards Publication ICS 7.1-1995:

(In case of divergence or contradiction between any translation and the English original, the original text in the English language will prevail.)

- Regardless of the care exercised in the design and manufacture of equipment or in the selection and ratings of components, there are hazards that can be encountered if such equipment is improperly operated.
- It is sometimes possible to misadjust the equipment and thus produce unsatisfactory or unsafe operation. Always use the manufacturer's instructions as a guide for functional adjustments. Personnel who have access to these adjustments should be familiar with the equipment manufacturer's instructions and the machinery used with the electrical equipment.
- Only those operational adjustments required by the operator should be accessible to the operator. Access to other controls should be restricted to prevent unauthorized changes in operating characteristics.

About the Book

Document Scope

This manual provides information on the Lexium™ MC12 multi carrier.

Validity Note

This document has been updated for the release of EcoStruxure™ Machine Expert V2.1.1.

For product compliance and environmental information (RoHS, REACH, PEP, EOL, etc.), go to www.se.com/ww/en/work/support/green-premium/.

The characteristics that are described in the present document, as well as those described in the documents included in the Related Documents section below, can be found online. To access the information online, go to the Schneider Electric home page www.se.com/ww/en/download/.

The characteristics that are described in the present document should be the same as those characteristics that appear online. In line with our policy of constant improvement, we may revise content over time to improve clarity and accuracy. If you see a difference between the document and online information, use the online information as your reference.

Related Documents

Title of documentation	Reference number
Cybersecurity Guidelines for EcoStruxure Machine Expert, Modicon and PacDrive Controllers and Associated Equipment User Guide	EIO0000004242
Cybersecurity Best Practices	CS-Best-Practices-2019-340
Lexium™ MC12 long stator motor segments, Instruction sheet	JYT8131301
Lexium™ MC guide rails, Instruction sheet	JYT8147601
Lexium™ MC12 carriers, Instruction sheet	JYT8150901
Lexium™ MC connection module, Instruction sheet	JYT9053801
Braking Resistor, Instruction sheet	GEX2324201
PacDrive Logic Motion Controller, LMC Pro/Pro2, Hardware Guide	EIO0000001503 (Eng) EIO0000001504 (Ger)

Product Related Information

The equipment described herein must be used in accordance with the application-specific risk analysis that you are to perform along with verification of all applicable standards. Pay attention in conforming to any safety information, different electrical requirements, and normative standards that would apply to your application of the information contained in the present manual and the manuals for associated equipment.

⚠️⚠️ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Disconnect all power from all equipment including connected devices prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires except under the specific conditions specified in the appropriate hardware guide for this equipment.
- Always use a properly rated voltage sensing device to confirm the power is off where and when indicated.
- Replace and secure all covers, accessories, hardware, cables, and wires and confirm that a proper ground connection exists before applying power to this unit.
- Use only the specified voltage when operating this equipment and any associated equipment.

Failure to follow these instructions will result in death or serious injury.

⚠️ WARNING

UNINTENDED EQUIPMENT OPERATION

- Use appropriate protective devices (functional safety devices) in compliance with local and national standards.
- Ensure that a risk assessment is conducted and respected according to EN/ISO 12100 during the design of your machine.
- Install and operate the device only in the intended environment.
- The equipment must be wired and fused in compliance with local and national regulatory requirements for the rated current and voltage of the particular equipment.
- Do not disassemble, repair, or modify this equipment.
- Do not connect wires to unused terminals and/or terminals indicated as "No Connection (N.C.)".

Failure to follow these instructions can result in death, serious injury, or equipment damage.

⚠️ WARNING

UNINTENDED EQUIPMENT OPERATION

- Perform a hazard and risk analysis to determine the appropriate safety integrity level, and any other safety requirements, for your specific application based on all the applicable standards.
- Ensure that the hazard and risk analysis is conducted and respected according to EN/ISO 12100 during the design of your machine.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

⚠ WARNING

LOSS OF CONTROL

- Perform a Failure Mode and Effects Analysis (FMEA), or equivalent risk analysis, of your application, and apply preventive and detective controls before implementation.
- Provide a fallback state for undesired control events or sequences.
- Provide separate or redundant control paths wherever required.
- Supply appropriate parameters, particularly for limits.
- Review the implications of transmission delays and take actions to mitigate them.
- Review the implications of communication link interruptions and take actions to mitigate them.
- Provide independent paths for control functions (for example, emergency stop, over-limit conditions, and error conditions) according to your risk assessment, and applicable codes and regulations.
- Apply local accident prevention and safety regulations and guidelines.¹
- Test each implementation of a system for proper operation before placing it into service.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

¹ For additional information, refer to NEMA ICS 1.1 (latest edition), Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control and to NEMA ICS 7.1 (latest edition), Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable Speed Drive Systems or their equivalent governing your particular location.

Terminology Derived from Standards

The technical terms, terminology, symbols and the corresponding descriptions in this manual, or that appear in or on the products themselves, are generally derived from the terms or definitions of international standards.

In the area of functional safety systems, drives and general automation, this may include, but is not limited to, terms such as *safety*, *safety function*, *safe state*, *fault*, *fault reset*, *malfunction*, *failure*, *error*, *error message*, *dangerous*, etc.

Among others, these standards include:

Standard	Description
IEC 61131-2:2007	Programmable controllers, part 2: Equipment requirements and tests.
ISO 13849-1:2015	Safety of machinery: Safety related parts of control systems. General principles for design.
EN 61496-1:2013	Safety of machinery: Electro-sensitive protective equipment. Part 1: General requirements and tests.
ISO 12100:2010	Safety of machinery - General principles for design - Risk assessment and risk reduction
EN 60204-1:2006	Safety of machinery - Electrical equipment of machines - Part 1: General requirements
ISO 14119:2013	Safety of machinery - Interlocking devices associated with guards - Principles for design and selection
ISO 13850:2015	Safety of machinery - Emergency stop - Principles for design
IEC 62061:2015	Safety of machinery - Functional safety of safety-related electrical, electronic, and electronic programmable control systems
IEC 61508-1:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems: General requirements.
IEC 61508-2:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems: Requirements for electrical/electronic/programmable electronic safety-related systems.
IEC 61508-3:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems: Software requirements.
IEC 61784-3:2016	Industrial communication networks - Profiles - Part 3: Functional safety fieldbuses - General rules and profile definitions.
2006/42/EC	Machinery Directive
2014/30/EU	Electromagnetic Compatibility Directive
2014/35/EU	Low Voltage Directive

In addition, terms used in the present document may tangentially be used as they are derived from other standards such as:

Standard	Description
IEC 60034 series	Rotating electrical machines
IEC 61800 series	Adjustable speed electrical power drive systems
IEC 61158 series	Digital data communications for measurement and control – Fieldbus for use in industrial control systems

Finally, the term *zone of operation* may be used in conjunction with the description of specific hazards, and is defined as it is for a *hazard zone* or *danger zone* in the *Machinery Directive (2006/42/EC)* and *ISO 12100:2010*.

NOTE: The aforementioned standards may or may not apply to the specific products cited in the present documentation. For more information concerning the individual standards applicable to the products described herein, see the characteristics tables for those product references.

Dual Dimensions

Dimensions are indicated in metric system and U.S. customary units system. The U.S. dimensions are given in parentheses, for example 8.4 mm (0.33 in).

NOTE: The given values in parentheses are rounded and for reference only.

Specific Safety Information

Proper Use

Overview

This section contains information regarding the operation of the Lexium™ MC12 multi carrier. Personnel working with the system must be qualified (Qualification of Personnel, page 15), and read and observe this information. The system was built in compliance with the recognized technical safety regulations.

Installation

The Lexium™ MC12 multi carrier is a partly completed machine according to Machinery Directive 2006/42/EC, and is intended to be integrated into another machine or assembled with other components to build up a machine or system.

Provide for Protective Measures

Before installing the Lexium™ MC12 multi carrier, provide appropriate protective devices in compliance with local and national standards. Do not commission components without appropriate protective devices. After installation, commissioning, or repair, test the protective devices used.

Other standards are applicable as guideline for a Lexium™ MC12 multi carrier integration into the machine such as (non exhaustive list):

- EN ISO 12100
- EN 60204-1
- EN ISO 13849-1

Perform a risk evaluation concerning the specific use before operating the system and take appropriate security measures.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Ensure that a risk assessment is conducted and respected according to EN/ISO 12100 during the design of your machine.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Applied Standard

The system is compliant with the requirements from the EMC Directive and conformity has been verified in accordance with the following standard:

- IEC 61800-3

Use Original Equipment Only

Use only the accessories and mounting parts specified in the documentation and only third-party devices or components that have been expressly approved by Schneider Electric. Only modify the system in the manner intended and described

in this documentation, and other documentation concerning any other associated equipment.

⚠ WARNING
UNINTENDED EQUIPMENT OPERATION <ul style="list-style-type: none">• Only use software and hardware components approved by Schneider Electric for use with the system.• Update your application program every time you change the physical hardware configuration. Failure to follow these instructions can result in death, serious injury, or equipment damage.

Misuse

The system is not suitable for the manipulation of living organisms or explosive materials.

Incompatible Environments

The components must not be used in the following environments:

- Hazardous (explosive) atmospheres
- Mobile, movable, or floating systems
- Life support systems
- Domestic appliances
- Underground
- Highly saline environments
- Nuclear power plants
- Environments with increased radioactive radiation
- High-hygienic areas
- Oily surroundings
- Vacuum

The system has been designed to operate outside of any hazardous location. Only install the system in zones known to be free of a hazardous atmosphere.

⚠ DANGER
POTENTIAL FOR EXPLOSION <p>Install and use this equipment in non-hazardous locations only.</p> Failure to follow these instructions will result in death or serious injury.

Installation and Operating Conditions

Only use the components in accordance with the installation and operating conditions described in this documentation. The operating conditions at the installation location must be inspected and maintained in accordance with the required technical data (performance data and ambient conditions). Commissioning is prohibited until the usable machine or system in which the Lexium™ MC12 multi carrier is installed is in accordance to the applicable local regulations and standards.

Compatibility with Foreign Substances

The equipment has been tested for compatibility with foreign substances according to the latest knowledge. However, it is impossible to follow up on all further developments of all substances such as lubricants, cleaning agents, or solvents. Therefore, you must perform a compatibility test before using new substances.

Schneider Electric provides samples of the different materials used for the Lexium™ MC12 multi carrier.

For the material samples (Material test kit 1), refer to Lexium™ MC accessories, page 30.

Qualification of Personnel

Target Audience for This Manual

This documentation is intended for teams of users having the following knowledge:

- Advanced knowledge in mechanical engineering
- Advanced knowledge in electrical engineering
- Requisite skills required to be considered a qualified person
- Automation system engineering
- Training and the knowledge of how the Lexium™ MC12 multi carrier, its installation and operation, as well as the construction of the machine/application for which it is integrated

Qualified Person

Electrical and mechanical equipment must be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material. A qualified person is one who has skills and knowledge related to the construction and operation of mechanical and electrical equipment and the installation, and has received safety training to recognize and avoid the hazards involved.

The qualified personnel must be able to detect possible hazards that may arise from parametrization, changing parameter values and generally from mechanical, electrical, or electronic equipment. The qualified personnel must be familiar with the standards, provisions, and regulations for the prevention of industrial accidents, which they must observe when working on the system.

Residual Risks

Overview

Risks arising from the Lexium™ MC12 multi carrier have been reduced. However a residual risk remains since the equipment is moved and operated with electrical voltage and electrical currents.

If activities involve residual risks, a safety message is made at the appropriate points. This includes potential hazards that may arise, their possible consequences, and describes preventive measures to avoid the hazards.

Electrical Parts

To operate the Lexium™ MC12 multi carrier described herein, you must connect the system to the control cabinet and the controller. As a system, there are residual risks that you must consider in your risk analysis of your application.

DANGER

ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Disconnect all power from all equipment including connected devices prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires except under the specific conditions specified in the appropriate hardware guide for this equipment.
- Always use a properly rated voltage sensing device to confirm the power is off where and when indicated.
- Operate electrical components only with a connected protective ground (earth) cable.
- Verify the secure connection of the protective ground (earth) cable to all electrical devices to ensure that connection complies with the connection diagram.
- Do not touch the electrical connection points of the components when the module is energized.
- Provide protection against indirect contact (EN 50178).
- Insulate any unused conductors on both ends of the power cable.

Failure to follow these instructions will result in death or serious injury.

Emergency Stop

The carriers are not equipped with a holding brake. In a de-energized state, carriers can move unintendedly when forces are applied to them (for example, gravity).

WARNING

ENTRAPMENT BY CARRIERS

- Provide means for ensuring that the segments can be put into a de-energized state within reach of the zone of operation.
- Make available those means to allow one person to manually move the carriers.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

After the segments have been put into a de-energized state, it may take a moment for the carriers to come to a standstill. Carriers that are in a vertical movement can run downward according to the force of gravity.

▲ WARNING
MOVING PARTS OF THE EQUIPMENT
Ensure that putting the segments into a de-energized state poses no subsequent risks in the zone of operation.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

NOTE: Provide separation devices for all infeed energies. It must be possible to secure the separation devices in de-energized position, for example, by locking.

Electromagnetic Fields

- Lexium™ MC12 carriers and Lexium™ MC12 long stator motor segments generate strong local electro-magnetic fields.
- The carriers have strong drive magnets and can attract metal objects that are in their proximity.
- A carrier can move suddenly and fast due to magnetic attraction.

▲ WARNING
MAGNETIC FIELDS
<ul style="list-style-type: none">• Keep persons with medical implants (for example, pace makers or metal implants) or metallic body jewelry away from the carriers and segments with a minimum distance of 30 cm (11.9 in).• Always leave the protective cover of the drive magnets in place for all exposed or uninstalled carriers.• Do not put your hands or fingers between the carriers and segments.• Do not place metallic tools in the vicinity of the carriers and segments.• Do not place electromagnetically sensitive devices in the vicinity of the carriers and segments.• Do not place credit cards or electronic/magnetic media in the vicinity of the carriers and segments.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

Protective cover of the drive magnets of carriers:

NOTE: Exposed or uninstalled carriers must have the protective cover of the drive magnets installed at all times. The cover is only removed at the time of carrier installation.

Protective packaging of carriers during transport:

The carriers must be transported in their associated protective packaging, which helps to reduce the effects of the strong drive magnets.

NOTE: Inductive sensors, such as proximity sensors, do not function properly if they are mounted near the segment coils. You must verify whether the sensors are working properly, especially when segment coils are active.

Assembly and Handling

▲ WARNING

CRUSHING, SHEARING, CUTTING AND HITTING DURING HANDLING

- Observe the general construction and safety regulations for handling and assembly.
- Use appropriate mounting and transport equipment and use appropriate tools.
- Prevent clamping and crushing by taking appropriate precautions.
- Cover edges and angles to protect against cutting damage.
- Wear suitable protective clothing (for example, protective goggles, protective boots, protective gloves).

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Motion in the System

Parts of the Lexium™ MC12 multi carrier can move at high speeds. In such cases, the payload weight and additionally installed tools contribute to the total kinetic energy.

Motion sequences can occur when operating with the system allowing operational staff to make misjudgments. For safety considerations (according to EN ISO 13849-1), see *Functional Safety*, page 44 and ensure that necessary protective measures are implemented.

The safety standards and directives for the respective country where the system is in use define which protective measures are appropriate. Additionally, the system engineer who is responsible for the integration of the system must evaluate which measures have to be taken.

NOTE: The configuration of the system, the carrier velocity, as well as the additional payload have an effect on the total energy, which can potentially be a source of damage and injury. At excessive speed, extreme acceleration and heavy load, the carriers can leave the track or the products can detach from the carrier.

▲ WARNING

CRUSHING, SHEARING, CUTTING AND IMPACT INJURY

- The equipment must be operated only within an enclosure.
- Open or enter the enclosure for cleaning and maintenance purposes only.
- Design the enclosure to safely deactivate the equipment as soon as a person enters the zone of operation of the system.
- Design the enclosure to withstand and to resist ejected parts from escaping the zone of operation.
- All barriers, protective doors, contact mats, light barriers, and other protective equipment, must be configured correctly and enabled whenever the equipment is under power.
- Define the clearance distance to the zone of operation so that operational staff do not have access to, nor can be enclosed in the zone of operation.
- Design the enclosure to account for the maximum possible travel paths of the equipment, including the maximum path until the hardware safety system limits as well as the additional run-on paths in case of a power interruption.
- Avoid excessive speed and extreme acceleration of the carriers by thoroughly testing your system taking into account the anticipated mass of the payload at the configured maximum speeds and accelerations.
- Verify that the distance between the mass center of gravity and the drive magnets is as small as possible.
- Take into account the impact of the centrifugal force in curves and the weight force in horizontal orientation of the track.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

In the event of a power supply interruption, the Lexium™ MC12 multi carrier deviates from the specified movement. Further, in case of an emergency stop request, the same may be true if the stop is uncontrolled.

▲ WARNING

DEVIATION FROM THE SPECIFIED MOVEMENT

- Ensure to take into account in your functional safety risk analysis the effect of a power interruption.
- Use, in the case of a powered stop such as an emergency stop, a synchronous stop on the path to avoid collisions.
- Take into account the extension of the run-on path of associated equipment, such as robots, in your functional safety risk analysis.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Hot Surfaces

The metal surfaces of the system may exceed 70 °C (158 °F) when subjected to heavy loads and/or high performance during operation.

▲ WARNING

HOT SURFACES

- Avoid unprotected contact with hot surfaces.
- Do not allow flammable or heat-sensitive parts in the immediate vicinity of hot surfaces.
- Verify that the heat dissipation is sufficient by performing a test run under maximum load conditions.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Hazardous Movements

There can be different sources of hazardous movements:

- Wiring or cabling errors
- Errors in the application program
- Component errors
- Errors in the measured values and signal transmitters

NOTE: Provide for personal safety by primary equipment monitoring or measures. Do not rely only on the internal monitoring of the system components. Adapt the monitoring or other arrangements and measures to the specific conditions of the installation in accordance with a hazard and risk analysis.

⚠ DANGER**UNAVAILABLE OR INADEQUATE PROTECTION DEVICE(S)**

- Prevent entry to a zone of operation with, for example, protective fencing, mesh guards, protective coverings, or light barriers.
- Dimension the protective devices properly and do not remove or modify them.
- Do not make any modifications that can degrade, incapacitate, or in any way invalidate protection devices.
- Bring the equipment to a stop before accessing the system or entering the zone of operation.
- Protect existing workstations and operating terminals against unauthorized operation.
- Position emergency stop switches so that they are easily accessible and can be reached quickly.
- Validate the functionality of emergency stop equipment before start-up and during maintenance periods.
- Prevent unintentional start-up by disconnecting the power connection of the equipment using the emergency stop circuit or using an appropriate lock-out tag-out sequence.
- Validate the system and installation before the initial start-up.
- Avoid operating high-frequency, remote control, and radio devices close to the system and their feed lines.
- Perform, if necessary, a special electromagnetic compatibility (EMC) verification of the system.

Failure to follow these instructions will result in death or serious injury.

The Lexium™ MC12 multi carrier may perform unanticipated movements because of incorrect wiring, incorrect settings, incorrect data, or other errors. The encoder magnets of the carriers can be affected by external magnetic fields.

⚠ WARNING**UNINTENDED MOVEMENT OR CARRIER OPERATION**

- Carefully install the wiring in accordance with EMC standards.
- Ensure that there are no external magnetic fields present in the areas of position sensing for the carriers.
- Do not operate the equipment with undetermined settings and data.
- Perform comprehensive commissioning tests that include verification of configuration settings and data that determine position and movement.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Noise Protection

The noise level of the Lexium™ MC12 multi carrier depends on the basic cycle and the payload, as well as on further application-specific accessory parts. If noise emissions reach a value greater than those defined by locally applicable regulations, wear hearing protection.

▲ CAUTION**NOISE EMISSIONS**

- Wear hearing protection in accordance with the locally applicable regulations.
- Attach a sign on the equipment if the noise emissions reach an excessive value.

Failure to follow these instructions can result in injury or equipment damage.

NOTE: Attach the following symbol where it can easily be seen.



Emissions

During operation, a small amount of lubricant can leak. The leakage of small amounts of lubricants at the Lexium™ MC12 multi carrier is not an indication of a damaged system. However, excessive lubricant emissions may be an indication of a damaged carrier.

NOTICE**INOPERABLE EQUIPMENT INDICATED BY CARRIER LUBRICANT EMISSIONS**

- Verify the mechanics before according to the defined maintenance schedule.
- Shut down the mechanics immediately if excessive lubricant emissions appear on or around the equipment or the objects being transported.

Failure to follow these instructions can result in equipment damage.

Heavy and/or Falling Parts

If you plan to assemble the Lexium™ MC12 multi carrier track outside of your machine, equip the mounting plate with suitable transport devices to be able to lift the mounted track into your machine.

▲ WARNING**HEAVY AND/OR FALLING PARTS**

- Use a suitable crane or other suitable lifting gear for mounting the system.
- Use the necessary personal protective equipment (for example, protective shoes, protective glasses and protective gloves).
- Mount the system so that it cannot come loose (use of securing screws with appropriate tightening torque), especially in cases of fast acceleration or continuous vibration.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Attachments or Modifications

You must design tools suitable for your application and install the tools on the Lexium™ MC12 carriers to transport your products within your track. In doing so, ensure that the movement is not restricted and/or that no motion errors can result from the modifications. Attachments and rebuilds must not influence the operation of the protective devices in any way and all EMERGENCY STOP buttons must be accessible and operational at all times.

▲ WARNING

UNINTENDED MACHINE OPERATION

- Do not drill into or modify the delivered components.
- Do not modify the cable set.
- Do not modify the housing.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Hazard Message Labels on the Components of the Lexium™ MC12 multi carrier

Overview

The following hazard message labels are affixed to the components of the Lexium™ MC12 multi carrier to warn of potential hazards or to call attention to information.

Hazard Message Labels on Components

The following table provides an overview of the hazard message labels on the components of the Lexium™ MC12 multi carrier:

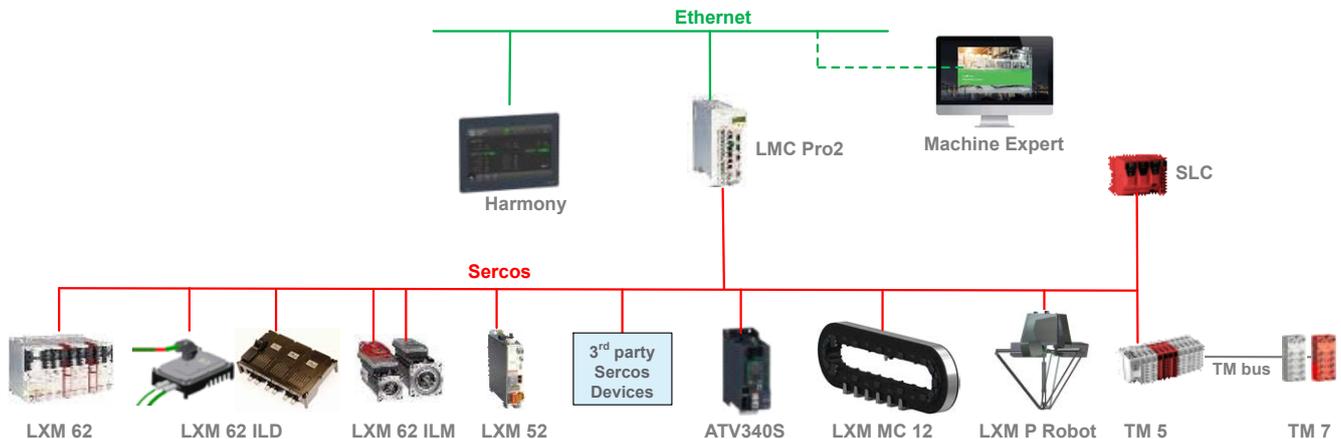
Hazard Message Label	Lexium™ MC12 long stator motor segment straight	Lexium™ MC12 long stator motor segment arc	Lexium™ MC12 carrier and cover	Lexium™ MC connection module
	X	X	—	—
	—	—	—	X
For important safety information, refer to Electrical Parts, page 16.				
	X	X	—	—
	—	—	X	—
For important safety information, refer to Electromagnetic Fields, page 17.				
	X	X	—	—
	—	—	—	X
For important safety information, refer to Hot Surfaces, page 20 and Assembly and Handling, page 18.				
	X	X	X	—
Read this hardware guide carefully, and become familiar with the system before trying to install, operate, service, or maintain it.				
X = Present on the component — = Not present on the component				

System Overview

System Architecture

Overview

The control system consists of several components, depending on your application. The following figure presents an example of a control system.



For more information about the several components, refer to the corresponding documentation at www.se.com/en/download/.

Product Overview

General Description of the Lexium™ MC12 multi carrier

Components Overview

The Lexium™ MC12 multi carrier is a transport system to be used in machines. It uses linear motion technology to move products individually through the machine.

Carriers are moved on a configurable track consisting of arc and straight segments. Process steps can be decoupled and run at different velocities.

Machines can be adapted to different products and product patterns on the fly.

The transport system is built from a combination of the following components:

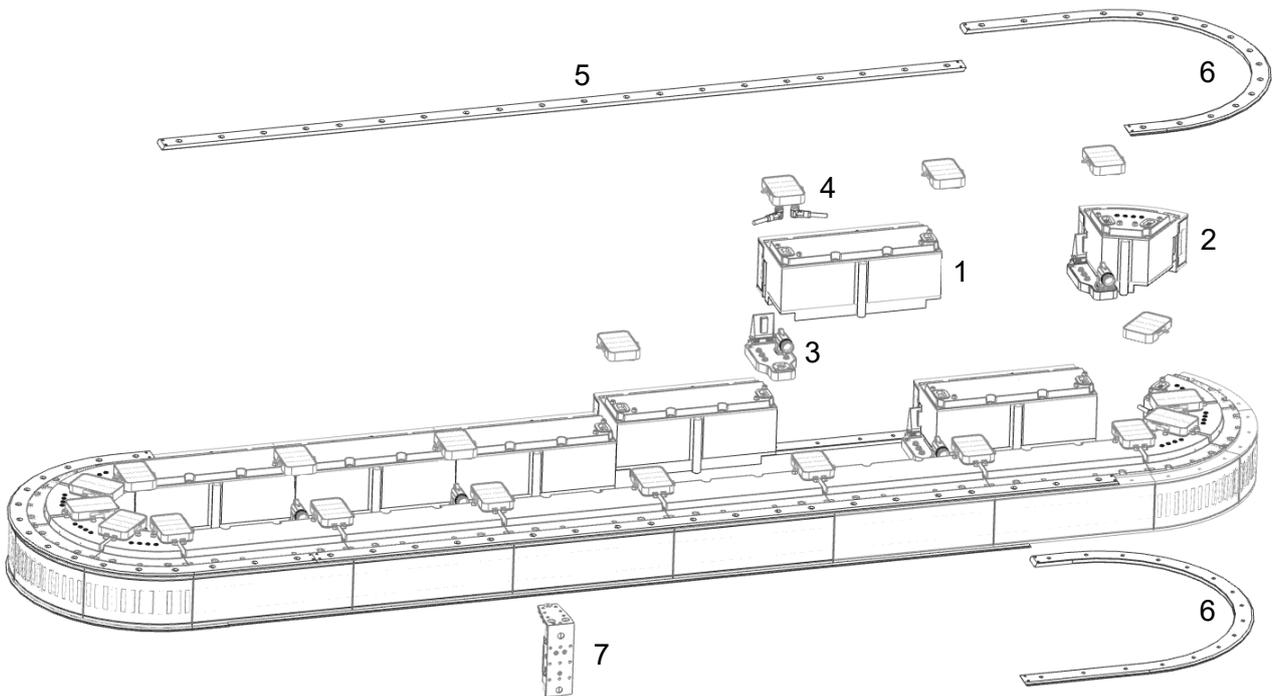
- Lexium™ MC12 long stator motor segments
 - Lexium™ MC12 long stator motor segment straight
 - Lexium™ MC12 long stator motor segment arc
- Lexium™ MC interconnects
 - Lexium™ MC power interconnect
 - Lexium™ MC communication interconnect
- Lexium™ MC guide rails
 - Lexium™ MC guide rail straight
 - Lexium™ MC guide rail arc
- Lexium™ MC12 carriers
- Lexium™ MC accessories

NOTE: For the number of Lexium™ MC12 long stator motor segments and Lexium™ MC12 carriers that can be used in one Lexium™ MC12 multi carrier, refer to System Planning, page 39.

To run and to control the Lexium™ MC12 multi carrier you need:

- One or more power supply/Lexium™ MC connection module combinations (depending on your system layout). The power supplies and the connection modules are installed in a control cabinet.
- One or more Lexium™ MC power cables, Sercos cables, SFO cables (for the Safe Force Off function).
- A PacDrive LMC Pro2 Motion Controller.
- EcoStruxure™ Machine Expert V2.0.3 or later.

The components of the Lexium™ MC12 multi carrier can be combined to many different layouts. The following figure presents the elements of a closed track.



- 1 Lexium™ MC12 long stator motor segment straight
- 2 Lexium™ MC12 long stator motor segment arc
- 3 Lexium™ MC power interconnect
- 4 Lexium™ MC communication interconnect
- 5 Lexium™ MC guide rail straight
- 6 Lexium™ MC guide rail arc
- 7 Lexium™ MC12 carrier

Lexium™ MC12 long stator motor segment straight

Presentation	Segment	Reference	Description
	Straight 300 mm (11.81 in)	LXMMC12MS06S100	Long stator motor segment (straight) with integrated drive electronics 300 mm (11.81 in), IP54, 120 N peakforce (for carrier LXMMC12CA51S100)

For information on references, also refer to chapter Type Code, page 32.

Lexium™ MC12 long stator motor segment arc

Presentation	Segment	Reference	Description
	Arc 45°	LXMMC12MA02S100	Long stator motor segment (arc) with integrated drive electronics 45° arc, IP54, 100 N peak force (for carrier LXMMC12CA51S100)

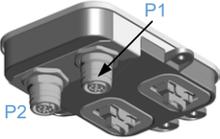
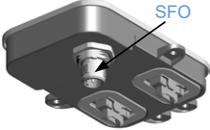
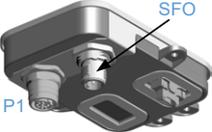
For information on references, also refer to chapter Type Code, page 32.

Lexium™ MC power interconnects / Power disconnect

Presentation	Power interconnect	Reference	Description
	Power interconnect (plain)	LXMMCBPA001S100 LXMMCBPA00XS100	Power interconnect between segments (1 piece) Power interconnect between segments (10 pieces)
 Same appearance as: Power interconnect (plain)	Power disconnect	LXMMCBPAB01S100	Power disconnect between segments The power disconnect is used to separate the DC bus between segments if you want to realize multiple power groups.
	Power interconnect with power connector (infeed)	LXMMCBPAP01S100	Power interconnect between segments with power infeed connector

For information on references, also refer to chapter Type Code, page 32.

Lexium™ MC communication interconnects

Presentation	Communication interconnect	Reference	Description
	Communication interconnect (plain)	LXMMBCA001S100 LXMMBCA00XS100	Communication interconnect between segments (1 piece) Communication interconnect between segments (10 pieces)
	Communication interconnect (Sercos)	LXMMBCAS01S100	Communication interconnect between segments with two additional Sercos connectors: Sercos port P1 (infeed) and Sercos port P2 (outfeed)
	Communication interconnect (SFO)	LXMMBCAF01S100	Communication interconnect between segments with one additional SFO connector (SFO = Safe Force Off)
	Communication interconnect open track (Sercos + SFO)	LXMMCBDASF1S100	Communication interconnect at the beginning of an open track with one additional Sercos connector (Sercos port P1 (infeed)) and one SFO connector
	Communication interconnect open track (Sercos)	LXMMCBDAS01S100	Communication interconnect at the end of an open track with one additional Sercos connector (Sercos port P2 (outfeed))

For information on references, also refer to chapter Type Code, page 32.

Lexium™ MC guide rail straight/Lexium™ MC guide rail arc

Lexium™ MC guide rail straight

Presentation	Guide Rail	Reference	Description
Example 901.2 mm (35.48 in): 	Set of straights	- LXMMCRS0A06S100 LXMMCRS0A12S100 LXMMCRS0A18S100 LXMMCRS0A24S100 LXMMCRS0A30S100	Straight top and bottom guide rail as a set in the length of: 300.4 mm (11.83 in) = 1 ul (unit length) 600.8 mm (23.65 in) = 2 ul 901.2 mm (35.48 in) = 3 ul 1201.6 mm (47.31 in) = 4 ul 1502 mm (59.13 in) = 5 ul
-	Set of straights 150.2 mm (5.91 in) end of open track with arcs	LXMMCRSEA03S100	Straight top and bottom guide rail as a set, 150.2 mm (5.91 in) straight for open track with arcs

Lexium™ MC guide rail arc

Presentation	Guide Rail	Reference	Description
	Set of 45° arcs	LXMMCRABA62S100	Arc top and bottom guide rails 45° as a set, 1/4 ul straight at one end and 3/4 ul straight at the other end
	Set of 90° arcs	LXMMCRABA64S100	Arc top and bottom guide rails 90° as a set, 1/4 ul straight at one end and 3/4 ul straight at the other end
	Set of 135° arcs	LXMMCRABA66S100	Arc top and bottom guide rails 135° as a set, 1/4 ul straight at one end and 3/4 ul straight at the other end
	Set of 180° arcs	LXMMCRABA68S100	Arc top and bottom guide rails 180° as a set, 1/4 ul straight at one end and 3/4 ul straight at the other end
	Set of 360° arcs	LXMMCRA0A00S100	Arc top and bottom guide rails 360° as a set

For information on references, also refer to chapter Type Code, page 32.

Lexium™ MC12 carrier

Presentation	Carrier	Reference	Description
	Carrier	LXMMC12CA51S100 LXMMC12CA5XS100	Carrier, 50 mm (1.97 in) width (1 piece) Carrier, 50 mm (1.97 in) width (10 pieces)

For information on references, also refer to chapter Type Code, page 32.

Lexium™ MC accessories

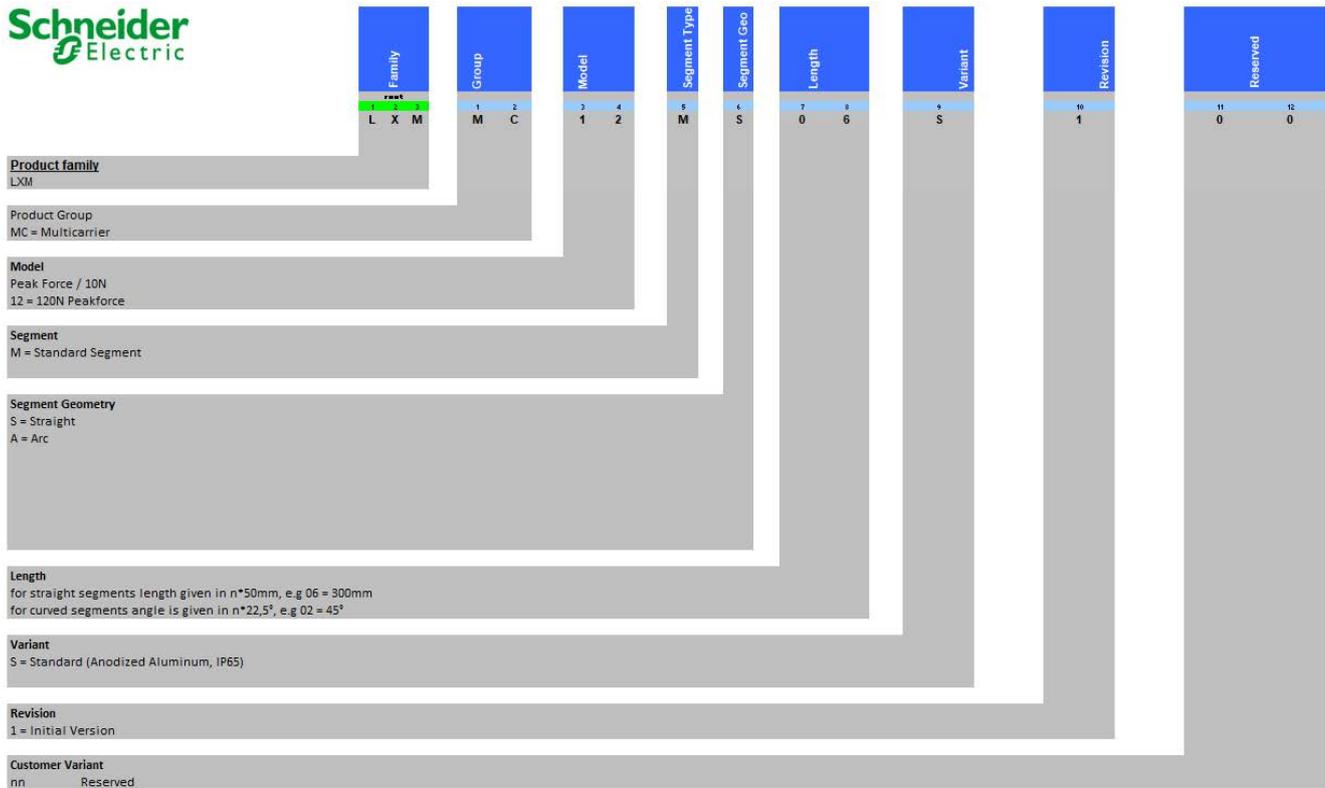
Presentation	Accessory	Reference	Description
	Lexium™ MC connection module	LXMMCACMD02S100	Connection module 20 A continuous power to connect track to power supply
—	Lexium™ MC connection module connector kit	LXMMCACMCS1S100	Set of connectors for the connection module (CN1...CN4)

Presentation	Accessory	Reference	Description
	External Braking Resistor	LXMMCABR120S100	External Braking Resistor with 2.0 m (6.56 ft) cable
–	Lexium™ MC power cable	- LXMMCAPC020S100 LXMMCAPC040S100 LXMMCAPC060S100 LXMMCAPC080S100 LXMMCAPC100S100 LXMMCAPC120S100 LXMMCAPC140S100 LXMMCAPC160S100 LXMMCAPC180S100 LXMMCAPC200S100	Power cable from Lexium™ MC connection module to power connector (infeed): 2.0 m (6.56 ft) 4.0 m (13.12 ft) 6.0 m (19.68 ft) 8.0 m (26.25 ft) 10.0 m (32.8 ft) 12.0 m (39.37 ft) 14.0 m (45.93 ft) 16.0 m (52.49 ft) 18.0 m (59.05 ft) 20.0 m (65.61 ft)
–	Sercos cable	- VW3E3065R030 VW3E3065R050 VW3E3065R100	Sercos cable with connectors RJ45 and M12 (angled) 3.0 m (9.84 ft) 5.0 m (16.4 ft) 10.0 m (32.8 ft)
–	SFO cable	- XZCP1241L2 XZCP1241L5 XZCP1241L10 XZCP1241L15 XZCP1241L20	SFO cable to communication interconnect with M12 connector (angled) and open cable end with wire ferrules 2.0 m (6.56 ft) 5.0 m (16.41 ft) 10.0 m (32.80 ft) 15.0 m (49.21 ft) 20.0 m (65.61 ft)
–	Lexium™ MC encoder magnet	LXMMCAMGEALS100	Package of encoder magnets for carrier (50 pieces)
–	Lexium™ MC motion magnet	LXMMCAMGMALS100	Package of motion magnets for carrier (50 pieces)
–	Lexium™ MC carrier handling tool	LXMMCACT0A1S100	Handling tool to put carrier on track or to remove carrier from track
–	Lexium™ MC roller replacement set	LXMMCARS0AXS100	Roller set for carrier, containing 10 x 4 rollers, 10 x 2 lubrication pads and required screws
–	Set of hard stops	LXMMCAHS001S00	Set of hard stops to stop carriers at the ends of an open track
–	Single-hand lubrication gun	VW33MAP22	Single-hand high pressure oil gun to fill the lubrication reservoirs
–	Material test kit 1	LXMMCAMK001S100	Material test kit 1: Material samples for resistance tests

For information on references, also refer to chapter Type Code, page 32.

Type Code

Lexium™ MC12 long stator motor segments



Lexium™ MC interconnects



Family	Group		Bridge	Bridge Type	Model	Supplies		Quantity	Variant	Revision	Reserved	
root	1	2	3	4	5	6	7	8	9	10	11	12
L X M	M	C	B	C	A	0	1	0	1	1	0	0

Product family
LXM

Product Group
MC = Multicarrier

Bridge
B=Interconnect

Bridge Type
C = Communication closed track
D = Communication open end of track
P = Power closed track
Q = Power open end of track

Model
A = stands for current Bridge design

Supplies
up to 2 different inputs/outputs can be specified
0 = no supply, plain interconnect
B = disconnector, interrupts connection between segments, no supply
P = Power Supply
S = Bus supply (sercos)
F = Safe Force Off

Quantity
1 = 1, X = 10, L = 50

Variant
S = Standard (Anodized Aluminum, IP65)

Revision
1 = Initial Version

Customer Variant
nn Reserved

Lexium™ MC guide rails



Family	Group		Rail	Geo1	Geo2	Model	Size		Variant	Revision	Reserved	
root	1	2	3	4	5	6	7	8	9	10	11	12
L X M	M	C	R	A	0	A	0	2	S	1	0	0

Product family
LXM

Product Group
MC = Multicarrier

Product Detail
R=Rail

Geometry (Same as Segment Geometry)
S=Straight
A=Arc

Geometry 2
0: no straight at end(s)
E: End of open track with curve
L: straight at left side
R: straight at right side
B: straight at both sides

Model
A = Standard

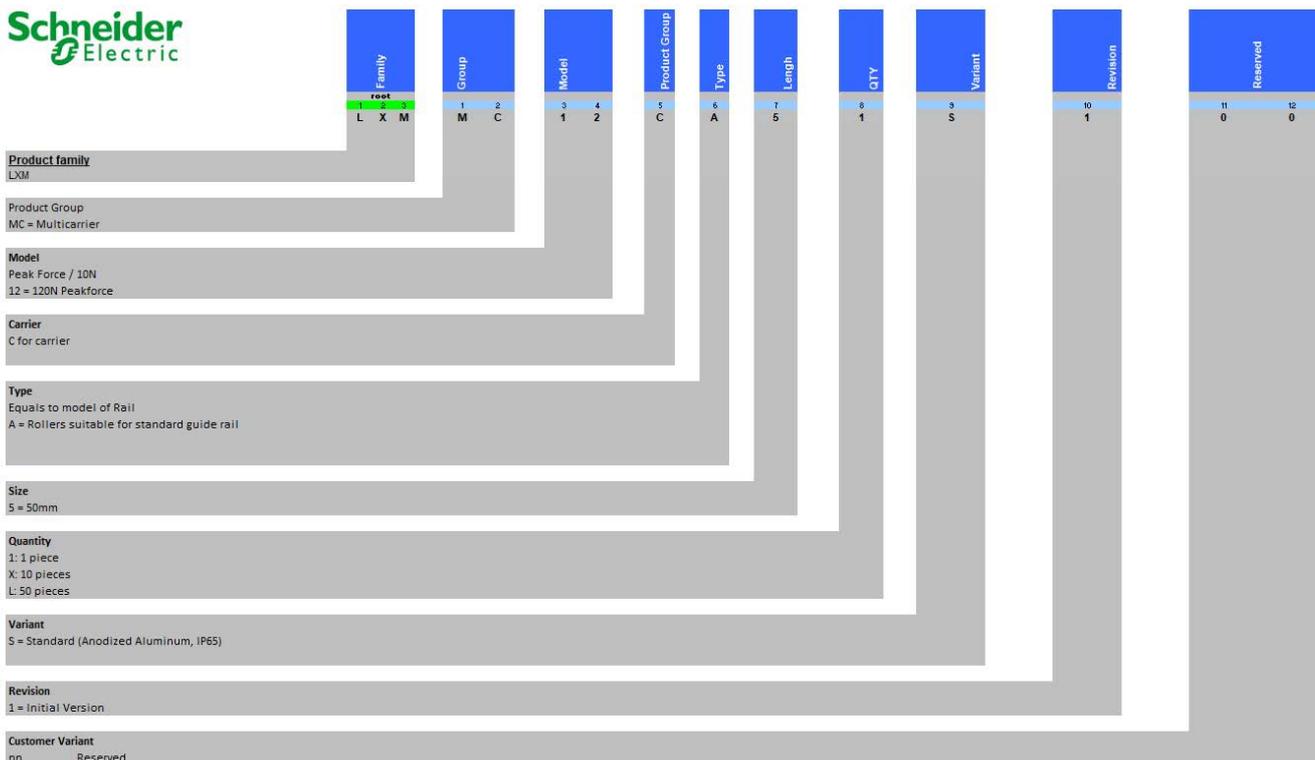
Size
nn / (ul/6) ul equals length of straight segment and air gap between segments. ul/6 equals approximately 50mm 60 equals a length of 10 segments +airgaps => approximately 3m rail
nm for all curved shapes. n is total length of both straights at curve. m is angle / 22.5°. Example: 08 = 180°. With exception of 360° curve all curves have small straights attached at both sides. 360° is coded as 0

Variant
S = Standard (Anodized Aluminum, IP65)

Revision
1 = Initial Version

Customer Variant
nn Reserved

Lexium™ MC12 carrier



Lexium™ MC accessories



Type Plate

Components with Type Plates

The following components of the Lexium™ MC12 multi carrier are equipped with a type plate:

- Lexium™ MC connection module
- Lexium™ MC12 long stator motor segments
 - Lexium™ MC12 long stator motor segment straight
 - Lexium™ MC12 long stator motor segment arc
- Lexium™ MC interconnects
 - Lexium™ MC power interconnect
 - Lexium™ MC communication interconnect
- Lexium™ MC guide rails (The rails have only laser marking with reduced information).
 - Lexium™ MC guide rail straight
 - Lexium™ MC guide rail arc
- Lexium™ MC12 carriers

Description of the Type Plate

Depending on the component, the type plates provide the following information:

Type plate information	Description	Example
	When scanning the QR code, the following information is provided: <ul style="list-style-type: none"> • Product name / type code • Serial number • Date of manufacture (DOM) • Hardware revision 	—
Product name / type code	For detailed information about the meaning of the particular digits, refer to <i>Type Code</i> , page 32.	Lexium LXMMC12MS06S100
Description	Component description	Long stator motor, straight, 300mm
Technical data	Depends on the component.	For example, voltage, current, standstill force, peak force, and so on.
Production data	<ul style="list-style-type: none"> • Serial number • Date of manufacture (DOM) • Hardware revision • Data matrix code • Country of origin 	<ul style="list-style-type: none"> • SN: PPHYWWXXXXX • PP-YYYY-WW • HW rev.: 00 • #000000 • Made in Germany
 Multiple rated equipment, see instruction manual.	Read the hardware guide carefully, and become familiar with the system before installing, operating, servicing, or maintaining it.	—
	WEEE mark (Waste Electrical or Electronic Equipment)	—
	RoHS mark (Restriction of Hazardous Substances Directive)	—
IPxx	Degree of protection (Ingress Protection)	—

Type plate information	Description	Example
Certification Area	For example, TÜV mark (Technischer Überwachungsverein, Technical Inspection Association)	—
	UKCA mark (UK Conformity Assessed)	—
	CE mark (standards for products sold within the European Economic Area EEA)	—
	Schneider Electric logo	—

Engineering

Electromagnetic Compatibility, EMC

Electromagnetic Disturbances of Signals and Devices

This product meets the EMC requirements according to the standard IEC 61800-3 emission category C2 if generally accepted practices to limit electromagnetic interference are implemented during installation.

As this product does not meet the EMC requirements according to the standard IEC 61800-3 emission category C1, signal and equipment interference can cause unexpected responses of other equipment in the vicinity of this equipment.

▲ WARNING
SIGNAL AND EQUIPMENT INTERFERENCE <ul style="list-style-type: none">• Install the wiring in accordance with the EMC requirements described in the present document.• Verify compliance with the EMC requirements described in the present document.• Verify compliance with all EMC regulations and requirements applicable in the country in which the product is to be operated and with all EMC regulations and requirements applicable at the installation site. Failure to follow these instructions can result in death, serious injury, or equipment damage.

These types of devices are not intended to be used on a low-voltage public network which supplies domestic premises. Radio frequency interference is expected if used in such a network.

▲ WARNING
RADIO INTERFERENCE <p>Do not use these products in domestic electrical networks.</p> Failure to follow these instructions can result in death, serious injury, or equipment damage.

Hardware Compatibility

Reference	Description
XPSUAT	Safety Module (Harmony XPS Universal product range)
XPSMCMRO0004G	Safety Relay Output Module (Modicon MCM product range)
TM5SDM4DTRFS	Safety Discrete I/O Module (Modicon TM5/TM7 Modular I/O System product range in conjunction with a Safety Logic Controller (SLC))

System Planning

Overview

Specify the following when planning the Lexium™ MC12 multi carrier:

- Identify a track geometry fitting to your machine layout and process. Also refer to [Track Orientation](#), page 40.
- Define a number of Lexium™ MC12 carriers to start with. Refer to [System Limits](#), page 39.
- Use the **Multicarrier Configuration** editor to configure the track, process stations, tools and products. Refer to **Multicarrier Configuration** Editor and **EcoStruxure Machine Expert Twin**, page 42.
- Develop, verify and optimize your application and track geometry with the embedded emulation (**EcoStruxure Machine Expert Twin**). Refer to **Multicarrier Configuration** Editor and **EcoStruxure Machine Expert Twin**, page 42.
- Verify that the application is within system limits. Refer to [System Limits](#), page 39.
- Specify associate equipment that is compatible with the strong magnetic fields of the equipment, such as capacitive sensors.
- Derive the number of power supplies and place the power infeed interconnects at the track.
- Dimension the braking resistors and define the feed points for the power and communication connections on the track. Refer to [Dimensioning the Braking Resistor and the Interconnects](#), page 41.
- Design the mounting plate of your track. Refer to [Mounting Plate](#), page 41.
- Include in your design an appropriate enclosure for the equipment and, according to your risk analysis, the appropriate safety-related devices and measures.
- Design tools suitable for your application and install the tools on the Lexium™ MC12 carriers to transport your products within your track.
- Include in your design and application a device (for example, a sensor) for identifying the carrier type and the type of tool mounted on the carrier to help prevent collisions.

System Limits

Track:

- Maximum track length: 24 m (78.4 ft)
For longer systems, contact your local Schneider Electric service representative.
- Maximum number of Lexium™ MC12 long stator motor segments per track: 82
- Maximum number of Lexium™ MC12 carriers per track: 130
For a larger number of carriers, contact your local Schneider Electric service representative.
- Maximum number of Lexium™ MC12 carriers per Lexium™ MC12 long stator motor segment straight: 6
- Maximum number of Lexium™ MC12 carriers per Lexium™ MC12 long stator motor segment arc: 4
- Total mass (carrier with tool and product): ≤ 3 kg (6.61 lb)
- Maximum acceleration at 1 kg (2.2 lbs): 120 m/s² (394 ft/s²)
- Maximum velocity: 4 m/s (13.1 ft/s)

Also refer to General Technical Data, page 69.

Power supply:

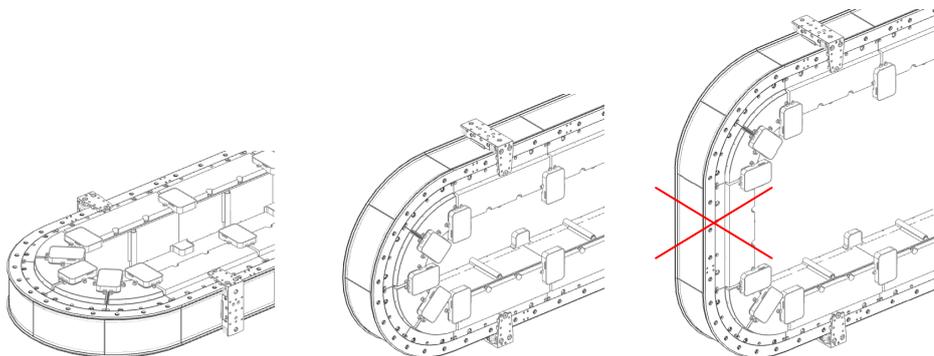
- The power supplies feed the Lexium™ MC12 multi carrier track. For each power supply, you must place a Lexium™ MC connection module between the power supply output and the Lexium™ MC12 multi carrier track.
- Up to a maximum of three power supply/Lexium™ MC connection module combinations can be used in parallel. If more than three power supplies are required, the track must be divided into power groups that are powered separately. For how to define power groups, refer to the different power interconnects (Lexium™ MC power interconnects / Power disconnecter, page 28).
- The power supplies approved for use by Schneider Electric are designed to handle the back feed voltage (braking voltage) from the Lexium™ MC12 multi carrier track during braking phase. Also refer to Connecting a Braking Resistor (CN2), page 117.
- The Lexium™ MC12 multi carrier requires that the power supply must be dimensioned according to the number of segments, segment groups, carriers, load and other pertinent parameters.

The maximum number of 24 segments per power supply/Lexium™ MC connection module combination must not be exceeded.

Also refer to Power Supply, page 106.

Track Orientation

The track orientation can be horizontal or vertical but straight segments are only allowed in horizontal orientation, as illustrated:



▲ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not use straight segments vertically.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Physical Coordinate System of the Track

The physical coordinate system of the track relates to the position of the Sercos infeed. The easiest solution is to put the Sercos infeed at the beginning of a straight segment (seen in clockwise direction).

Mounting Plate

The mounting plate must be prepared before installing the track. Refer to Mounting Plate, page 76.

Tools for the Carriers

You must install tools on the Lexium™ MC12 carriers to transport your products within your track.

Refer to Mounting the Tools on the Lexium™ MC12 carrier, page 94 and Dimensions and Drilling Templates, page 156.

Dimensioning the Power Supply

The required power and the number of power supplies must be calculated depending on the desired performance characteristics of your track.

You can feed the DC bus at different points of the track. For example, feed at points where a high electrical load due to deceleration and acceleration is to be expected.

For dimensioning the power supply, contact your local Schneider Electric service representative.

Dimensioning the Braking Resistor and the Interconnects

The required braking resistor must be calculated depending on the desired braking capability and characteristics of your track. In addition, the number of Lexium™ MC power interconnects and Lexium™ MC communication interconnects and their optimized feed points on the track can be calculated.

Contact your local Schneider Electric service representative for these calculations.

Libraries and Example Project

EcoStruxure Machine Expert provides two libraries to program your Lexium™ MC12 multi carrier application:

- EcoStruxure Machine Expert Multicarrier library
For controlling the Lexium™ MC12 multi carrier and moving the individual carriers.
For more information, refer to the EcoStruxure Machine Expert Multicarrier Library Guide.
- EcoStruxure Machine Expert MulticarrierStation library.
For controlling the handling of carriers within individual stations and between the stations.
For more information, refer to the EcoStruxure Machine Expert MulticarrierStation Library Guide.

In addition, creating a new project in EcoStruxure Machine Expert using the example project will simplify your work (**File > New Project > From Example > Multicarrier Example**). For more information, refer to the Lexium™ MC multi carrier Example Guide (see EcoStruxure Machine Expert, Lexium™ MC multi carrier Example Guide).

Multicarrier Configuration Editor and EcoStruxure Machine Expert Twin

Multicarrier Configuration

The **Multicarrier Configuration** editor is provided by Schneider Electric as a part of EcoStruxure Machine Expert.

It is used to configure a Lexium™ MC multi carrier from scratch or to modify an existing configuration. As a result, the **Multicarrier Configuration** editor adapts the device configuration in EcoStruxure Machine Expert, and generates or modifies code in the application.

You can use the **Multicarrier Configuration** editor to layout your track by adding and parameterizing the following components:

- Straight and curved segments (pre-defined type, length, topological address, start position, end position)
- Stations (name, waiting position, process position)
- Carrier instances (number, carrier compounds)
- Carrier compounds (name, description, properties)
- Tools (name, description, properties)
- Products (name, description, properties)

You can display the track and its components in simplified graphical representations.

For more information on the **Multicarrier Configuration** editor, refer to the Lexium™ MC multi carrier Configuration Guide (see EcoStruxure Machine Expert, Lexium™ MC multi carrier Configuration Guide).

EcoStruxure Machine Expert Twin

The EcoStruxure Machine Expert installation includes the installation files of EcoStruxure Machine Expert Twin. EcoStruxure Machine Expert Twin can be used with the EcoStruxure Machine Expert license.

NOTE: EcoStruxure Machine Expert Twin can also be installed as a standalone version from the Schneider Electric Software Installer by clicking **Install new software** and selecting the product EcoStruxure Machine Expert Twin. In this case, a separate license is required.

A viewer of **EcoStruxure Machine Expert Twin** is embedded in the **Multicarrier Configuration** editor. With this, you can display your configured track as a 3-D emulation and see your application running virtually (by usage of a controller but without real mechanics).

This helps you to analyze your application behavior and to optimize your track design.

NOTE: Only one track can be emulated within the viewer at a time.

Information about Wiring

Overview

Use only Schneider Electric approved devices in your application, and especially Schneider Electric pre-fabricated cables, wherever and whenever possible.

For further information, refer to *Technical Data for Cables*, page 74.

Use an appropriate torque indication or screwdriver for tightening connections.

Observe and implement the following points when wiring:

1. Observe the minimum and maximum cross-sections of the cables necessary for the load carrying capacity of the equipment being connected.
2. Verify the integrity of cable shields to ensure continuity to ground.
3. Ensure that there is a proper, equipotential connection to ground for all interconnected equipment. The equipotential connection for the segments is implemented via the power cable.
4. Do not disconnect cable connection terminals when under power.
5. Ensure that all ground connections have sufficient surface area continuity.
6. Do not interchange DC+ and DC- conductors in the cable between the Lexium™ MC connection module and the Lexium™ MC12 multi carrier track.
7. Do not connect the DC bus directly to the power supply. Always connect the DC bus to the Lexium™ MC connection module.
8. Do not interchange the emergency stop circuits. This has to be observed especially when two different safety-related circuits are used.

If, for example, two parallel conductors are shown as coming from one point, you may not run just one conductor and then branch it off at a later point. If it is wired this way, induction loops (interference emitters and antennas) as well as interfering potential shifts may occur.

An incorrect wiring may result in damage of components.

⚠ CAUTION

DAMAGE OF COMPONENTS DUE TO INCORRECT WIRING

Ensure and verify the correct wiring of power supplies, connection modules and segments.

Failure to follow these instructions can result in injury or equipment damage.

Functional Safety

Process Minimizing Risks Associated with the Machine

Overview

The goal of designing machines safely is to protect people. The risk associated with machines with electrically controlled components comes chiefly from moving machine parts and the electricity itself.

Only you, the user, machine builder, or system integrator can be aware of all the conditions and factors realized in the design of your application for the machine. Therefore, only you can determine the automation equipment and the related safeties and interlocks which can be properly used, and validate such usage.

Hazard and Risk Analysis

Based on the system configuration and utilization, a hazard and risk analysis must be carried out for the system (for example, according to ISO 12100 or ISO 13849-1). The results of this analysis must be considered when designing the machine, and subsequently applying safety-related equipment and safety-related functions. The results of your analysis may deviate from any application examples contained in the present or related documentation. For example, additional safety components may be required. In principle, the results from the hazard and risk analysis have priority.

⚠ WARNING

NON-CONFORMANCE TO SAFETY FUNCTION REQUIREMENTS

- Specify the requirements and/or measures to be implemented in the risk analysis you perform.
- Verify that your safety-related application complies to applicable safety regulations and standards.
- Make certain that appropriate procedures and measures (according to applicable sector standards) have been established to help avoid hazardous situations when operating the machine.
- Use appropriate protective devices (functional safety devices) in compliance with local and national standards.
- Validate the overall safety-related function and thoroughly test the application.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

The ISO 13849-1 *Safety of machinery - Safety-related parts of control systems - Part 1: General principle for design* describes an iterative process for the selection and design of safety-related parts of controllers to reduce the risk to the machine to a reasonable degree.

To perform risk assessment and risk minimization according to ISO 12100, proceed as follows:

1. Defining the boundary of the machine.
2. Identifying risks associated with the machine.
3. Assessing risks.
4. Evaluating risks.
5. Minimizing risks by:
 - Intrinsically safe design
 - Protective devices
 - User information (see ISO 12100)
6. Designing safety-related controller parts (SRP/CS, Safety-Related Parts of the Control System) in an interactive process.

To design the safety-related controller parts in an interactive process, proceed as follows:

Step	Action
1	Identify necessary safety functions that are executed via SRP/CS (Safety-Related Parts of the Control System).
2	Determine required properties for each safety function.
3	Determine the required performance level PL_r .
4	Identify safety-related parts executing the safety function.
5	Determine the performance level PL of the afore-mentioned safety-related parts.
6	Verify the performance level PL for the safety function ($PL \geq PL_r$).
7	Verify if all requirements have been met (validation).

Additional information is available on www.se.com.

Safe Force Off (SFO) Function

Functional Description

With the SFO (Safe Force Off) function, you can set the segments to a defined safe state. In the defined safe state, the segment will not generate any force to carriers through its magnetic field.

This SFO (Safe Force Off) function relates to the components:

- Lexium™ MC connection modules
- Lexium™ MC12 long stator motor segments
- Lexium™ MC12 carriers
- Lexium™ MC communication interconnects

In the sense of the relevant standards (IEC 60204-1), the requirements of the stop category 0 (SFO) and stop category 1 (Safe Stop 1, SS1) can be met. Both categories lead to a force-free segment while SS1 takes this state after a predefined time.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Make certain that no hazards can arise for persons or material during the coast down period of the carriers/machine.
- Do not enter the zone of operation during the coast down period.
- Ensure that no other persons can access the zone of operation during the coast down period.
- Use appropriate protective devices (functional safety devices) in compliance with local and national standards.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

selectable Lexium™ MC12 long stator motor segment straight or Lexium™ MC12 long stator motor segment arc. The signal is forwarded with the Lexium™ MC communication interconnects to all segments belonging to the same SFO group.

The supply voltage (48 Vdc DC bus) does not need to be interrupted.

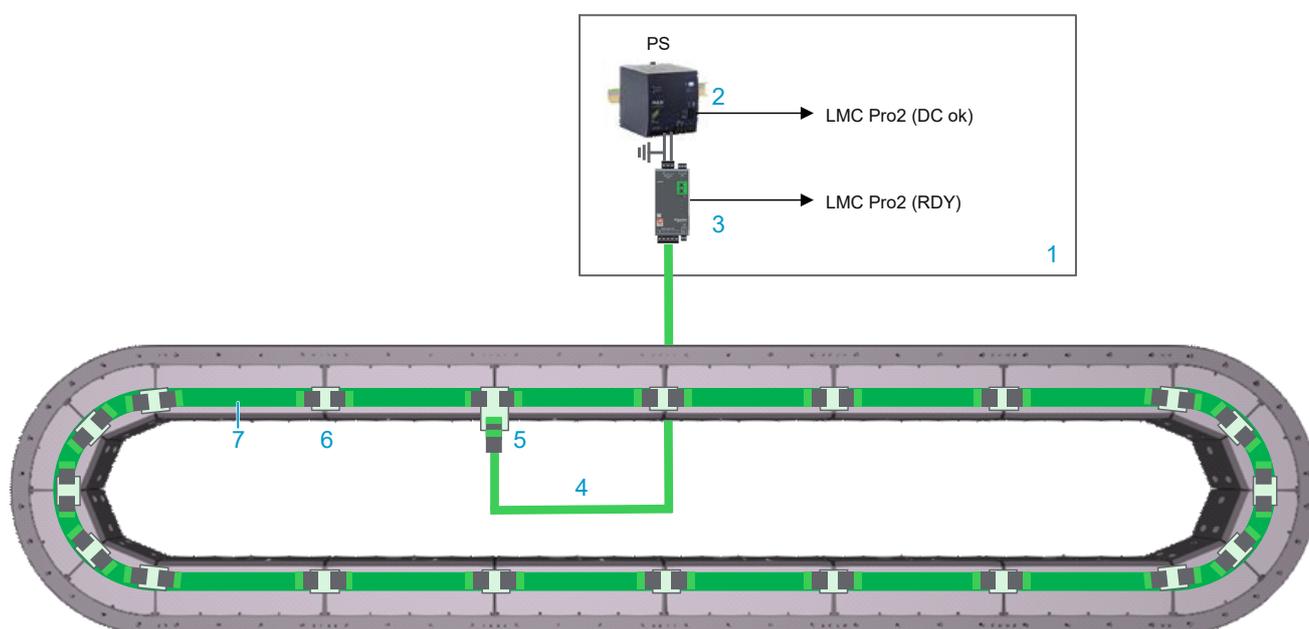
Lexium™ MC connection module

- The Lexium™ MC connection module (3) helps protect the Lexium™ MC12 multi carrier track against overvoltage.
- The Lexium™ MC connection module (3) supplies the Lexium™ MC12 multi carrier track with power (DC bus)

The Lexium™ MC power cable (4) is connected to the Lexium™ MC power interconnect (5) at the bottom of a segment.

- The DC bus (7) (up to 60 A) in the Lexium™ MC12 multi carrier track is distributed from segment to segment via the Lexium™ MC power interconnects (6).

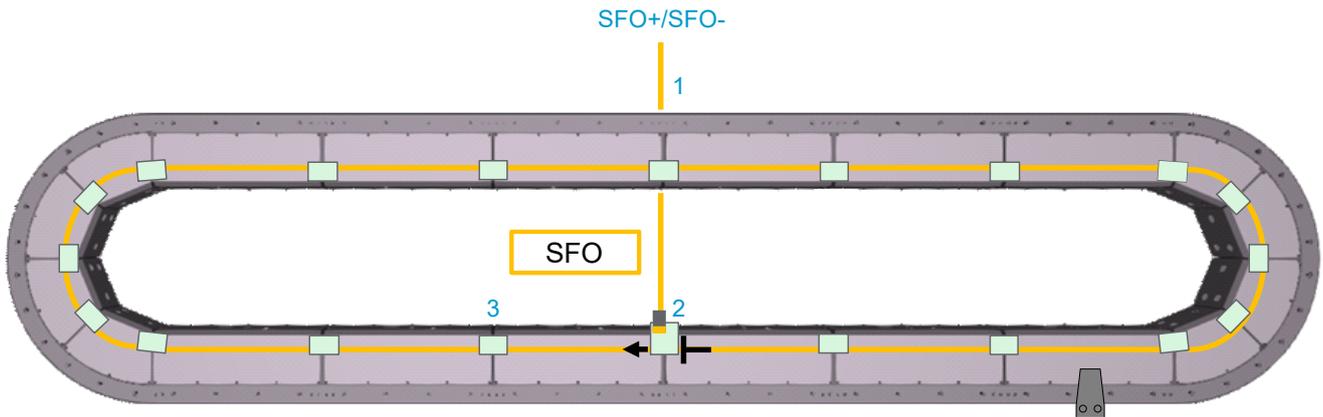
View of the Lexium™ MC12 multi carrier track from below



Element	Description
1	Control cabinet
2	Power supply
3	Lexium™ MC connection module
4	Lexium™ MC power cable with socket connector
5	Lexium™ MC power interconnect with plug connector
6	Lexium™ MC power interconnect without connector
7	Internal DC bus connection

SFO (Safe Force Off)

View of the Lexium™ MC12 multi carrier track from above



- The SFO (Safe Force Off) signal is used to set the segments to a de-energized state. This means that the coils in the segments no longer exert an electromagnetic force on the carriers.
- The SFO signal is transmitted via an SFO cable (1). This cable is connected with a Lexium™ MC communication interconnect (2) with SFO connector at the top of a segment.
- The SFO signal is distributed from segment to segment via the Lexium™ MC communication interconnects (3).
- Several SFO groups can be set up for different sections of the track. An SFO group always starts at the Lexium™ MC communication interconnect with SFO connector and extends clockwise to the next Lexium™ MC12 long stator motor segment via the Lexium™ MC communication interconnect.
- Each segment must be provided with an SFO signal. Either with an SFO cable or via the Lexium™ MC communication interconnect from the segment before.

Also refer to Connecting SFO (Safe Force Off) to the Track, page 130.

Defined Safe State

In the defined safe state, the segment will not generate any force to carriers through its magnetic field. This de-energized state is also automatically entered when errors are detected in the safety-related circuit.

Mode of Operation

When the stop or the emergency stop button is activated, the defined safe state is requested. This is achieved by inhibiting the PWM signals to the power stage of the segments. This means that the coils in the segments no longer exert an electromagnetic force on the carriers. The PWM signals cannot control the power stage so that a startup of the Lexium™ MC12 multi carrier is prevented (pulse pattern lock).

You can use the SFO (Safe Force Off) function to implement the control function “Stopping in case of emergency” (IEC 60204-1) for stop category 0 and stop category 1. Use an appropriate external safety-related circuit to prevent the unintended restart of the Lexium™ MC12 multi carrier after a stop, as required in the machine directive.

Stop Category 0

In stop category 0 (SFO), the carriers coast to a stop (provided there are no external forces operating to the contrary). The SFO safety-related function is

intended to help prevent an unintended start-up, and therefore corresponds to an unassisted stop in accordance with IEC 60204-1.

In circumstances where external influences are present, the coast down time depends on physical properties of the components used (such as weight, velocity, friction, and so on). That is to say, if this means a hazard to your personnel or equipment, you must take appropriate measures (refer to [Hazard and Risk Analysis](#), page 44).

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Make certain that no hazards can arise for persons or material during the coast down period of the carriers/machine.
- Do not enter the zone of operation during the coast down period.
- Ensure that no other persons can access the zone of operation during the coast down period.
- Use appropriate protective devices (functional safety devices) in compliance with local and national standards.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Also refer to [Track Orientation](#), page 40.

Stop Category 1

For stops of category 1 (Safe Stop 1, SS1) you can request a controlled stop via the PacDrive Logic Motion Controller (LMC). The controlled stop by the PacDrive LMC is not safety-relevant, nor monitored, and does not perform as defined in the case of a power outage or if an error is detected. The final switch off in the defined safe state is accomplished by switching off the SFO (Safe Force Off) input. This has to be implemented by using an external safety-related switching device with safety-related delay.

Coast Down Time of Carriers

Your track may have sections with and without the Safe Force Off (SFO) function. For example:

- The segments of your track belong to different SFO groups with the SFO function.
- Some segments of your track belong to an SFO group with the SFO function and other segments belong to an SFO group without the SFO function.

Refer to [Examples SFO/Non-SFO Groups](#), page 51.

You must be aware that de-energizing a segment (SFO function) does not lead to an immediate standstill of the carriers, but that the carriers require a certain coast down time.

The coast down time of carriers depends on physical properties of the components used (such as weight, velocity, friction, and so on). This means that after activating the SFO function for one segment (segment group), a carrier can still roll into another segment.

For open tracks, this means that a carrier can still roll to the end of the track after activating the SFO function and strike the hard stop of the track.

NOTE: If coast down time means a hazard to your personnel or equipment, you must take appropriate measures (refer to [Hazard and Risk Analysis](#), page 44).

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Make certain that no hazards can arise for persons or material during the coast down period of the carriers/machine.
- Do not enter the zone of operation during the coast down period.
- Ensure that no other persons can access the zone of operation during the coast down period.
- Use appropriate protective devices (functional safety devices) in compliance with local and national standards.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

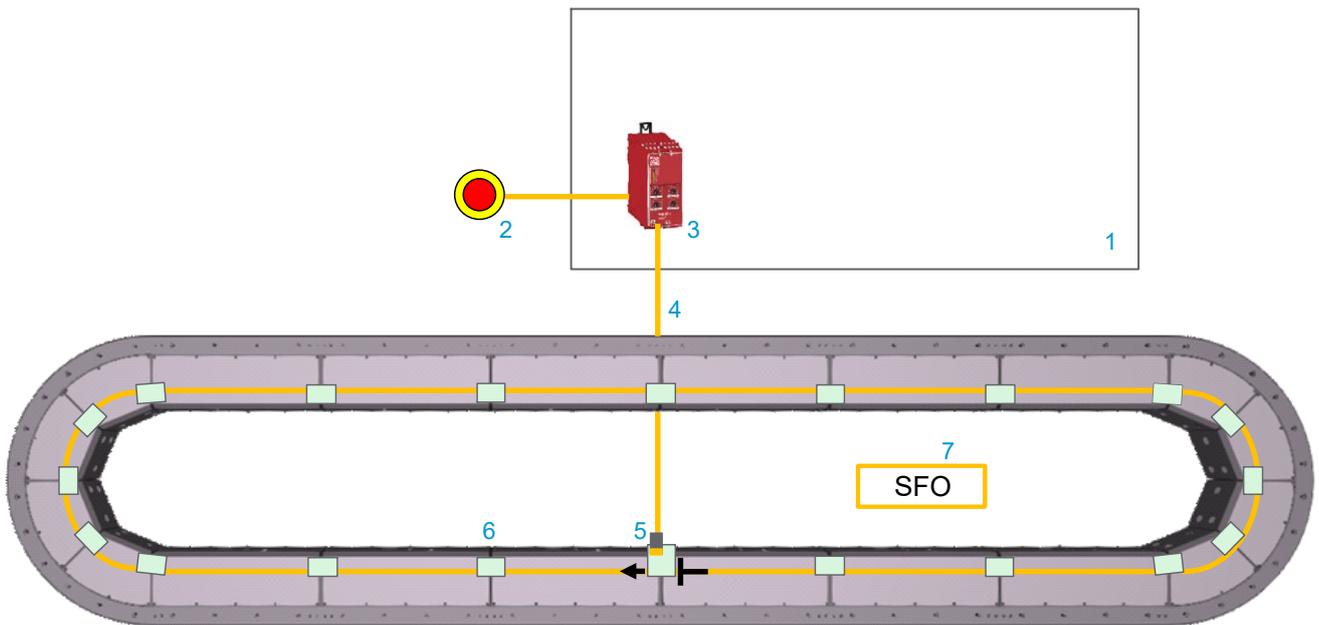
Also refer to Open Track, page 83.

Examples SFO/Non-SFO Groups

Views of the Lexium™ MC12 multi carrier track from above

Example: All segments of a closed track belong to one SFO group with the SFO function. This means that all segments of your track are de-energized at once.

Before entering the SFO group area, you must wait until all carriers have coasted down. Also refer to Coast Down Time of Carriers, page 50.

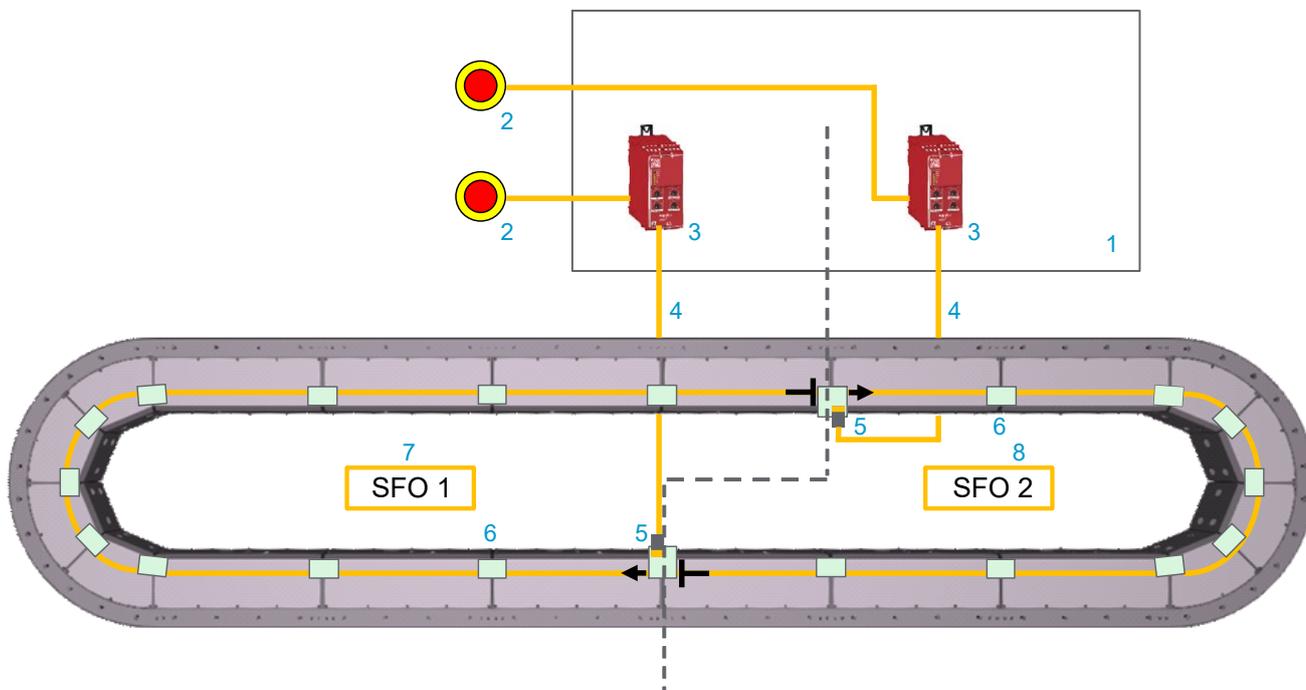


Element	Description
1	Control cabinet
2	Emergency stop switch
3	Safety-related switching device (for example, Harmony XPSUAT Safety Module)
4	SFO cable
5	Lexium™ MC communication interconnect with SFO connector
6	Lexium™ MC communication interconnect
7	SFO group

Also refer to Connecting SFO (Safe Force Off) to the Track, page 130.

Example: The segments of a closed track belong to two different SFO groups with the SFO function. This means that the segments of SFO group 1 and SFO group 2 can be de-energized independently of each other. If you de-energize SFO group 1, you must be aware that the carriers of the SFO group 2 can still roll into SFO group 1 and vice versa.

Before entering the SFO group 1 area, you must wait until all carriers have coasted down and you must take appropriate measures that no carriers from SFO group 2 can roll into SFO group 1. Also refer to Coast Down Time of Carriers, page 50.



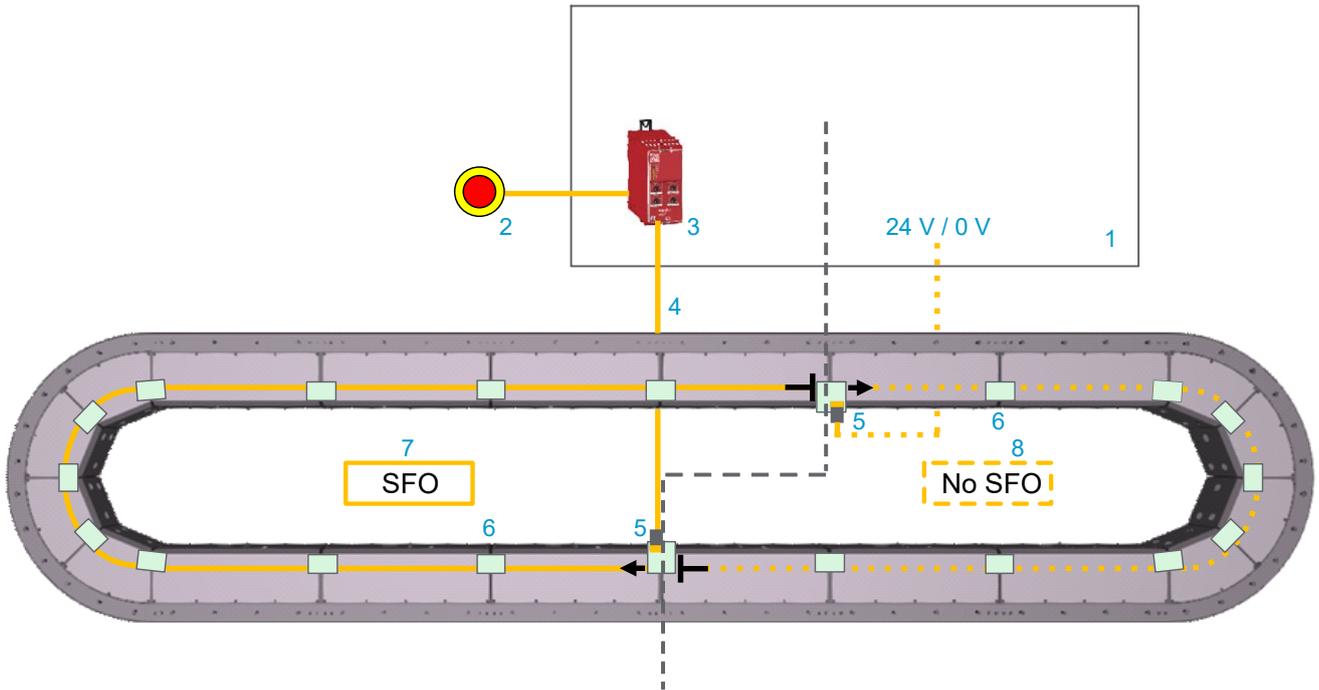
Element	Description
1	Control cabinet
2	Emergency stop switch
3	Safety-related switching device (for example, Harmony XPSUAT Safety Module)
4	SFO cable
5	Lexium™ MC communication interconnect with SFO connector
6	Lexium™ MC communication interconnect
7	SFO group 1
8	SFO group 2

Also refer to Connecting SFO (Safe Force Off) to the Track, page 130.

Example: Some segments of a closed track belong to an SFO group with the SFO function and other segments belong to an SFO group without the SFO function. This means that the segments of the SFO group with the SFO function can be de-energized and the segments of the SFO group without the SFO function can not be de-energized.

If you de-energize the SFO group with the SFO function, you must be aware that the carriers of the group without the SFO function can roll into the SFO group with the SFO function and vice versa.

Before entering the SFO group area, you must wait until all carriers have coasted down and you must take appropriate measures that no carriers from the group with no SFO can roll into the SFO group. Also refer to Coast Down Time of Carriers, page 50.



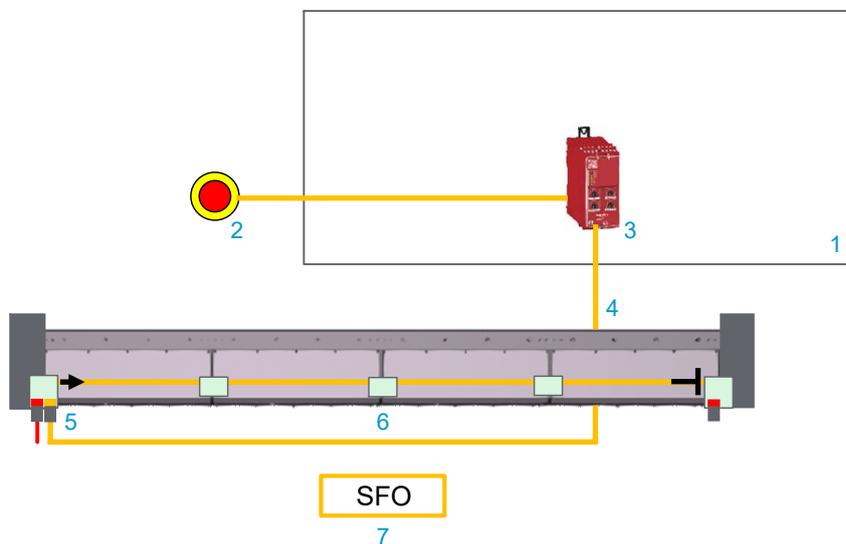
Element	Description
1	Control cabinet
2	Emergency stop switch
3	Safety-related switching device (for example, Harmony XPSUAT Safety Module)
4	SFO cable
5	Lexium™ MC communication interconnect with SFO connector
6	Lexium™ MC communication interconnect
7	SFO group
8	Non-SFO group

Also refer to Connecting SFO (Safe Force Off) to the Track, page 130.

Example: All segments of an open track belong to one SFO group with the SFO function. This means that all segments of your track are de-energized at once.

If you de-energize the SFO group, you must be aware that the carriers can still roll to the end of the track and strike the hard stop of the track.

Before entering the SFO group area, you must wait until all carriers have coasted down. Also refer to Coast Down Time of Carriers, page 50.



Element	Description
1	Control cabinet
2	Emergency stop switch
3	Safety-related switching device (for example, Harmony XPSUAT Safety Module)
4	SFO cable
5	Lexium™ MC communication interconnect with SFO connector
6	Lexium™ MC communication interconnect
7	SFO group

Also refer to Open Track, page 83.

Also refer to Connecting SFO (Safe Force Off) to the Track, page 130.

Not Using the Safe Force Off (SFO) Function

If you have a group of segments in your track that should not use the SFO function, you must supply 24 V to this group permanently. To do this, install a Lexium™ MC communication interconnect with SFO connector to the first segment of this group and supply SFOin+ (24 V) and SFOin- (0 V). This puts the segments of this group in an energized state and allows them to apply electromagnetic force to the Lexium™ MC12 carriers.

If the transition of carriers from a section of the track that does not use the SFO function to a section of the track with SFO function poses a hazard to your personnel or equipment, you must take appropriate measures (refer to Hazard and Risk Analysis, page 44).

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Make certain that no hazards can arise for persons or material during the coast down period of the carriers/machine.
- Do not enter the zone of operation during the coast down period.
- Ensure that no other persons can access the zone of operation during the coast down period.
- Use appropriate protective devices (functional safety devices) in compliance with local and national standards.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Validity of the Safety Case

The safety case for the SFO (Safe Force Off) function of the Lexium™ MC12 multi carrier is identified and defined by the standards listed in *Safety Standards*, page 61. The safety case for the designated safety function of the Lexium™ MC12 multi carrier applies to the following product versions, which can be found examining the appropriate software object in EcoStruxure Machine Expert (see EcoStruxure Machine Expert, Programming Guide):

Component	References	Product version
Lexium™ MC connection module	LXMMCACMD02S100	02
Lexium™ MC12 long stator motor segment straight	LXMMC12MS06S100	02
Lexium™ MC12 long stator motor segment arc	LXMMC12MA02S100	02
Lexium™ MC12 carrier	LXMMC12CA51S100	02
Lexium™ MC communication interconnect plain	LXMMBCA001S100	02
Lexium™ MC communication interconnect with two Sercos connectors	LXMMBCAS01S100	02
Lexium™ MC communication interconnect with one SFO connector	LXMMBCAF01S100	02
Lexium™ MC communication interconnect for open track with one Sercos and one SFO connector	LXMMCBDASF1S100	02
Lexium™ MC communication interconnect for open track with one Sercos connector	LXMMCBDAS01S100	02
Also refer to <i>Product Overview</i> , page 26.		

For additional information, contact your Schneider Electric service representative.

Interface and Control

The SFO (Safe Force Off) function is operated via the difference between the two input signals SFOin+ (24 V) and SFOin- (0 V).

For information on the technical data and electrical connections, refer to the chapter *Technical Data for Safe Force Off (SFO)*, page 70.

Setup, Installation and Maintenance

Prevent Possible Unintended Operation and Avoid Overvoltage

The following measures avoid overvoltages and help prevent possible unintended equipment operation through conductive pollution or parts falling into the device:

⚠ DANGER

ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Install the Lexium™ MC connection module in a control cabinet or housing with a minimum IP 54 rating and secured by a key or tool mechanism.
- Comply with the clearances and creepage distances according to EN 50178.
- The Lexium™ MC12 multi carrier must only be operated with 24 Vdc (SFO) / 48 Vdc (DC bus) power supplies certified according to IEC 62368-1.

Failure to follow these instructions will result in death or serious injury.

NOTE: These power supply units do not deliver permanent overvoltage over 120 Vdc.

Only operate the Lexium™ MC12 multi carrier with approved, specified cables, accessories and replacement equipment by Schneider Electric.

⚠ DANGER

ELECTRIC SHOCK OR ARC FLASH

Do not use non-Schneider Electric approved cables, accessories or any type of replacement equipment.

Failure to follow these instructions will result in death or serious injury.

Avoid Unintentional Restart

The unintentional restart of the equipment must be avoided by appropriate means, depending on your particular application.

⚠ DANGER

ELECTRIC SHOCK OR ARC FLASH

- Ensure that a restart of the system is not possible after a return of power or the tripping of a functional safety device unless preceded by a deliberate enable signal from the system.
- Ensure that the enable signal meets the specified safety criteria.

Failure to follow these instructions will result in death or serious injury.

Commissioning

Overview

Step	Action
1	Verify the installation. For more information, refer to <i>Verifying the Installation</i> , page 135.
2	Verify that a hazard and risk analysis has been performed. Refer to <i>Hazard and Risk Analysis</i> , page 44.
3	Carry out a functional test of the Safe Force Off (SFO) function for all segments that need the safety-related function.
4	Especially verify the correct application of the segments without the Safe Force Off (SFO) function.
5	Verify the interaction between track sections with and without the SFO function. Refer to <i>Coast Down Time of Carriers</i> , page 50
6	Complete installation in accordance with the EMC regulations.
7	Afterwards, commission the Lexium™ MC12 multi carrier.

Best Practices

Overview

When the machine is commissioned, the connected segments are usually hidden from sight of the machine operator and cannot be monitored directly.

⚠ WARNING

UNSUPERVISED MACHINE START-UP

Only start the machine if there are no persons within the zone of operation of moving machine components.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Verify Connections

Step	Action
1	Verify all terminals, connectors, and other connections on all system components for correct and firm fit.
2	Only use robust connectors and secure fixings.
3	Verify the protective earth ground (PELV, Protective Extra Low Voltage) of the power supplies (24 Vdc SFO / 48 Vdc DC bus).
4	Verify the wiring of the DC bus (48 Vdc) from the Lexium™ MC connection module to the track. Only use the pre-assembled cable provided by Schneider Electric. Refer to Technical Data for Cables, page 74.
5	Verify the wiring of the safety function to the segments to avoid an interchange of the SFO+ and SFO– inputs. Only use the pre-assembled cable provided by Schneider Electric. Refer to Technical Data for Cables, page 74.
6	Use coded connectors (refer to chapter Connecting SFO (Safe Force Off) to the Track, page 130) and perform a commissioning test (refer to chapter Commissioning, page 57).
7	Use only appropriate transport packaging to forward or return individual system components.

⚠ DANGER

ELECTRIC SHOCK DUE TO INADEQUATE PROTECTIVE SEPARATION

Only connect devices, electrical components, or lines to the signal voltage connectors of these products that feature a sufficient, protective separation from the connected circuits in accordance with the standards (IEC 61800-5-1: Adjustable speed electrical power drive systems - safety requirements).

Failure to follow these instructions will result in death or serious injury.

External Forces

The defined safe state of the Lexium™ MC12 multi carrier is achieved when the segments are set to a de-energized state. This means that the coils in the segments no longer exert an electromagnetic force on the carriers.

If external forces act upon the carriers, they will not necessarily maintain their position. In any case, the carriers will coast to an unassisted stop. This coast down time depends on physical properties of the components used (such as weight, torque, friction, and so on), and additional measures such as mechanical brakes may be necessary to help prevent any hazard from materializing. If the defined safe state is inappropriate for your application where external forces may move

the carriers as determined by your risk assessment, implement other external safety-related measures.

▲ WARNING

UNINTENDED EQUIPMENT OPERATION

- Make certain that no hazards can arise for persons or material during the coast down period of the carriers/machine.
- Do not enter the zone of operation during the coast down period.
- Ensure that no other persons can access the zone of operation during the coast down period.
- Use appropriate protective devices (functional safety devices) in compliance with local and national standards.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Maintenance

Overview

The SFO (Safe Force Off) function has been designed for a defined lifetime that does not require to verify the safety-related function, nor any specific maintenance requirements. For the defined lifetime, refer to *Safety Standards*, page 61.

After this lifetime has elapsed, a statement about the SFO function cannot be made due to the aging of the component. If you want to ensure the functional safety after this period, you need to replace the device that includes the safety function.

NOTE: Subject the product to a complete function test after replacement.

Physical Environment

Overview

The system is not protected against physical or chemical sources of damage by any design features, such as:

- Toxic
- Explosive
- Corrosive
- Highly reactive
- Inflammable types

The system has been designed to operate outside of any hazardous location. Only install the system in zones known to be free of a hazardous atmosphere.

⚠ DANGER

POTENTIAL FOR EXPLOSION

Install and use this equipment in non-hazardous locations only.

Failure to follow these instructions will result in death or serious injury.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Observe and conform to ambient temperatures, storage temperatures and transport temperatures of the individual components as specified in the hardware guide.
- Prevent the formation of moisture during the storage and transport of individual components.
- Conform to the vibration and shock requirements specified in the hardware guide when operating, storing and transporting system components.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

The power supplies and the Lexium™ MC connection modules must only be installed in an electrical equipment enclosure (for example, in a control cabinet). The electrical equipment enclosure must be lockable by using a key or tool.

Safety Standards

Overview

The SFO safety-related function has been designed and tested for functional safety according to the following standards

- IEC 61508:2010
- IEC 61800-5-2:2016
- EN ISO 13849-1:2015
- IEC 62061:2021

An independent assessment was performed by TÜV Nord.

According to the above listed standards, the figures for the devices for using the SFO (Safe Force Off) function are as follows:

Standard characteristics	Lexium™ MC connection module	Lexium™ MC communication interconnect with SFO connector	Lexium™ MC12 long stator motor segment straight/Lexium™ MC12 long stator motor segment arc (including communication interconnects between segments)
SFF (IEC 61508)* Safe Failure Fraction	100 %	100 %	99 %
HFT (IEC 61508) Hardware Fault Tolerance	1	1	1
Type (IEC 61508)	A	A	A
SIL (IEC 61508, IEC 6206) Safety Integrity Level Safety Integrity Level Claim Limit	3	3	3
PFH (IEC 61508)* Probability of Dangerous Failures per Hour	0	0	$2.9 \cdot 10^{-10}/h$
PL (cat) (ISO 13849-1) Performance Level (Category)	e (4)	e (4)	e (4)
MTTFd (ISO 13849-1)* Mean Time to Dangerous Failure	–	–	4000 years
DC (ISO 13849-1)* Diagnostic Coverage	–	–	99 %
Lifetime	20 years	20 years	20 years
Maximum reaction time between the request and execution of the designated safety function	10 ms	10 ms	10 ms
Maximum reaction time before the detection of safety-related errors	10 ms	10 ms	10 ms
<p>NOTE: The values specified are rounded individually and are therefore not a result of a conversion by for example, PFH in MTTFd or the comparative tables from ISO13849-1.</p> <p>* In case you have multiple segments in your SFO function, apply the appropriate estimations from IEC 61508, IEC 62061 and ISO 13849 to estimate the reliability of the SFO function.</p>			

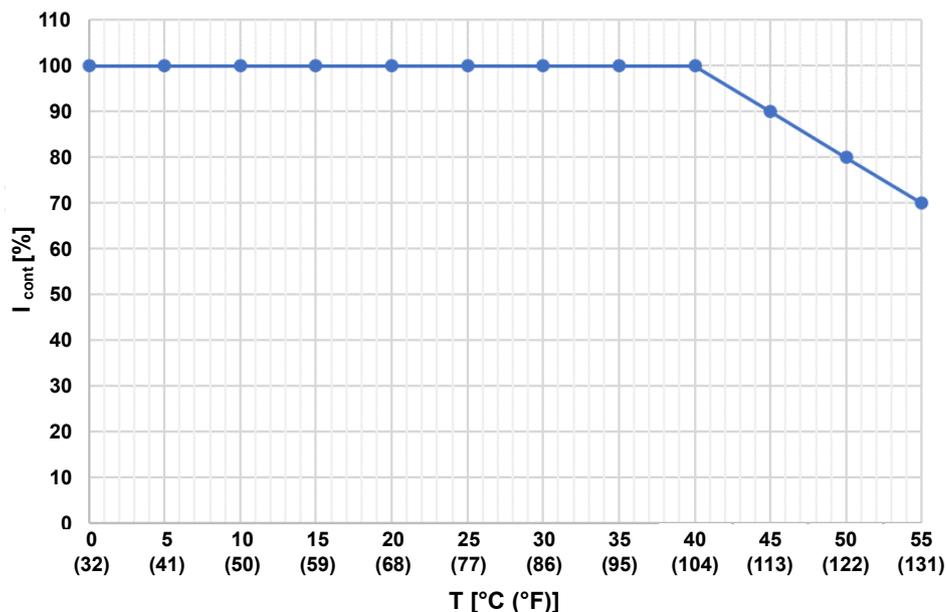
Special Conditions

Increased Ambient Temperature

Due to increased ambient temperature, the available continuous output current and the continuous coil current is reduced.

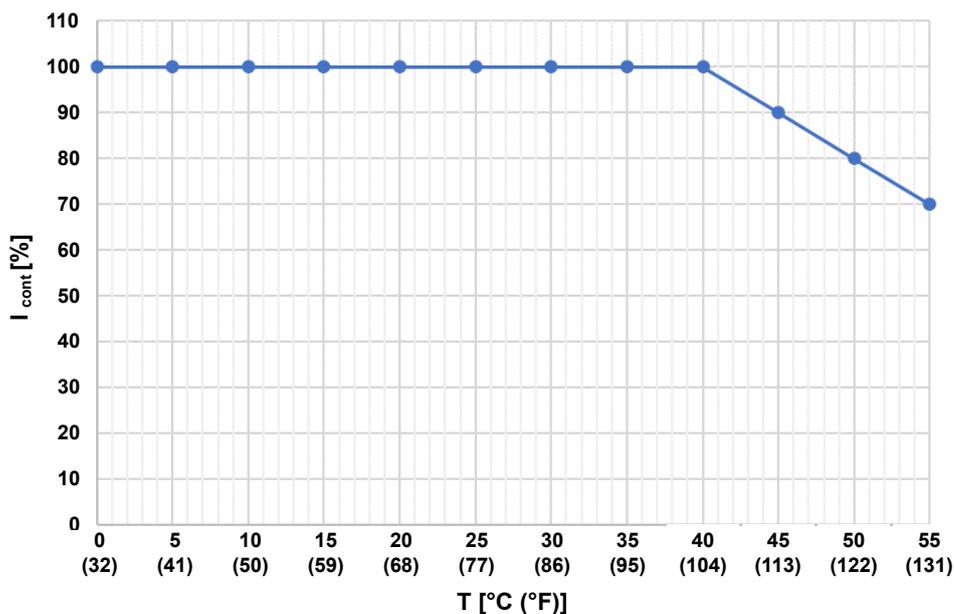
Cabinet devices (connection modules)

Continuous output current I_{cont} [%] reduction at increased ambient temperature T [$^{\circ}C$ ($^{\circ}F$)]



Field devices (track, segments, coils)

Continuous coil current I_{cont} [%] reduction at increased ambient temperature T [$^{\circ}C$ ($^{\circ}F$)]

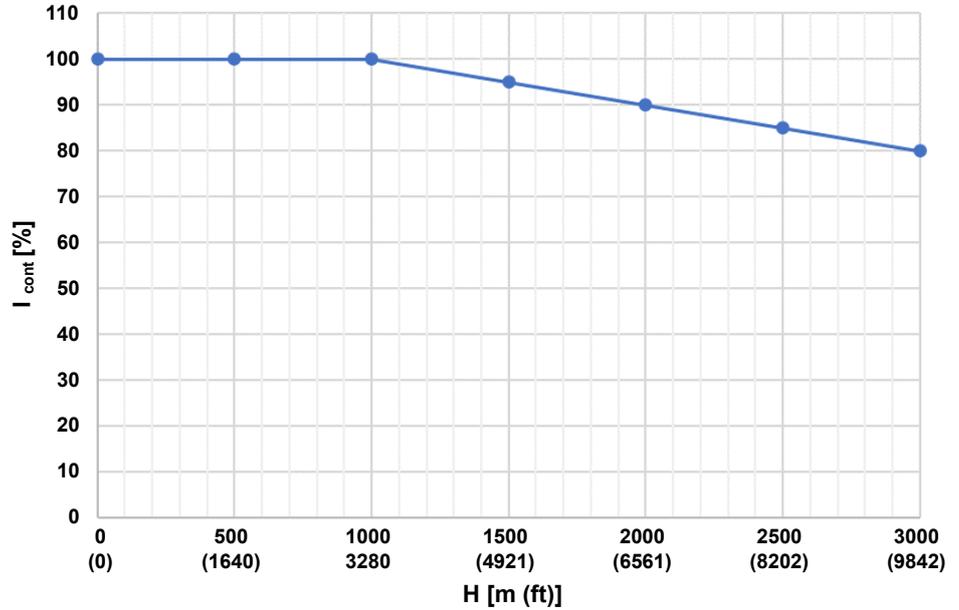


Increased Installation Altitude

Due to the lower air pressure at higher altitudes, the cooling effect is reduced. Therefore, the continuous current of the segments / coils and the DC bus output current of the connection module must be reduced by 1% per 100 m (328 ft) starting from an installation altitude of 1000 m (3281 ft).

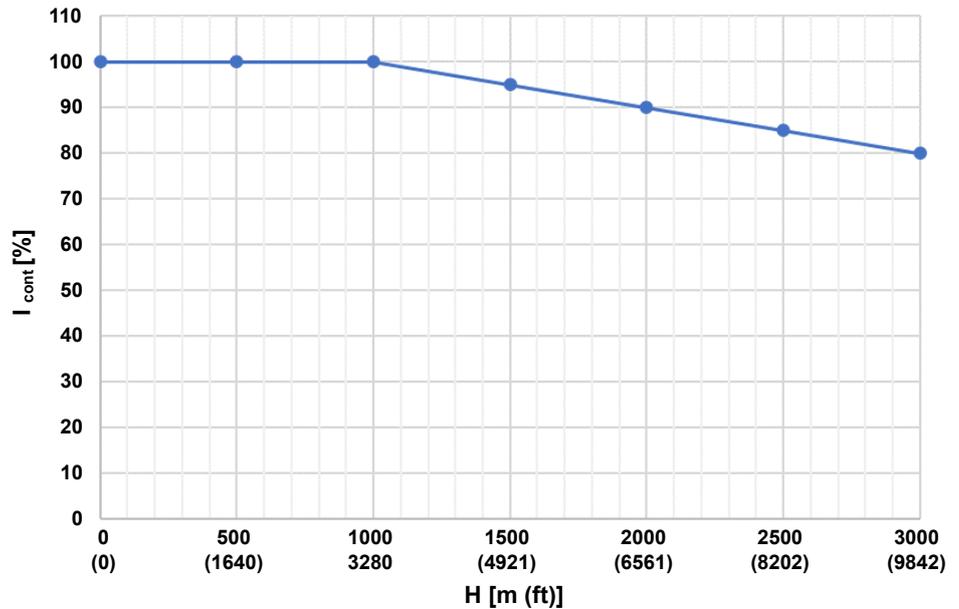
Cabinet devices (connection modules)

Continuous output current I_{cont} [%] reduction at increased installation height H [m (ft)]



Field devices (track, segments, coils)

Continuous coil current I_{cont} [%] reduction at increased installation height H [m (ft)]



Technical Data

General Installation Conditions for the System

Overview

Parameter	Value
EMC Classification for emission IEC 61800-3	C2 (emission)
EMC Classification for immunity IEC 61800-3	Second environment (immunity)
Pollution degree IEC 61800-5-1	2 ⁽¹⁾
Overvoltage category IEC 61800-5-1	III
Protective Class IEC 61800-5-1	I
Supply system / Earthing conditions IEC 61800-2 and IEC 61800-5-1	TN-S May be provided by use of an upstream isolating transformer with earthed star point, voltage range and further installation requirements in accordance with the installation manual of the power supply, page 74.
Mounting height IEC 61800-2 and IEC 61800-5-1	0...2000 m (0...6561 ft) without power de-rating 2000...3000 m (6561...9842 ft) with power de-rating ⁽²⁾
<p>(1) For cabinet devices: The devices must be protected against conductive contamination. For example, by installing them in a cabinet with degree of protection greater than or equal to IP54 in accordance with IEC 60529. Assuming that conductive contamination can be excluded at the installation site, a cabinet with a lower degree of protection is permissible.</p> <p>(2) For more information, refer to the de-rating information in Special Conditions, page 62.</p>	

Ambient Conditions

Ambient Conditions Field Devices

Operation

Procedure	Parameter	Unit	Value
Environmental characteristics	Based on class 3K3 according to IEC 60721-3-3: 2002		
	Ambient temperature	°C (°F)	+5...+40 (+41...+104)/ +55 (131) with power derating ⁽¹⁾
	Relative humidity	%	5...85
	Air pressure	kPa	70...106
	Heat radiation	–	Prohibited
	Condensation	–	Prohibited
	Precipitation	–	Prohibited
	Water from sources other than rain	–	Allowed according to IP54.
Formation of ice	–	Prohibited	
Mechanical conditions	Class 3M4 according to IEC 60721-3-3: 2002		
	Displacement amplitude	mm / frequency range Hz	3.0 / 2-9
	Acceleration amplitude	m/s ² / frequency range Hz	10 / 9-200
	Shock response spectrum type I	peak acceleration m/s ²	100
(1) For more information, refer to the de-rating information in Special Conditions, page 62.			

Transport

Procedure	Parameter	Unit	Value
Environmental characteristics	Based on class 2K4 according to IEC 60721-3-2:1997		
	Ambient temperature	°C (°F)	-40...+70 (-40...+158)
	Relative humidity	%	5...95
	Air pressure	kPa	70...106
	Condensation	–	Prohibited
	Precipitation	–	Prohibited (1)
	Water from sources other than rain	–	Prohibited (1)
	Formation of ice	–	Prohibited (1)
Mechanical conditions	Based on class 2M2 according to IEC 60721-3-2:1997		
	Displacement amplitude	mm/ frequency range Hz	3.5 / 2...9
	Acceleration amplitude	m/s ² /frequency range Hz	10 / 9...200
	Shock response spectrum type I	m/s ²	100
	Shock response spectrum type II	m/s ²	300
(1) Based on the product packaging			

For detailed information about storage conditions, refer to [Transport and Storage](#), page 78.

Long-term Storage in Transport Packaging

Procedure	Parameter	Unit	Value
Environmental characteristics	Based on class 1K2 according to IEC 60721-3-1:1997		
	Ambient temperature	°C (°F)	+5...+40 (+41...+104)
	Relative humidity	%	5...85
	Air pressure	kPa	70...106
	Condensation	–	Prohibited
	Precipitation	–	Prohibited
	Water from sources other than rain	–	Prohibited
	Formation of ice	–	Prohibited
Mechanical conditions	Based on class 1M2 according to IEC 60721-3-1:1997		
	Static load	kPa	5

Ambient Conditions Cabinet Devices

Operation

Procedure	Parameter	Unit	Value
Environmental characteristics	Based on class 3K3 according to IEC 60721-3-3: 2002		
	Ambient temperature	°C (°F)	+5...+40 (+41...+104)/ +55 (131) with power derating ⁽¹⁾
	Relative humidity	%	5...85
	Air pressure	kPa	70...106
	Heat radiation	–	Prohibited
	Condensation	–	Prohibited
	Precipitation	–	Prohibited
	Water from sources other than rain	–	Prohibited
Formation of ice	–	Prohibited	
Mechanical conditions	Based on class 3M4 according to IEC 60721-3-3: 2002		
	Displacement amplitude	mm / frequency range Hz	3.0 / 2...9
	Acceleration amplitude	m/s ² / frequency range Hz	10 / 9...200
	Shock response spectrum type I	peak acceleration m/s ²	100
(1) For more information, refer to the de-rating information in Special Conditions, page 62.			

Transport

Procedure	Parameter	Unit	Value
Environmental characteristics	Based on class 2K4 according to IEC 60721-3-2:1997		
	Ambient temperature	°C (°F)	-40...+70 (-40...+158)
	Relative humidity	%	5...95
	Air pressure	kPa	70...106
	Condensation	–	Prohibited
	Precipitation	–	Prohibited (1)
	Water from sources other than rain	–	Prohibited (1)
Mechanical conditions	Based on class 2M2 according to IEC 60721-3-2:1997		
	Displacement amplitude	mm/ frequency range Hz	3.5 / 2...9
	Acceleration amplitude	m/s ² /frequency range Hz	10 / 9...200
	Shock response spectrum type I	m/s ²	100
	Shock response spectrum type II	m/s ²	300
(1) Based on the product packaging			

For detailed information about storage conditions, refer to [Transport and Storage](#), page 78.

Long-term Storage in Transport Packaging

Procedure	Parameter	Unit	Value
Environmental characteristics	Based on class 1K2 according to IEC 60721-3-1:1997		
	Ambient temperature	°C (°F)	+5...+40 (+41...+104)
	Relative humidity	%	5...85
	Air pressure	kPa	70...106
	Condensation	–	Prohibited
	Precipitation	–	Prohibited
	Water from sources other than rain	–	Prohibited
Mechanical conditions	Based on class 1M2 according to IEC 60721-3-1:1997		
	Static load	kPa	5

Mechanical and Electrical Data

General Technical Data

Designation	Unit	Value	Description
Peak force (straight segment)	N (lbf)	120 (27)	Force for acceleration and deceleration of carrier and load (10 % derating at the transition between segments)
Peak force (arc segment)	N (lbf)	100 (22.48)	
Total mass	kg (lb)	≤ 3 (6.61)	Carrier with tool and payload
Carrier nominal mass	kg (lb)	0.79 (1.74)	NOTE: For the calculation of the carrier acceleration, add a virtual mass of 96 grams (0.21 lb) due to the rotative inertia of the four carrier rollers.
Maximum acceleration at a total mass of 1 kg (2.2 lbs)	m/s ² (ft/s ²)	120 (394)	-
Maximum speed (straight segment)	m/s (ft/s)	4 (13.1)	-
Repetitive accuracy (+/-)	mm (in)	< 0.03 (0.0012) straight	Single carrier to the same, single position multiple times
		< 0.05 (0.002) arc	
Absolute accuracy (+/-)	mm (in)	< 0.25 (0.01) straight	Single carrier to positions within one segment
		< 0.35 (0.014) arc	
Carrier size (W x H)	mm (in)	50 x 147 (1.97 x 5.79)	-
Length (straight segment)	mm (in)	299.8 (11.8)	-
Radius (arc segment)	mm (in)	256 (10.1)	Outer radius of the segment
Degree of protection (field devices)	IP	54	-
Degree of protection (cabinet devices)	IP	20	-
Maximum number of carriers per track	#	130	Could be more, depending on the Sercos bandwidth and load. For a larger number of carriers, contact your local Schneider Electric service representative.
Maximum number of carriers per segment (straight segment)	#	6	-
Maximum number of carriers per segment (arc segment)	#	4	-
Minimum carrier pitch	mm (in)	Width of carrier	-
Maximum track length	m (ft)	24 (78.4)	For longer systems, contact your local Schneider Electric service representative.
Track orientation	-	horizontal and vertical	For vertical orientation, only arc segments are allowed. Also refer to Track Orientation, page 40.
Safety function	-	Hardwired SFO (Safe Force Off)	-

Technical Data for Safe Force Off (SFO)

Designation	Unit	Value
Maximum current consumption per segment	mA	15
Maximum potential difference between SFO- and PE (protective ground/earth)	V	15
Input characteristics per segment:		
• SFO active (power stage off) voltage:	V	$-3 \leq U_{SFO} \leq 5$
• Power stage active (SFO inactive) voltage:	V	$15 \leq U_{SFO} \leq 30$
• Average current consumption (SFO active)	mA	$5 \leq I_{SFO} \leq 15$
• Maximum dynamic test pulse duration	μ s	500
• Maximum dynamic test pulse frequency	Hz	20
• Maximum input capacitance – Lexium™ MC communication interconnect with SFO (Safe Force Off) connector	nF	16.5
• Maximum input capacitance per segment	nF	1.2
Input characteristics per SFO group (line connection)		
• Maximum number of inline segments:	–	68
• For more than 15 inline segments:	–	–
◦ Power stage active (SFO inactive) voltage (at cable length 2 m (6.56 ft))	• V	• $20 \leq U_{SFO} \leq 30$
◦ Power stage active (SFO inactive) voltage (at cable length 20 m (65.62 ft))	• V	• $22.5 \leq U_{SFO} \leq 30$

Technical Data for Lexium™ MC12 long stator motor segments

Lexium™ MC12 long stator motor segment straight

Designation	Unit	Value	Description
Peak force	N (lbf)	120 (27)	50 mm (1.97 in) carrier width
Standstill force	N (lbf)	30 (6.74)	50 mm (1.97 in) carrier width
Rated voltage	Vdc	48	-
Rated current	A	10	-
Mass	kg (lb)	7.9 (17.42)	-
Length	mm (in)	299.8 (11.8)	-
Width	mm (in)	162.6 (6.4)	-
Height	mm (in)	136 (5.35)	-

For more information, refer to the de-rating information in Special Conditions, page 62.

Lexium™ MC12 long stator motor segment arc

Designation	Unit	Value	Description
Peak force	N (lbf)	100 (22.48)	50 mm (1.97 in) carrier width
Standstill force	N (lbf)	30 (6.74)	50 mm (1.97 in) carrier width
Rated voltage	Vdc	48	-
Rated current	A	10	-
Mass	kg (lb)	4.5 (9.92)	-
Radius	mm (in)	256 (10.1)	Outer radius of segment
Width	mm (in)	194.1 (7.64)	-
Height	mm (in)	136 (5.35)	-
Arc angle	°	45	-

For more information, refer to the de-rating information in Special Conditions, page 62.

Technical Data for Lexium™ MC interconnects

Lexium™ MC communication interconnect with connector

Designation	Unit	Value	Description
Voltage	Vdc	24	-
Current	A	2	Maximum current consumption SFO
Mass	kg (lb)	0.1 (0.22)	-
Length	mm (in)	77.5 (3.05)	-
Width	mm (in)	56.5 (2.22)	-
Height	mm (in)	22.65 (0.89)	-

Lexium™ MC communication interconnect without connector

Designation	Unit	Value	Description
Mass	kg (lb)	0.05 (0.11)	-
Length	mm (in)	46 (1.81)	-
Width	mm (in)	56.5 (2.22)	-
Height	mm (in)	22.65 (0.89)	-

Lexium™ MC power interconnect with connector

Designation	Unit	Value	Description
Voltage	Vdc	48	Rated DC bus voltage
Current	A	20	Rated current connector
DC bus current	A	60	Rated current common DC bus
Mass	kg (lb)	0.6 (1.32)	-
Length	mm (in)	173 (6.81)	-
Width	mm (in)	75 (2.95)	-
Height	mm (in)	82.2 (3.24)	-

Lexium™ MC power interconnect without connector

Designation	Unit	Value	Description
Mass	kg (lb)	0.4 (0.88)	-
Length	mm (in)	119.1 (4.69)	-
Width	mm (in)	75 (2.95)	-
Height	mm (in)	82.2 (3.24)	-

Technical Data for Lexium™ MC guide rails

Lexium™ MC guide rail straight

Designation	Unit	Value	Description
Mass	kg (lb)	2.06 (4.54)	Mass per meter
Length	mm (in)	-	Corresponds to the length of:
		150.2 (5.91)	0.5 straight segment
		300.4 (11.83)	1 straight segment
		600.8 (23.65)	2 straight segments
		901.2 (35.48)	3 straight segments
		1201.6 (47.31)	4 straight segments
1502 (59.13)	5 straight segments		
Width	mm (in)	35 (1.38)	-
Height	mm (in)	8 (0.31)	-

Lexium™ MC guide rail arc

Designation	Unit	Value	Description
Mass	kg (lb)	2.06 (4.54)	Mass per meter
Width	mm (in)	35 (1.38)	-
Height	mm (in)	8 (0.31)	-
Arc angle	°	45	Guide rails arc end in a short straight at both sides. 1/4 ul (unit length) straight at one end and 3/4 ul straight at the other end. 1 ul = 300.4 mm (11.83 in). This does not apply to the 360° arc.
		90	
		135	
		180	
		360	

Technical Data for Lexium™ MC12 carriers

Lexium™ MC12 carrier

Designation	Unit	Value	Description
Peak force	N (lbf)	120 (27)	Peak force for straight segments
Standstill force	N (lbf)	30 (6.74)	-
Maximum velocity	m/s (ft/s)	4 (13.1)	-
Mass	kg (lb)	0.79 (1.74)	NOTE: For the calculation of the carrier acceleration, add a virtual mass of 96 grams (0.21 lb) due to the rotative inertia of the four carrier rollers.
Length	mm (in)	91.6 (3.61)	-
Width	mm (in)	50 (1.97)	-
Height	mm (in)	145.1 (5.71)	-

Technical Data for Lexium™ MC connection modules

Lexium™ MC connection module

Designation	Unit	Value	Description
Input voltage	Vdc	48	Rated input voltage
Input current	A	20	Rated input current
Output voltage	Vdc	48	Rated output voltage
Output current	A	20	Rated output current
Ready relay output voltage	Vac/Vdc	30	-
Ready relay output current	A	1	Resistive load
Mass	kg (lb)	0.725 (1.6)	-
Length	mm (in)	117 (4.6)	-
Width	mm (in)	63 (2.48)	-
Height	mm (in)	123.6 (4.87)	-

For de-rating refer to Special Conditions, page 62.

Technical Data for Lexium™ MC braking resistor

Lexium™ MC braking resistor

Designation	Unit	Value	Description
Resistance value	Ohm	3	-
Continuous power	W	100	-
Peak energy	J	4000	At 60 V
Cable	m (ft)	2 (6.56)	-
Mass	kg (lb)	0.78 (1.72)	-

Technical Data for Power Supply

The equipment has been tested with a PULS QT40.481 power supply by Schneider Electric for use with the Lexium™ MC12 multi carrier.

In general the power supply has the following characteristics:

Designation	Unit	Value	Description
Input – output separation	-	PELV	-
Adjustable output voltage	Vdc	48 – 52	-
Continuous output current	A	20	Electronically protected against overload, short circuit and no-load
Short term output current	A	≥ 30	-
Peak (25 ms) output current	A	≥ 55	-
Parallel use	-	Up to 3 power supplies	-
Back-Feeding loads	Vdc	≥ 63	-
DC ok	Vdc	24, relay output	Potential-free

Technical Data for Cables

Lexium™ MC power cable

Designation	Unit	Value	Description
Voltage isolation	V	1000	-
Rated voltage	Vdc	48	-
Maximum continuous current	A	20	-
Temperature range	°C (°F)	-40...+80 (-40...+176 (fixed routing) -25...+80 (-13...+176 (mobile)	-
Cable diameter	mm (in)	10.3 ± 0.4 (0.41 ± 0.016)	-
Bending radius	-	5 x diameter (fixed routing)	-
Sheath	-	PUR, oil resistant, halogen-free, flame-retardant	-

Sercos cable

Designation	Unit	Value	Description
Voltage isolation	V	300	-
Temperature range	°C (°F)	-20...+60 (-4...+140)	-
Cable diameter	mm (in)	6.7 ± 0.2 (0.26 ± 0.008)	-
Bending radius	-	5 x diameter (fixed routing) 10 x diameter (flexing, 5 million bending cycles)	-
Sheath	-	PUR, oil resistant, halogen-free, flame-retardant	-
Cable type and shielding	-	CAT6 with S/FTP (Sercos)	-

SFO cable

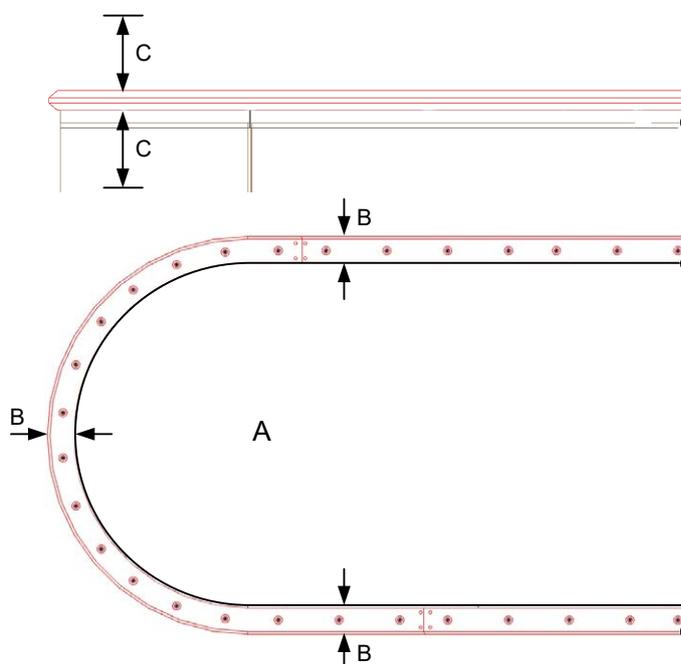
Designation	Unit	Value	Description
Voltage isolation	Vac	250	-
	Vdc	300	
Rated voltage	Vdc	24	-
Maximum continuous current	A	4	-
Temperature range	°C (°F)	-40...+80 (-40...+176) fixed	-
		-5...80 (23...176) flexing	
Cable outer diameter	mm (in)	5.2 mm (0.20)	-
Sheath	-	PUR, oil resistant, halogen-free, flame-retardant	-

Mounting Plate

Overview

The following prerequisites must be met by the mounting plate:

- The mounting plate must be flat, level and clean. The flatness of the mounting plate must be at least 0.4 mm/m (0.0048 in/ft).
- The mounting plate must support the weight of the fully assembled system.
- Have the mounting plate made of aluminium with a thickness of at least 15 mm (0.59 in) to help to ensure a sufficient heat dissipation. This also requires a good thermal connection between the segments and the mounting plate. If you use other material you must verify to reach a sufficient heat dissipation.
- To help to install the guide rails:
 - The size of the mounting plate (**A**) must be about 70 mm (2.76 in) (= 2 x **B**) smaller than the shape of your system layout.
 - A working space (**C**) of about 100 mm (3.94 in) must be available above and below the rails.



- The mounting plate must be provided with all necessary holes and threads. The drilling templates of the components are part of this documentation. Refer to Dimensions and Drilling Templates, page 156.

You can download the CAD files of the individual components from the Schneider Electric homepage.

NOTE: For a large system, use a frame with several mounting plates installed.

Do not move/lift the pre-assembled Lexium™ MC12 multi carrier if it is not installed on a mounting plate.

If you plan to assemble the Lexium™ MC12 multi carrier track outside of your machine, equip the mounting plate with suitable transport devices to be able to lift the mounted track into your machine.

▲ WARNING

HEAVY AND/OR FALLING PARTS

- Use a suitable crane or other suitable lifting gear for mounting the system.
- Use the necessary personal protective equipment (for example, protective shoes, protective glasses and protective gloves).
- Mount the system so that it cannot come loose (use of securing screws with appropriate tightening torque), especially in cases of fast acceleration or continuous vibration.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Service Life

Overview

The service life of the Lexium™ MC12 multi carrier is a function of the mean forces and torques that act in the system.

For detailed information about the service life of the system, refer to [Maintenance Plan](#), page 139.

Transport and Unpacking

Transport and Storage

Transport Conditions

The components of the Lexium™ MC12 multi carrier must be handled with care. Shocks and impacts may damage the components. Damage may lead to reduced running accuracy, reduced service life, or to an inoperable Lexium™ MC12 multi carrier.

The components of the system are transported in cardboard boxes. The respective box dimensions vary according to the dimensions of the components and the order quantity.

For detailed information about transport conditions, refer to *Ambient Conditions*, page 65.

Storage

The components of the Lexium™ MC12 multi carrier can be stored inside the packaging or unpacked. In both cases, ensure that they are stored in a sheltered and dry place. Avoid humidity which can have corrosive effects on the components.

NOTE: When stored, the components of the Lexium™ MC12 multi carrier need to be on a level surface.

For detailed information about storage conditions, refer to *Ambient Conditions*, page 65.

Transporting and Storing the Lexium™ MC guide rails

Lexium™ MC guide rails can bend if handled improperly and may then no longer be usable.

NOTICE

INOPERABLE EQUIPMENT

- Handle the guide rails with care to prevent mechanical damage.
- Do not bend the guide rails.

Failure to follow these instructions can result in equipment damage.

Transporting the Lexium™ MC12 carriers

The carriers must be transported in their associated protective packaging, which helps to reduce the effects of the strong drive magnets.

NOTE: Exposed or uninstalled carriers must have the protective cover of the drive magnets installed at all times. The cover is only removed at the time of carrier installation.

- Carriers have strong local magnetic fields. Refer to *Transporting the Lexium™ MC12 carriers*, page 78.
- The carriers have strong drive magnets and can attract metal objects that are in their proximity.
- A carrier can move suddenly and fast due to magnetic attraction.

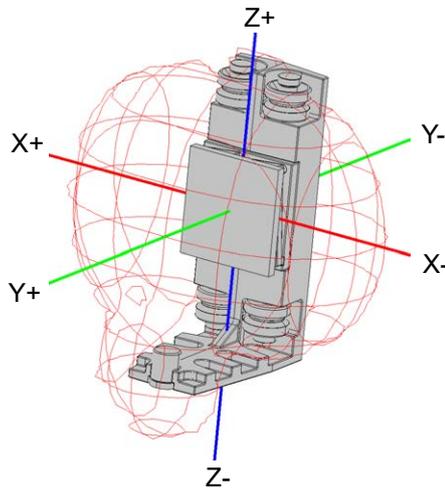
▲ WARNING

MAGNETIC FIELDS

- Keep persons with medical implants (for example, pace makers or metal implants) or metallic body jewelry away from the carriers and segments with a minimum distance of 30 cm (11.9 in).
- Always leave the protective cover of the drive magnets in place for all exposed or uninstalled carriers.
- Do not put your hands or fingers between the carriers and segments.
- Do not place metallic tools in the vicinity of the carriers and segments.
- Do not place electromagnetically sensitive devices in the vicinity of the carriers and segments.
- Do not place credit cards or electronic/magnetic media in the vicinity of the carriers and segments.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

The graphic shows the magnetic field of a carrier with a protective cover for the drive magnets.



NOTE: To avoid interferences with implanted devices, keep at least the following minimum distances from the carrier (with the protective cover in place) to achieve a flux density of less than 0.5 mT (milli-Tesla) according to DIRECTIVE 2013/35/EU.

Dimension	+	-
X	85 mm (3.35 in)	85 mm (3.35 in)
Y	70 mm (2.76 in)	25 mm (0.99 in)
Z	75 mm (2.96 in)	105 mm (4.14 in)

NOTE: If you remove the protective cover, the distance to be kept to all carrier and segment surfaces increases to 300 mm (11.9 in).

The carrier has two magnets which, together with the magnetic fields in the segments, move the carrier on the track. These two magnets are glued onto the carrier. A shock to the carrier can cause the glued-on magnets to flake off and the magnets can splinter.

In addition, the carrier has an encoder magnet. This can be demagnetized by improper handling, for example, if the magnets of another carrier come too close.

▲ WARNING

INOPERABLE EQUIPMENT

- Handle the carrier with care.
- Do not drop the carrier.
- Do not strike the carrier.
- Keep a minimum distance of 50 mm (1.97 in) between the encoder magnet and other magnets.
- Ensure to fill the lubrication reservoirs of the carriers before first use.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

For information on filling the lubrication reservoirs refer to *Filling the Lubrication Reservoirs*, page 154.

Unpacking

Overview

Before you start to unpack and position the components of the Lexium™ MC12 multi carrier, pay special attention to the accident prevention regulations and the safety regulations.

▲ WARNING
<p>CRUSHING, SHEARING, CUTTING AND HITTING DURING HANDLING</p> <ul style="list-style-type: none"> • Observe the general construction and safety regulations for handling and assembly. • Use appropriate mounting and transport equipment and use appropriate tools. • Prevent clamping and crushing by taking appropriate precautions. • Cover edges and angles to protect against cutting damage. • Wear suitable protective clothing (for example, protective goggles, protective boots, protective gloves). <p>Failure to follow these instructions can result in death, serious injury, or equipment damage.</p>

Unpacking

Step	Action
1	Transport the components of the Lexium™ MC12 multi carrier in its packaging as close as possible to the installation site.
2	Open the cardboard box with appropriate tools.
3	Verify the components of the Lexium™ MC12 multi carrier for transport damage.
4	NOTE: Also refer to Transporting the Lexium™ MC12 carriers, page 78.

NOTE: In case of any transport damage, contact your local Schneider Electric service representative.

Mechanical Installation

Information About Installation

Overview

Proceed with care during the following steps in order to help to prevent the following points:

- Injuries and material damage
- Incorrect installation and programming of components
- Incorrect operation of components
- Use of non-authorized cables or modified components

For further Information, refer to Specific Safety Information, page 12.

Accessibility for Servicing

When mounting the Lexium™ MC12 multi carrier, consider that some components may have to be accessed for servicing. Allow for such accessibility in your mechanical design.

Mounting the Lexium™ MC12 multi carrier

Prerequisites

The following prerequisites must be met to mount your Lexium™ MC12 multi carrier:

- The layout of your Lexium™ MC12 multi carrier is defined.
- It is specified where the Lexium™ MC power cables, the Sercos cable, and SFO cables will be connected.
- All components to build the requested system layout are available.
- All components have the same temperature (for the storage temperature range, refer to Ambient Conditions, page 65).
- The mounting plate for your system is prepared. Refer to chapter Mounting Plate, page 76.

▲ WARNING

HEAVY AND/OR FALLING PARTS

- Use a suitable crane or other suitable lifting gear for mounting the system.
- Use the necessary personal protective equipment (for example, protective shoes, protective glasses and protective gloves).
- Mount the system so that it cannot come loose (use of securing screws with appropriate tightening torque), especially in cases of fast acceleration or continuous vibration.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Open Track

With an open track, the carriers could leave the track at the ends. Therefore, mechanical hard stops must be mounted at both ends of an open track.

▲ WARNING

EQUIPMENT OPERATION HAZARD

Mount mechanical hard stops at both ends of an open track.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Refer to Mounting the Hard Stops, page 89.

Mounting the Lexium™ MC12 multi carrier Track

The components of the Lexium™ MC12 multi carrier must be handled with care. Refer to Transport and Storage, page 78.

Lexium™ MC guide rails can bend if handled improperly and may then no longer be usable.

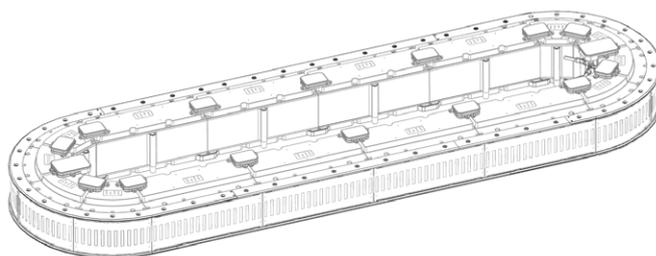
NOTICE

INOPERABLE EQUIPMENT

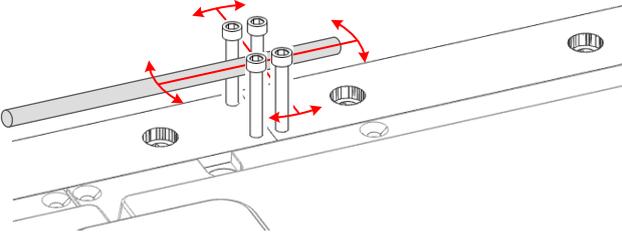
- Handle the guide rails with care to prevent mechanical damage.
- Do not bend the guide rails.

Failure to follow these instructions can result in equipment damage.

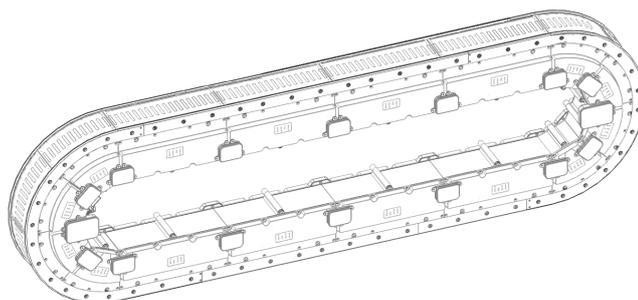
Horizontal Mounting

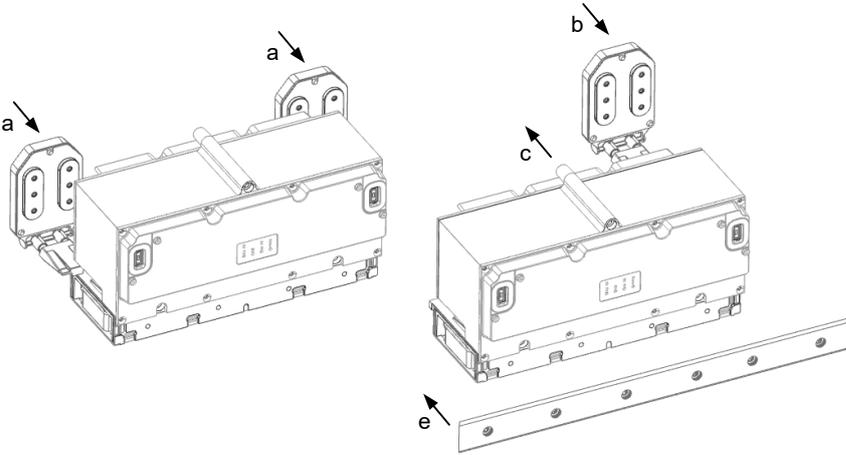
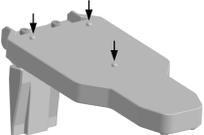
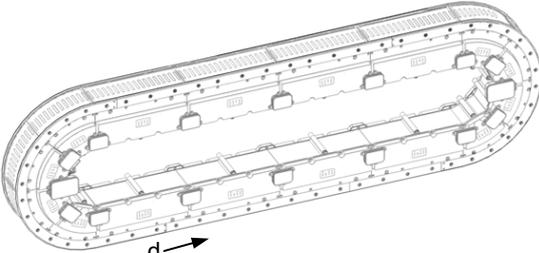


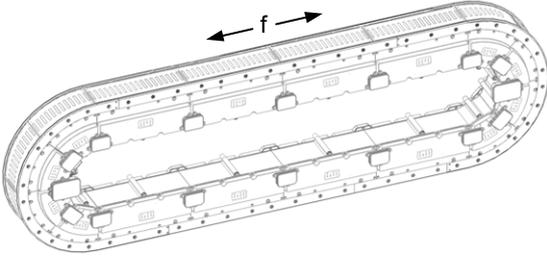
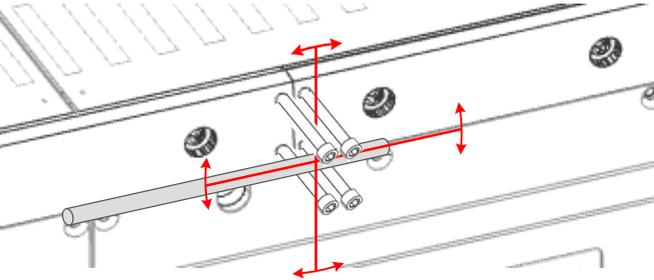
Step	Action
1	<p>Place two Lexium™ MC power interconnects (a) at a distance of one segment length at the intended location on the mounting plate.</p> <p>To achieve the correct distance between the interconnects, insert the three semi-circular positioning knobs on the bottom of the interconnects into the corresponding holes in the mounting plate.</p> <p>NOTE: If a power interconnect is used to supply your system with power from the control cabinet, use the respective reference of the Lexium™ MC power interconnects / Power disconnecter, page 28.</p>
2	<p>Insert a segment (b) from above into the two interconnects. Make sure that the segment is not tilted during insertion. The alignment aid and the oval fitting of the power interconnects help you to join the segments in a straight alignment.</p> <p>Fasten the segment loosely with three screws (M6x120 class 8.8 ISO 4762) to the mounting plate so that it will stay in place but can still be shifted a little bit.</p>
3	<p>Place the next Lexium™ MC interconnect (c) at a distance of one segment length at the intended location on the mounting plate.</p> <p>To achieve the correct distance between the interconnects, insert the three semi-circular positioning knobs on the bottom of the interconnect into the corresponding holes in the mounting plate.</p> <p>Insert a segment (d) from above into the two interconnects. Make sure that the segment is not tilted during insertion. The alignment aid and the oval fitting of the power interconnects help you to join the segments in a straight alignment.</p> <p>Fasten the segment loosely with three screws.</p>
4	<p>Proceed in the same way, using straight and arc segments to build your system layout.</p> <p>With an open track proceed as described under Hard Stops\Horizontal Mounting.</p>

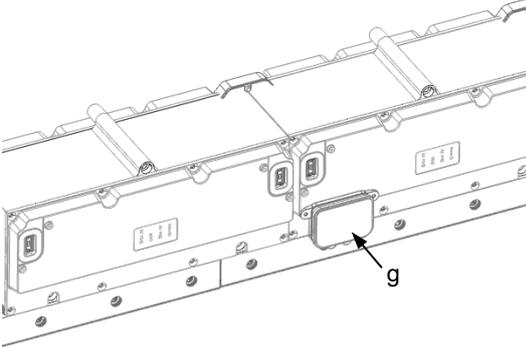
Step	Action
5	When all the segments are in place, install the bottom Lexium™ MC guide rails (e), starting at an arc segment or at an open end of the track. The rails are mounted offset to the segments by design.
6	Position a Lexium™ MC guide rail (e) under the segments and fasten the rail with the associated screws (M6x16 class 8.8 DIN 7984) loosely. NOTE: Make sure that the holes in the rails exactly match the holes in the segments. Make sure that the rails are aligned with the segment stops.
7	Tighten the fastening screws of the rail at the first segment.
8	Align next rail. Make sure that the rails fit closely together at the transition between two rails. For fine alignment of the rails, you can remove the M5 screws (set screws) closest to the transition and insert M5x20 screws. Make sure that you do not drive the screws in too deep: the screws must not have any contact with the support surface for the rails. Then slide a suitable mounting tool between the screws (in rail direction or across the rail direction) and carefully push the rails into the desired position. After fine alignment of the rails, replace the long M5 screws with the M5 set screws again.
	
9	Tighten screws of both rails at the segment the rails connect with a torque of 10.1 Nm (89.4 lbf-in).
10	Proceed in the same way with the subsequent bottom rails until all bottom rails are installed.
11	Repeat steps 5 - 10 for the corresponding top rails (f).
12	If you need to adjust the height of a rail at the transition of two rails, unfasten the screws closest to the transition, adjust the two set screws (M5x8 ISO 4026) and fasten the rail again. NOTE: Ensure that the height of the rails is accurately aligned to ensure smooth guidance of the carrier.
13	After you adjusted the height of the rails at the transition, tighten the first and the last fastening screws of the rail with a torque of 7.2 Nm (63.7 lbf-in).
14	Repeat steps 12 - 13 for all bottom and top rails.
15	Hand tighten the M5 set screws that were not used when adjusting the height of the rails (step 12). Make sure that they are screwed in completely.
16	Tighten the rest of the guide rail screws with the a torque of 7.2 Nm (63.7 lbf-in).
17	After you installed the rails, tighten the screws of the Lexium™ MC12 long stator motor segments with a torque of 10.1 Nm (89.4 lbf-in). Result: The Lexium™ MC12 multi carrier track is fixed.
18	Insert the Lexium™ MC communication interconnects (g) from top between the segments. Fix the communication interconnect with its four corresponding screws (M3x8 ISO 14583) with a torque of 0.6 Nm (5.31 lbf-in). NOTE: If such a communication interconnect is used to connect the system with the Sercos bus and/or an SFO (Safe Force Off) control device, use the respective reference of the Lexium™ MC communication interconnects, page 29.
19	Use the Lexium™ MC power cables, the Sercos cable, and the SFO cables to connect your Lexium™ MC12 multi carrier with the control cabinet. For details, refer to chapter Electrical Installation, page 104. Result: The Lexium™ MC12 multi carrier track is installed and ready for verification. Also refer to Verifying the Installation, page 135.

Vertical Mounting



Step	Action
1	<p>Insert two Lexium™ MC power interconnects (a) into a segment sideways. Make sure that the power interconnects are not tilted during insertion.</p> <p>NOTE: If a power interconnect is used to supply your system with power from the control cabinet, use the respective reference of the Lexium™ MC power interconnects / Power disconnecter, page 28.</p> 
2	<p>Fasten the segment loosely with three screws (M6x120 class 8.8 ISO 4762) to the mounting plate so that it will stay in place but can still be shifted a little bit.</p> <p>To achieve the correct distance between the interconnects, insert the three semi-circular positioning knobs on the bottom of the interconnects into the corresponding holes in the mounting plate.</p> 
3	<p>Insert one Lexium™ MC interconnect (b) into another segment.</p>
4	<p>Insert the segment (c) sideways into the power interconnect of the already mounted segment.</p> <p>NOTE: It is a good practice to start with the lower left straight segment (d).</p> 
5	<p>Fasten the segment loosely with three screws to the mounting plate so that it will stay in place but can still be shifted a little bit.</p>

Step	Action
6	Proceed in the same way, using straight and arc segments to build your system layout. With an open track proceed as described under Mounting the Hard Stops\Vertical Mounting.
7	When all the segments are in place, tighten the screws of the segments with a torque of 10.1 Nm (89.4 lbf-in).
8	After all segments are in place and screwed tight, install the top Lexium™ MC guide rails (e), starting in the middle of your track (f) or at an open end of the track. The rails are mounted offset to the segments by design. 
9	Position a Lexium™ MC guide rail on the segments and fasten the rail with the associated screws (M6x16 class 8.8 DIN 7984) loosely. NOTE: Make sure that the holes in the rails exactly match the holes in the segments. Make sure that the rails are aligned with the segment stops.
10	Proceed in the same way with the subsequent top rails until all top rails are installed.
11	Repeat steps 9 - 10 for the corresponding bottom rails. Result: The top rails and the bottom rails are in place.
12	Start aligning all straight top rails from the inside to the outside. (f).
13	Align the two rails at the middle segment. Make sure that the rails fit closely together at the transition between two rails. For fine alignment of the rails, you can remove the M5 screws (set screws) closest to the transition and insert M5x20 screws. Make sure that you do not drive the screws in too deep: the screws must not have any contact with the support surface for the rails. Then slide a suitable mounting tool between the screws (in rail direction or across the rail direction) and carefully push the rails into the desired position. After fine alignment of the rails, replace the long M5 screws with the M5 set screws again. 
14	If you need to adjust the height of a rail at the transition of two rails, unfasten the screws closest to the transition, adjust the two set screws (M5x8 ISO 4026) and fasten the rail again. NOTE: Make sure that the height of the rails is accurately aligned to ensure smooth guidance of the carrier.
15	After you adjusted the height of the rails at the transition, tighten the first and the last fastening screws of the rail with a torque of 7.2 Nm (63.7 lbf-in). NOTE: Hand tighten the M5 set screws that were not used when adjusting the height of the rails. Make sure that they are screwed in completely.
16	Proceed in the same way with the subsequent straight top rails until all straight top rails are aligned.
17	Proceed in the same way with the straight bottom rails.
18	After aligning the straight rails, align the arc rails in the same way.
19	After aligning all rails, tighten the remaining fastening screws of all rails with a torque of 7.2 Nm (63.7 lbf-in).

Step	Action
20	<p>Insert the Lexium™ MC communication interconnects (g) sideways between the segments. Fix the communication interconnect with its four corresponding screws (M3x8 ISO 14583) with a torque of 0.6 Nm (5.31 lbf-in).</p>  <p>NOTE: If such a communication interconnect is used to connect the system with the Sercos bus and/or an SFO (Safe Force Off) control device, use the respective reference of the Lexium™ MC communication interconnects, page 29.</p>
21	<p>Use the Lexium™ MC power cables, the Sercos cable, and the SFO cables to connect your Lexium™ MC12 multi carrier with the control cabinet.</p> <p>For details, refer to chapter Electrical Installation, page 104.</p> <p>Result: The Lexium™ MC12 multi carrier track is installed and ready for verification.</p> <p>Also refer to Verifying the Installation, page 135.</p>

NOTE: If you mounted the Lexium™ MC12 multi carrier track outside of your machine, disconnect the track from control cabinet (power, Sercos, and SFO), equip the mounting plate with the suitable transport devices, and lift the Lexium™ MC12 multi carrier track into your machine.

⚠ **DANGER**

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Disconnect all power from all equipment including connected devices prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires except under the specific conditions specified in the appropriate hardware guide for this equipment.
- Always use a properly rated voltage sensing device to confirm the power is off where and when indicated.
- Replace and secure all covers, accessories, hardware, cables, and wires and confirm that a proper ground connection exists before applying power to this unit.
- Use only the specified voltage when operating this equipment and any associated equipment.

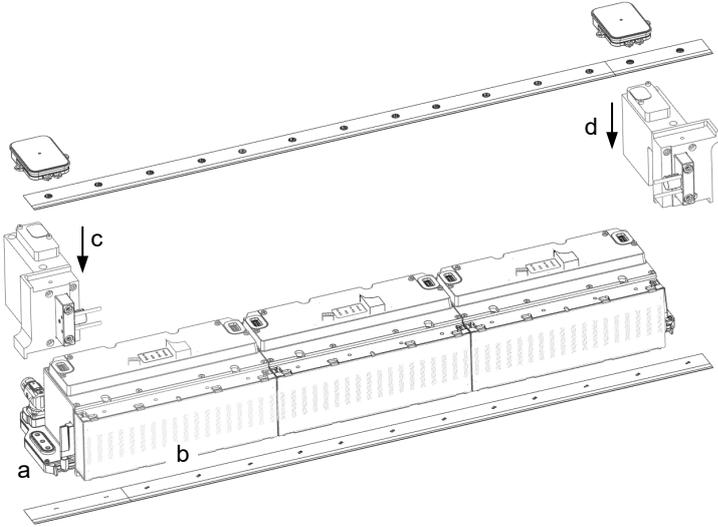
Failure to follow these instructions will result in death or serious injury.

Mounting the Hard Stops

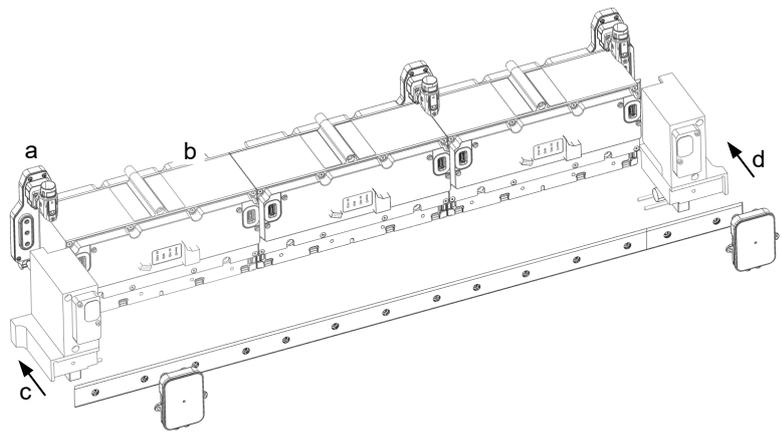
With an open track, the carriers could leave the track at the ends. Therefore, mechanical hard stops must be mounted at both ends of an open track.

Mounting of the hard stops is carried out similarly to the mounting of the track (Mounting the Lexium™ MC12 multi carrier, page 83).

Horizontal Mounting

Step	Action
1	<p>After mounting the power interconnects (a) and the segments (b), insert a left hard stop (c) from above into the left power interconnect and a right hard stop (d) into the right power interconnect.</p> 
2	<p>Fasten the hard stops loosely with two screws (M6x120 class 8.8 ISO 4762) to the mounting plate so that they stay in place but can still be shifted a little bit.</p>
3	<p>Then proceed as described from step 5 in the section Mounting the Lexium™ MC12 multicarrier rail\Horizontal mounting above.</p>

Vertical Mounting

Step	Action
1	<p>After mounting the power interconnects (a) and the segments (b), insert a left hard stop (c) from above into the left power interconnect and a right hard stop (d) into the right power interconnect.</p> 
2	<p>Fasten the hard stops loosely with two screws (M6x120 class 8.8 ISO 4762) to the mounting plate so that they stay in place but can still be shifted a little bit.</p>
3	<p>Then proceed as described from step 7 in the section Mounting the Lexium™ MC12 multi carrier Track\Vertical mounting above.</p>

Mounting a Lexium™ MC12 carrier

Overview

NOTE: Exposed or uninstalled carriers must have the protective cover of the drive magnets installed at all times. The cover is only removed at the time of carrier installation.

- Carriers have strong local magnetic fields. Refer to *Transporting the Lexium™ MC12 carriers*, page 78.
- The carriers have strong drive magnets and can attract metal objects that are in their proximity.
- A carrier can move suddenly and fast due to magnetic attraction.

⚠ WARNING

MAGNETIC FIELDS

- Keep persons with medical implants (for example, pace makers or metal implants) or metallic body jewelry away from the carriers and segments with a minimum distance of 30 cm (11.9 in).
- Always leave the protective cover of the drive magnets in place for all exposed or uninstalled carriers.
- Do not put your hands or fingers between the carriers and segments.
- Do not place metallic tools in the vicinity of the carriers and segments.
- Do not place electromagnetically sensitive devices in the vicinity of the carriers and segments.
- Do not place credit cards or electronic/magnetic media in the vicinity of the carriers and segments.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

The carrier has two magnets which, together with the magnetic fields in the segments, move the carrier on the track. These two magnets are glued onto the carrier. A shock to the carrier can cause the glued-on magnets to flake off and the magnets can splinter.

In addition, the carrier has an encoder magnet. This can be demagnetized by improper handling, for example, if the magnets of another carrier come too close.

⚠ WARNING

INOPERABLE EQUIPMENT

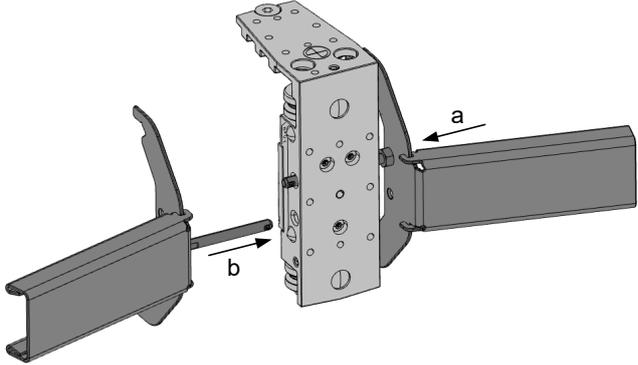
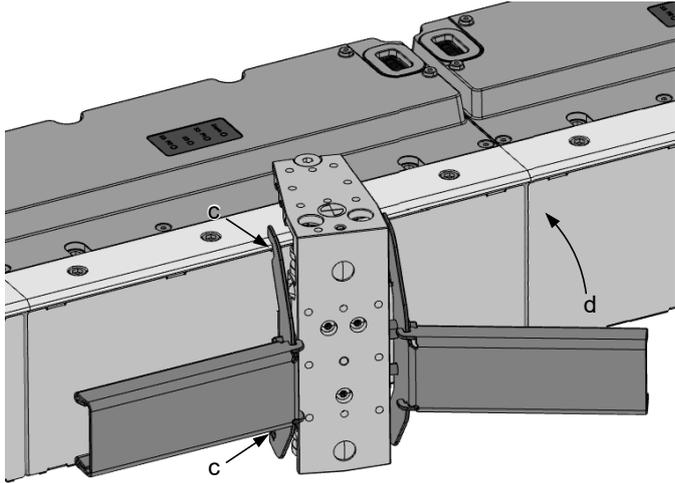
- Handle the carrier with care.
- Do not drop the carrier.
- Do not strike the carrier.
- Keep a minimum distance of 50 mm (1.97 in) between the encoder magnet and other magnets.
- Ensure to fill the lubrication reservoirs of the carriers before first use.

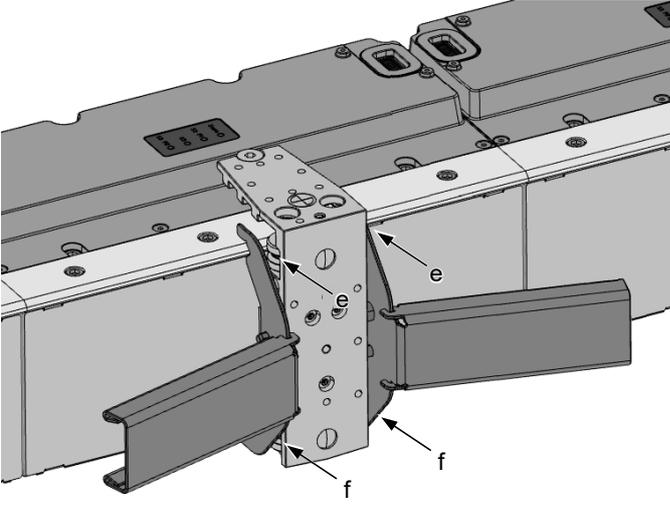
Failure to follow these instructions can result in death, serious injury, or equipment damage.

For information on filling the lubrication reservoirs refer to *Filling the Lubrication Reservoirs*, page 154.

Mounting

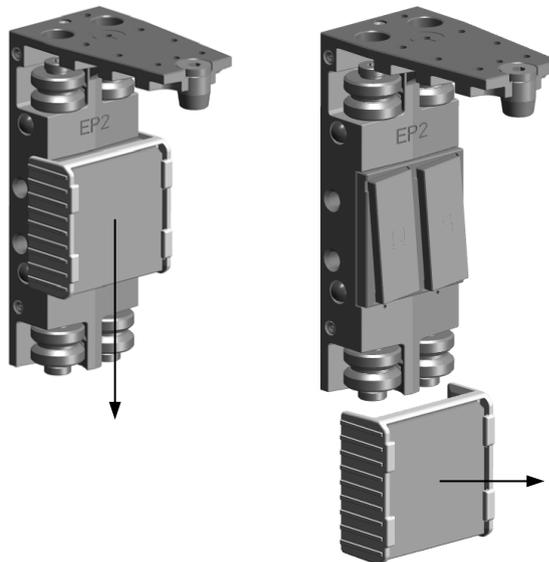
NOTE: Exposed or uninstalled carriers must have the protective cover of the drive magnets installed at all times. The cover is only removed at the time of carrier installation.

Step	Action
1	Install the protective cover of the drive magnets by sliding it onto the magnets if it is not already installed.
2	Fill the lubrication reservoirs of the carriers before first use. Refer to <i>Filling the Lubrication Reservoirs</i> , page 154.
3	<p>Attach the Lexium™ MC carrier handling tool to the carrier.</p>  <p>NOTE: The Lexium™ MC carrier handling tool consists of two identical parts. Push the guide bolt (a) of the first part of the Lexium™ MC carrier handling tool from the right through the carrier. Push the guide bolt (b) of the second part of the Lexium™ MC carrier handling tool from the left through the carrier.</p> <p>NOTE: The right and the left part of the Lexium™ MC carrier handling tool are secured by circlips at the upper end of the guide bolts.</p>
4	Remove the protective cover of the drive magnets by sliding it from the magnets. For more details, refer to Removing the Protective Cover of the Drive Magnets , page 93.
5	<p>Place the upper and lower guide grooves (c) of the Lexium™ MC carrier handling tool on the upper and lower rails.</p> 

Step	Action
6	<p>Swivel the Lexium™ MC carrier handling tool with the carrier towards the segment until the carrier is magnetically attracted to the segment (d).</p> <p>Result: The two upper rollers (e) and the two lower rollers (f) of the carrier are positioned on the rails. The carrier can be moved manually along the rails.</p> 
7	Disassemble the Lexium™ MC carrier handling tool from the Lexium™ MC12 carrier.

Removing the Protective Cover of the Drive Magnets

Remove the protective cover of the drive magnets by sliding it from the magnets.



Mounting the Tools on the Lexium™ MC12 carrier

Overview

You must design tools suitable for your application and install the tools on the Lexium™ MC12 carriers to transport your products within your track.

- Your products must be held properly by the tools so that the products do not move on the carriers or slide down from the carriers during the acceleration and deceleration movements.
- Distribute the load of the products and tools symmetrically on the Lexium™ MC12 carriers to allow maximum acceleration/deceleration and velocity of the Lexium™ MC12 carriers.

NOTE: Exposed or uninstalled carriers must have the protective cover of the drive magnets installed at all times. The cover is only removed at the time of carrier installation.

- Carriers have strong local magnetic fields. Refer to *Transporting the Lexium™ MC12 carriers*, page 78.
- The carriers have strong drive magnets and can attract metal objects that are in their proximity.
- A carrier can move suddenly and fast due to magnetic attraction.
- Implement a device like, for example, a sensor for identifying the carrier and the type of tool mounted on the carrier to help prevent collisions.

▲ WARNING

MAGNETIC FIELDS

- Keep persons with medical implants (for example, pace makers or metal implants) or metallic body jewelry away from the carriers and segments with a minimum distance of 30 cm (11.9 in).
- Always leave the protective cover of the drive magnets in place for all exposed or uninstalled carriers.
- Do not put your hands or fingers between the carriers and segments.
- Do not place metallic tools in the vicinity of the carriers and segments.
- Do not place electromagnetically sensitive devices in the vicinity of the carriers and segments.
- Do not place credit cards or electronic/magnetic media in the vicinity of the carriers and segments.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

The carrier has two magnets which, together with the magnetic fields in the segments, move the carrier on the track. These two magnets are glued onto the carrier. A shock to the carrier can cause the glued-on magnets to flake off and the magnets can splinter.

In addition, the carrier has an encoder magnet. This can be demagnetized by improper handling, for example, if the magnets of another carrier come too close.

▲ WARNING

INOPERABLE EQUIPMENT

- Handle the carrier with care.
- Do not drop the carrier.
- Do not strike the carrier.
- Keep a minimum distance of 50 mm (1.97 in) between the encoder magnet and other magnets.
- Ensure to fill the lubrication reservoirs of the carriers before first use.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

For information on filling the lubrication reservoirs refer to Filling the Lubrication Reservoirs, page 154.

Mounting Options

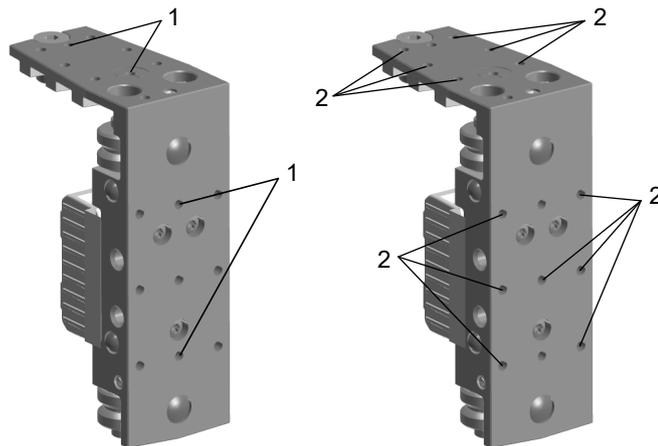
1. A Lexium™ MC12 carrier provides two fitting holes (4 mm, +0.015...+0.005 mm / 0.1575 in, +0.00059...+0.000197 in) on the short angle arm of the carrier and two fitting holes on the long angle arm of the carrier.

Use these fitting holes (1) to align your tool with the carrier.

2. The Lexium™ MC12 carrier provides six M5 threaded holes (hole depth 10 mm/0.39 in) on the short angle arm of the carrier and seven M5 threaded holes (hole depth 10 mm/0.39 in) on the long angle arm of the carrier.

Use these threaded holes (2) to fix your tool on the carrier.

Tighten the fixing screws. Maximum tightening torque is 5.9 Nm (52.2 lbf-in).



Mounting/Unmounting the Lexium™ MC connection module

Overview

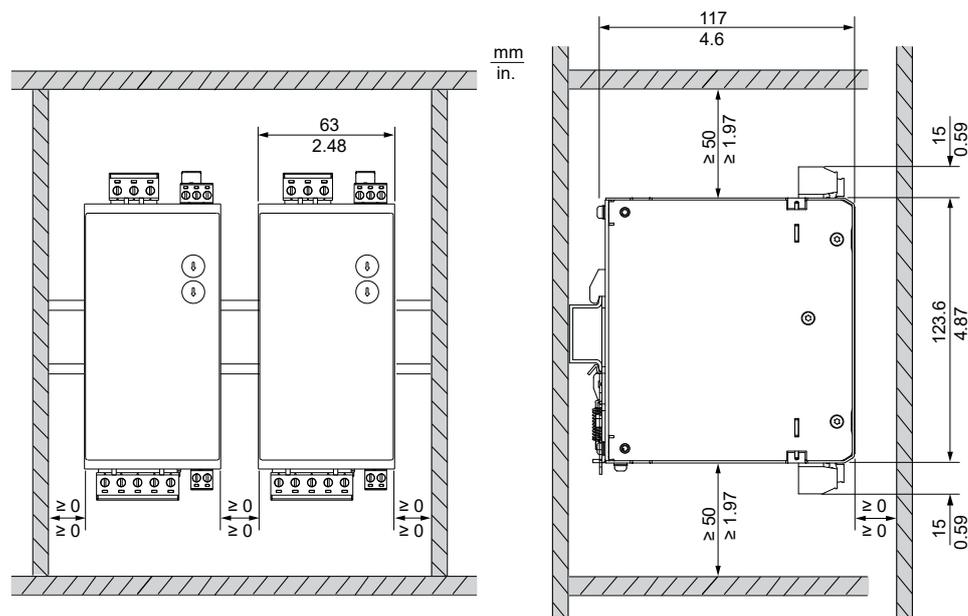
The Lexium™ MC connection module must be installed in a control cabinet with degree of protection greater or equal to IP54.

Preparing the Control Cabinet

Step	Action
1	If necessary to maintain and respect the maximum ambient operating temperature, install an additional fan in the control cabinet.
2	Do not block the fan air inlet of the product.
3	Observe tolerances as well as distances to the cable channels and adjacent braking resistors or other heat producing equipment.

Required Distances

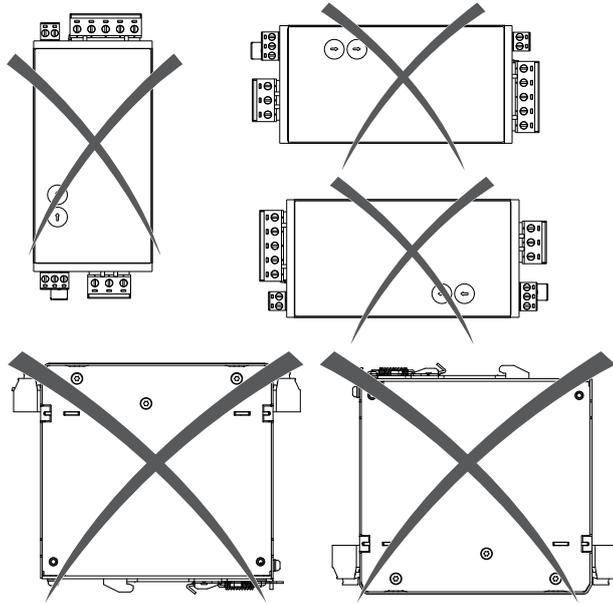
Keep a distance of at least 50 mm (1.97 in) above and below the Lexium™ MC connection module.



NOTE: Do not lay any cables or cable channels over the Lexium™ MC connection module.

Not Allowed Mounting Positions

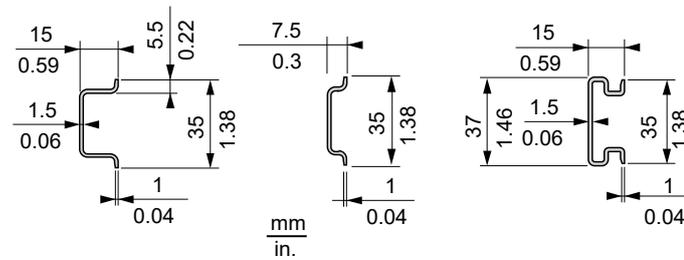
Do not mount the Lexium™ MC connection module in any of the following mounting positions:



DIN Rails

The Lexium™ MC connection module can be mounted on various DIN rails. The DIN rails are not included in the scope of delivery of the Lexium™ MC connection module.

DIN rail examples:



Mounting/Unmounting the Lexium™ MC connection module

Step	Action
1	<p>Place the upper guide groove of the Lexium™ MC connection module on the DIN rail.</p>
2	<p>Swivel the Lexium™ MC connection module towards the DIN rail until the lower guide groove engages.</p>
3	<p>To remove the Lexium™ MC connection module from the DIN rail, insert a screwdriver into the hole in the bottom locking tab and swivel the screwdriver to the Lexium™ MC connection module.</p> <p>Result: The Lexium™ MC connection module is mechanically unlocked.</p>
4	<p>Swing the Lexium™ MC connection module up and remove it from the DIN rail.</p>

Mounting the External Braking Resistor

Preparing the Control Cabinet

During operation, the surface temperature of the external braking resistor may exceed 250 °C (482 °F).

⚠ DANGER

EXTREMELY HOT SURFACES

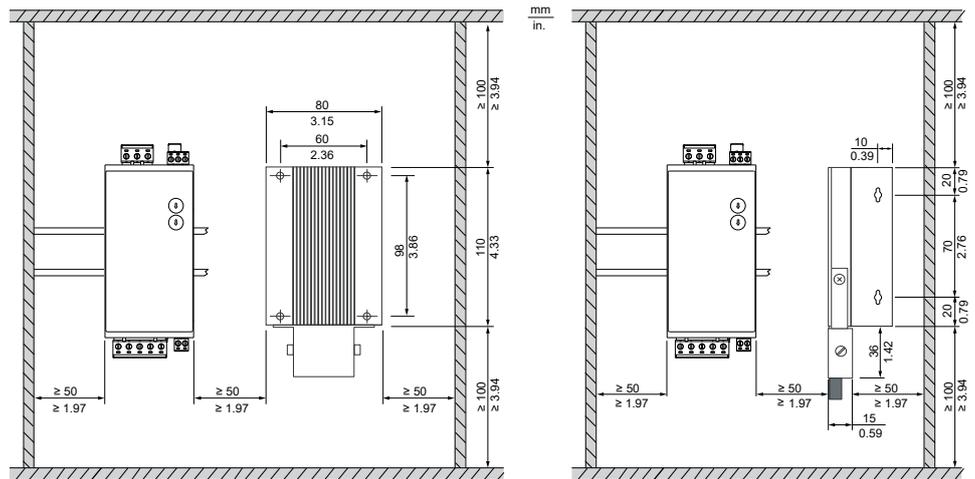
- Do not make unprotected contact with the surfaces of the external braking resistor.
- Keep all flammable or heat-sensitive materials away from the external braking resistor.
- Verify that the heat dissipation is sufficient by performing a test run under maximum load conditions.

Failure to follow these instructions will result in death or serious injury.

Step	Action
1	If necessary to maintain and respect the maximum ambient operating temperature, install an additional fan in the control cabinet.
2	Do not block the fan air inlet of the product.
3	Observe tolerances as well as distances to the cable channels and adjacent braking resistors or other heat producing equipment.

Required Distances

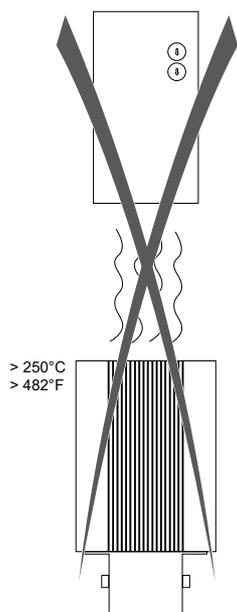
- Keep a distance of at least 100 mm (3.94 in) above and below the external braking resistor.
- Keep a distance of at least 50 mm (1.97 in) to the right and left of the external braking resistor.



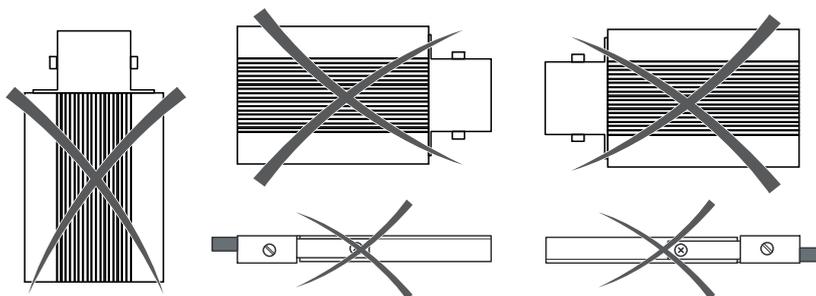
NOTE: Do not lay any cables or cable channels over the external braking resistor.

Not Allowed Mounting Positions

Do not mount the external braking resistor below another device.



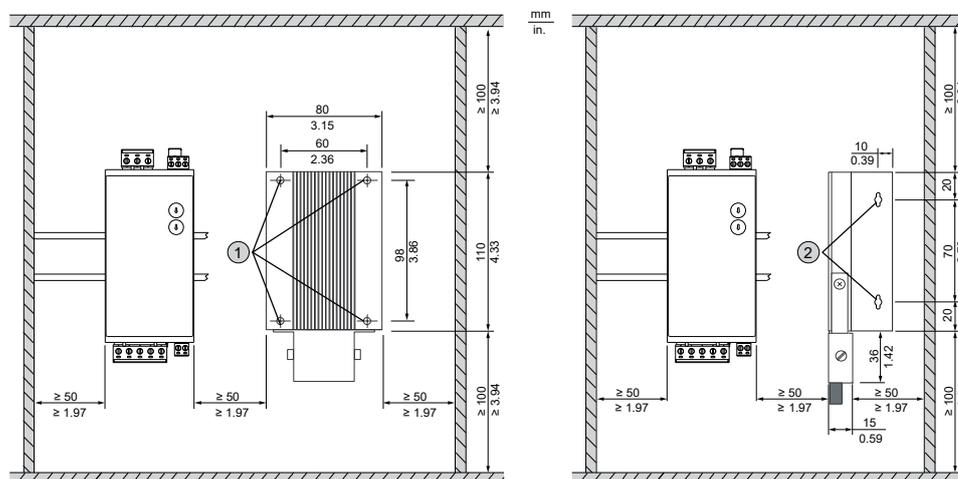
Do not mount the external braking resistor in any of the following mounting positions.



Mounting the External Braking Resistor

The following options are available for mounting the external braking resistor:

- Four through holes in the corners of the external braking resistor (1).
- Mounting bracket supplied with the external braking resistor (2).



Indicators

Indicators of the Segments

Overview

The Lexium™ MC12 long stator motor segments are equipped with four LED indicators on the top:

	State: Segment state
	S3 P1: Port status Sercos bus
	S3: Network status Sercos bus
	S3 P2: Port status Sercos bus

State LED Indicator

The **State** LED indicates the internal state of the segment.

LED indicator color / status	Flashing pattern (3 seconds)	Description	Instructions / information for the user
Off	–	Device is not energized or is otherwise inoperable.	<ul style="list-style-type: none"> Verify the power supply. Replace device.
Steady orange		Segment boot phase	Boot and initialization phase of the segment
Flashing green (4 Hz, 125 ms)		Segment update state	Firmware update file transfer or internal firmware update process.
Flashing slowly orange (1 Hz, 500 ms)		SFO not supplied with 24 V, power stage not prepared.	–
Flashing slowly green (1 Hz, 500 ms)		SFO supplied with 24 V, power stage not prepared.	–
Orange for 875 ms, off for 125 ms		SFO not supplied with 24 V, power stage prepared.	–
Green for 875 ms, off for 125 ms		SFO supplied with 24 V, power stage prepared.	–
Steady green		Power stage active	–
Flashing red (4 Hz, 125 ms)		A general error has been detected.	<ul style="list-style-type: none"> The Devices tree in EcoStruxure Machine Expert displays the error detected. Acknowledge the detected error in the EcoStruxure Machine Expert Logic Builder menu Online > Reset diagnostic messages of controller. Otherwise restart device.
Steady red		A non-recoverable error has been detected requiring user intervention: <ul style="list-style-type: none"> Watchdog Firmware Checksum Internal error detected 	<ul style="list-style-type: none"> Cycle power (power reset) If this condition persists, contact your local Schneider Electric service representative.

S3 P1 and S3 P2 LED Indicators

The **S3 P1** and **S3 P2** LEDs indicate the status of both Sercos ports.

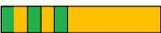
LED indicator color / status	Flashing pattern (3 seconds)	Description	Instructions / information for the user
Off	–	Possible causes: <ul style="list-style-type: none"> No cable connected The device is not energized 	<ul style="list-style-type: none"> Connect the cable. Verify the power supply.
Steady orange		Cable connected, no Sercos communication	–
Steady green		Cable connected, active Sercos communication	–

S3 LED Indicator

The **S3** LED indicates the network status of the Sercos bus.

LED indicator color / status	Flashing pattern (3 seconds)	Description	Instructions / information for the user
Off	–	Possible causes: <ul style="list-style-type: none"> The device is not energized or is otherwise inoperable, or there is no communication due to an interrupted or separated connection. 	<ul style="list-style-type: none"> Verify the power supply. Sercos boot-up
Steady green		Active Sercos connection without an error detected in the CP4.	–
Flashing green (2 Hz, 250 ms)		The device is in loopback mode. Loopback describes the situation in which the Sercos telegrams have to be sent back on the same port on which they were received. Possible cause: Sercos loop break	Workaround: <ul style="list-style-type: none"> Close ring. Reset condition: <ul style="list-style-type: none"> Acknowledge the detected error in the EcoStruxure Machine Expert Logic Builder menu Online > Reset diagnostic messages of controller. Switch from CP0 to CP1 alternatively. NOTE: If during phase CP1 a line topology or ring break was detected (device in loopback mode), the LED indicator condition does not change.
Steady red		Sercos diagnostic class 1 (C1D) error has been detected on port 1 and/or port 2.	Reset condition: <ul style="list-style-type: none"> Acknowledge the detected error in the EcoStruxure Machine Expert Logic Builder menu Online > Reset diagnostic messages of controller.
Flashing red / green (2 Hz, 250 ms)		Communication error has been detected. Possible causes: <ul style="list-style-type: none"> Improper functioning of the telegram CRC error detected 	Reset condition: <ul style="list-style-type: none"> The configuration shows which error has been detected. Acknowledge the detected error in the EcoStruxure Machine Expert Logic Builder menu Online > Reset diagnostic messages of controller.
Orange		The device is in a communications phase CP0 up to and including CP3 or HP0 up to and including HP2. Sercos telegrams are received.	See table below for the individual CP indications.
Flashing orange (2 Hz, 250 ms)		Device identification	–

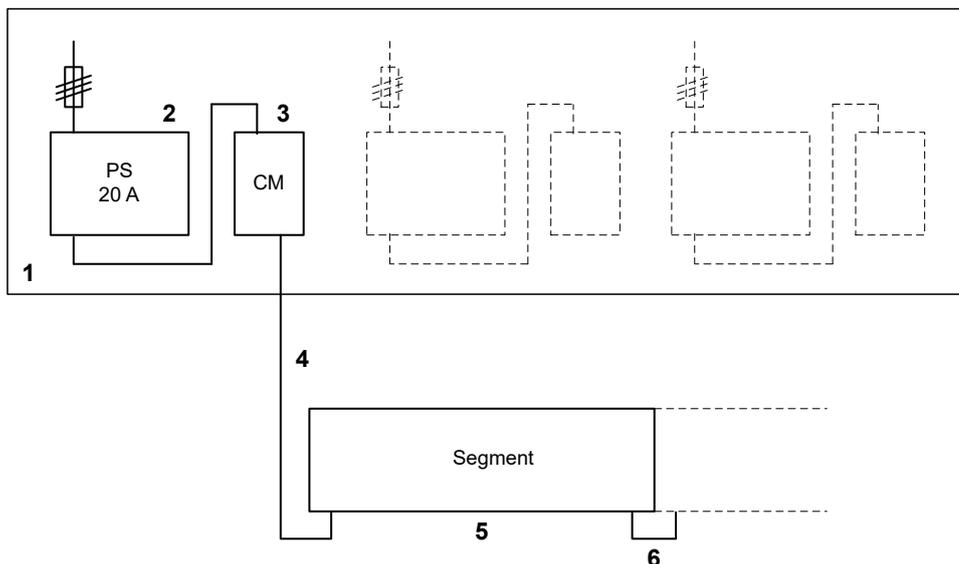
NOTE: The communication phase information is available as follows while in orange state:

LED indicator color / status	Flashing pattern (3 seconds)	Description	Instructions / information for the user
Steady orange		Communication phase is CP0	–
One brief green flash followed by steady orange		Communication phase is CP1	–
Two brief green flashes followed by steady orange		Communication phase is CP2	–
Three brief green flashes followed by steady orange		Communication phase is CP3	–

Electrical Installation

Information About Power Supply/Connection Module

Overview



- The power supply (2) and the Lexium™ MC connection module (3) are installed in a cabinet (1).
- The power supplies feed the Lexium™ MC12 multi carrier track. For each power supply, you must place a Lexium™ MC connection module between the power supply output and the Lexium™ MC12 multi carrier track.

Up to a maximum of three power supply/Lexium™ MC connection module combinations can be used in parallel. If more than three power supplies are required, the track must be divided into power groups that are powered separately. For how to define power groups, refer to the different power interconnects (Lexium™ MC power interconnects / Power disconnect, page 28).

The power supplies approved for use by Schneider Electric are designed to handle the back feed voltage (braking voltage) from the Lexium™ MC12 multi carrier track during braking phase. Also refer to *Connecting a Braking Resistor (CN2)*, page 117.

- The Lexium™ MC12 multi carrier track (5) is connected to the Lexium™ MC connection module with a pre-assembled cable (4).

NOTE: If you have to remove a connector from the cable, for example, to lead the cable through a cable bushing, make sure to reconnect the wires of the cable correctly to the connector afterwards. Observe the requirements for the degree of protection and the EMC regulations.

Refer to cable wiring diagram *Pinout and Cable Diagram*, page 122.

NOTE: The front covers of the segments are not connected to the PE (protective ground/earth). The electrical safety requirements are fulfilled by appropriate insulation measures (protective separation).

- The Lexium™ MC connection module supplies the Lexium™ MC12 multi carrier track with power (DC bus).

The Lexium™ MC connection module limits the DC bus voltage to <60 Vdc, conforming to Functional Safety rules. Refer to *Scope of Operation (Designated Safety Function)*, page 47.

- You can feed the DC bus at different points of the track. For example, feed at points where a high electrical load due to deceleration and acceleration is to be expected.

- The DC bus (up to 60 A) inside the Lexium™ MC12 multi carrier track is distributed from segment to segment via the Lexium™ MC power interconnects (6).
- The Lexium™ MC12 multi carrier requires that the power supply must be dimensioned according to the number of segments, segment groups, carriers, load and other pertinent parameters.

The maximum number of 24 segments per power supply/Lexium™ MC connection module combination must not be exceeded.

For how to dimension the power supplies, refer to System Planning, page 39.

⚠ CAUTION

INOPERABLE EQUIPMENT

- Do not connect the DC bus of the Lexium™ MC12 multi carrier track directly to the power supply.
- Always connect the DC bus through the Lexium™ MC connection module.

Failure to follow these instructions can result in injury or equipment damage.

Also refer to Technical Data for Power Supply, page 74 and Technical Data for Lexium™ MC connection modules, page 73.

For a controlled movement of the carriers on a track, the required hardware preconditions must be fulfilled. This includes the correct state of the DC bus (DC ok) and SFO (Safe Force Off) signals of segments and enabled logical devices (track, segments, carriers). You must monitor the required hardware preconditions in your application and implement adequate reactions for a controlled behavior of the devices.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Monitor electrical I/O signals from peripheral devices like power supplies and connection modules in your application.
- Permanently monitor the state of the track, the segments and the carriers in your application.
- Trigger a controlled reaction of your application when deviations from the monitored preconditions are detected.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Power Supply

Overview

- The power supplies feed the Lexium™ MC12 multi carrier track. For each power supply, you must place a Lexium™ MC connection module between the power supply output and the Lexium™ MC12 multi carrier track.

Up to a maximum of three power supply/Lexium™ MC connection module combinations can be used in parallel. If more than three power supplies are required, the track must be divided into power groups that are powered separately. For how to define power groups, refer to the different power interconnects (Lexium™ MC power interconnects / Power disconnect, page 28).

The power supplies approved for use by Schneider Electric are designed to handle the back feed voltage (braking voltage) from the Lexium™ MC12 multi carrier track during braking phase. Also refer to Connecting a Braking Resistor (CN2), page 117.

- For how to dimension the power supplies, refer to System Planning, page 39.

⚠ CAUTION

INOPERABLE EQUIPMENT

- Do not connect the DC bus of the Lexium™ MC12 multi carrier track directly to the power supply.
- Always connect the DC bus through the Lexium™ MC connection module.

Failure to follow these instructions can result in injury or equipment damage.

NOTE: Only use power supplies that are approved for use by Schneider Electric. Refer to Technical Data for Power Supply, page 74.

Also refer to Technical Data for Power Supply, page 74 and Information About Power Supply/Connection Module, page 104.

Status LEDs/Switches/Potentiometer

The PULS QT40.481 power supply (tested by Schneider Electric for use with the Lexium™ MC12 multi carrier) provides different LEDs, switches, and potentiometers. (Also refer to Technical Data for Power Supply, page 74).

- LED: **DC ok** (green)
On, when the voltage on the output terminals is >90% of the adjusted output voltage.

- LED: **Overload** (red)

On, when the voltage on the output terminals is <90% of the adjusted output voltage, or in case of a short circuit in the output.

Flashing, when the shut-down has been activated or the device has switched off due to over-temperature.

- Switch: **Parallel Use/Single Use**

Set to **Parallel Use** when the power supplies are connected in parallel to increase the output power.

NOTE: If you use several power supplies in parallel, the output voltage of all power supplies must be set to the same value (default value = 48 V).

- Potentiometer: **48-52 V** (output voltage, 48 V = nominal value for the Lexium™ MC12 multi carrier)

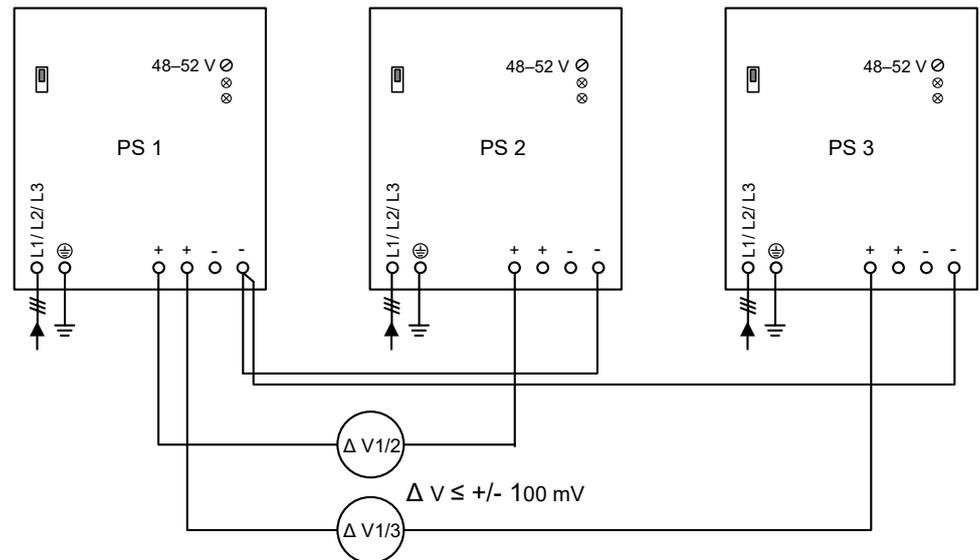
Voltage Adjustment for Parallel Operation of Power Supplies

If only one power supply per power group is used, the switch at the power supply has to be set to **Single Use**.

For two or three power supplies in parallel, the switches at the power supplies have to be set to **Parallel Use**.

If you use several power supplies in parallel, the output voltage of all power supplies must be adjusted to the same value (± 100 mV). This is important to maintain an even load.

The following diagram shows a circuit for adjusting the output voltages of several power supplies.



Proceed in the following way:

Step	Action
1	Connect the power supplies to the mains. L1, L2, L3, PE (protective ground/earth).
2	Connect the negative output voltage terminal of power supply 1 to the negative output voltage terminals of the power supplies 2 and 3 for the purposes of calibrating the voltage of the supplies.
3	Power on the parallel power supplies. NOTE: The power supplies connected in parallel must be powered on at the same time. Use one contactor or power on the mains.
4	Measure the voltage difference between the positive output voltage terminal of the power supply 1 and the positive output voltage terminal of the power supply 2 and adjust the output voltage of power supply 2 to the same voltage as that of power supply 1 (the measured voltage difference must be less than +/- 100 mV). Use the potentiometer 48-52 V to adjust the voltage.
5	Measure the voltage difference between the positive output voltage terminal of the power supply 1 and the positive output voltage terminal of the power supply 3 and adjust the output voltage of power supply 3 to the same voltage as that of power supply 1 (the measured voltage difference must be less than +/- 100 mV).
6	Power off the parallel power supplies.
7	Remove the connections of the negative output voltage terminal of power supply 1 to the negative output voltage terminals of power supplies 2 and 3.
8	For further steps, refer to <i>Connecting the Power Supply to the Lexium™ MC connection module</i> , page 111.

To ensure an equal load on the power supplies connected in parallel, the power cables in the same power group must have the same length.

NOTICE

INOPERABLE EQUIPMENT

Use the same length of power cables to the connection modules when using parallel power supplies.

Failure to follow these instructions can result in equipment damage.

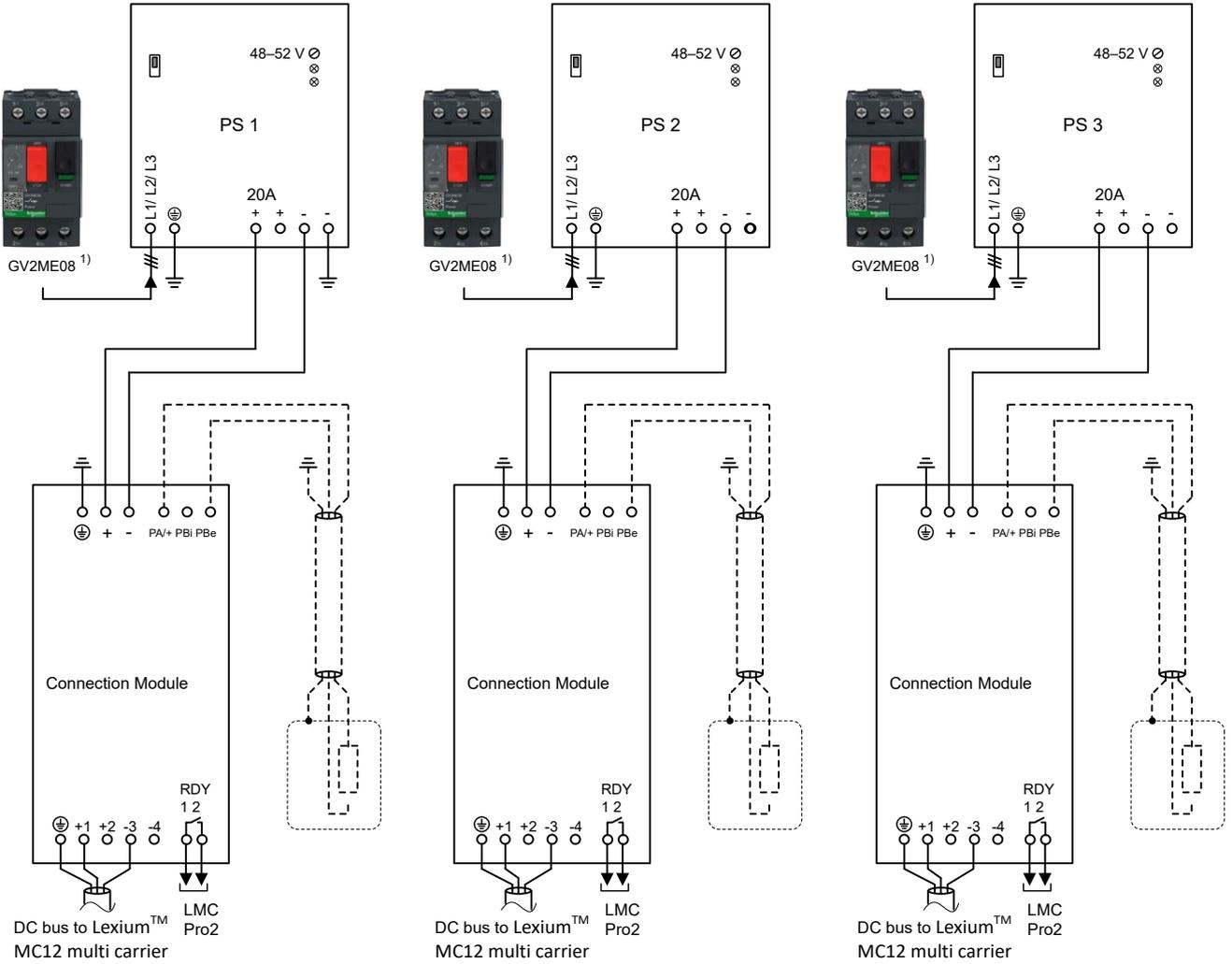
Wiring Power Groups (Example)

The following must be observed when installing power groups:

- The output voltage of all power supplies must be adjusted to the same value.
- The switches at the power supplies must be set to **Parallel Use**.

Refer to section Voltage Adjustment for Parallel Operation of Power Supplies, page 107.

The DC bus of the power supplies is connected in parallel by the power interconnects on the Lexium™ MC12 multi carrier track.



1) GV2ME08 is an example. Refer to the documentation of the power supply for protection devices.

Fusing the Mains Connection

- Depending on the power supplies you use, you must install appropriate fuses and circuit breakers for the power supplies.
- Do not short circuit or overload the power supplies.
- If you use two or three power supplies in parallel, set the respective switch at the power supplies to **Parallel Use** and adjust the output voltage of the power supplies to an identical value.
- Connect the **DC ok** relay contact to the PacDrive LMC Pro2 Motion Controller for diagnostic purposes.
- If application requirements or your risk analysis dictates, ensure that the PacDrive LMC Pro2 Motion Controller can de-energize the power supplies in case of an error detected in the Lexium™ MC12 multi carrier track or the Lexium™ MC connection module.

NOTE: The power supplies, the mains connection of the power supplies and their fusing are not part of the Schneider Electric scope of delivery. Installation, fusing, and so on, must be in accordance with the specifications of the power supply manufacturer. Also refer to *Technical Data for Power Supply*, page 74.

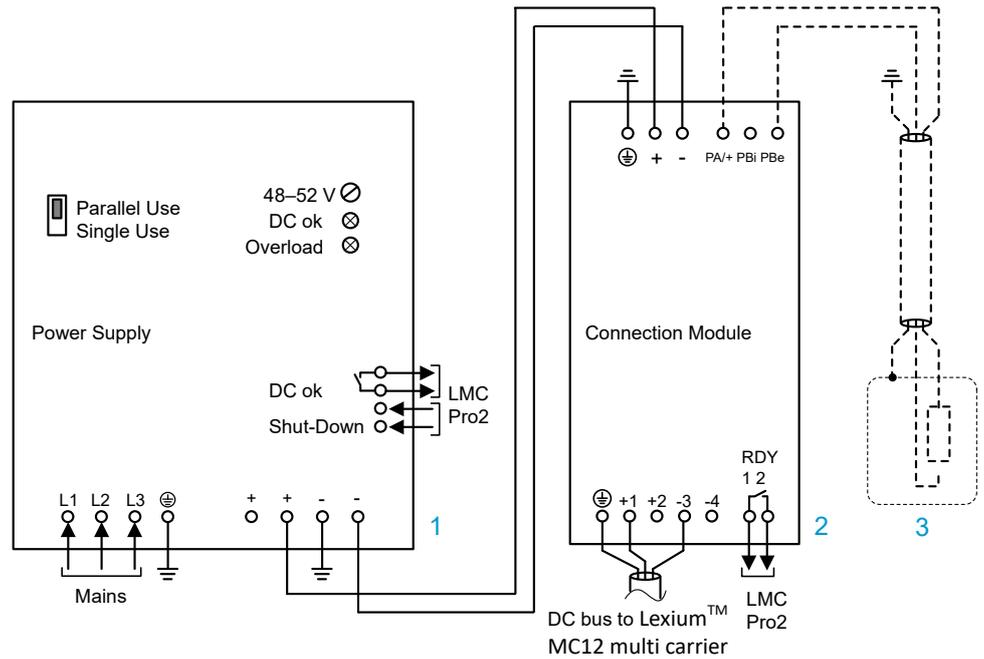
DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Disconnect all power from all equipment including connected devices prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires except under the specific conditions specified in the appropriate hardware guide for this equipment.
- Always use a properly rated voltage sensing device to confirm the power is off where and when indicated.
- Replace and secure all covers, accessories, hardware, cables, and wires and confirm that a proper ground connection exists before applying power to this unit.
- Use only the specified voltage when operating this equipment and any associated equipment.

Failure to follow these instructions will result in death or serious injury.

Connecting the Power Supply to the Lexium™ MC connection module



- 1 Power supply (refer to Technical Data for Power Supply, page 74)
- 2 Lexium™ MC connection module
- 3 Optional external braking resistor with over temperature switch (optional) and heat sink

NOTE: To use the internal braking resistor, jumper **PA/+** to **PBi**.

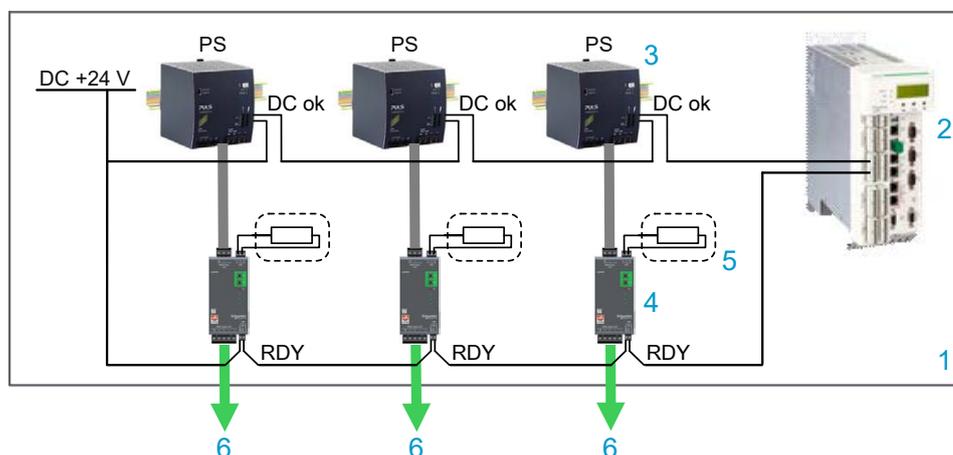
Step	Action
1	Remove power from the supply voltages. Respect the safety instructions concerning electrical installation.
2	Verify that no voltages are present.
3	Set the switch Parallel Use/Single Use to the required position (refer to Status LEDs/ Switches/Potentiometer, page 106)
4	Set the potentiometer: 48-52 V to 48 V (default output value for the Lexium™ MC12 multi carrier) NOTE: If you use several power supplies in parallel, the output voltage of all power supplies must be set to the same value (48 V). Refer to Voltage Adjustment for Parallel Operation of Power Supplies, page 107.
5	Connect the PE (protective ground/earth) terminal of the Lexium™ MC connection module to the PE (protective ground/earth) of the cabinet.
6	Connect one negative output voltage terminal of the power supply to the PE (protective ground/earth) of the cabinet. NOTE: For each group of power supplies (up to three) only the negative output voltage terminal of power supply 1 is connected to the PE (protective ground/earth) of the cabinet.
7	Connect the positive output voltage terminal of the power supply to the positive output voltage terminal of the Lexium™ MC connection module.
8	Connect one negative output voltage terminal of the power supply to the negative output voltage terminal of the Lexium™ MC connection module.
9	Connect the DC ok relay contact of the power supply to the PacDrive LMC Pro2 Motion Controller for diagnostic purposes. Refer to Wiring Example (DC Ok + RDY), page 112.
10	Connect the Shut Down digital input of the power supply to the PacDrive LMC Pro2 Motion Controller so that the PacDrive LMC Pro2 Motion Controller can de-energize the power supply in case of an error detected in the Lexium™ MC12 multi carrier or the Lexium™ MC connection module. Refer to Wiring Example (Shut Down), page 113.

Monitoring of Lexium™ MC12 multi carrier Components

- The PacDrive LMC Pro2 Motion Controller receives status and diagnostic information from the segments and carriers via the Sercos bus.
- To monitor the status of the power supplies, connection modules and the external braking resistors, you can connect the respective signal contacts to the inputs of the PacDrive LMC Pro2 Motion Controller. Refer to *Wiring Example (DC Ok + RDY)*, page 112.
 - Power supplies: **DC ok**
 - Connection modules: **RDY**
 - Braking resistor: Over temperature switch (optional)
- In the event of a detected error on the output voltage, the power supplies can be de-energized via the **Shut Down** input or, alternatively, the power supplies can be powered off on the input side via a contactor. Refer to *Wiring Example (Shut Down)*, page 113.

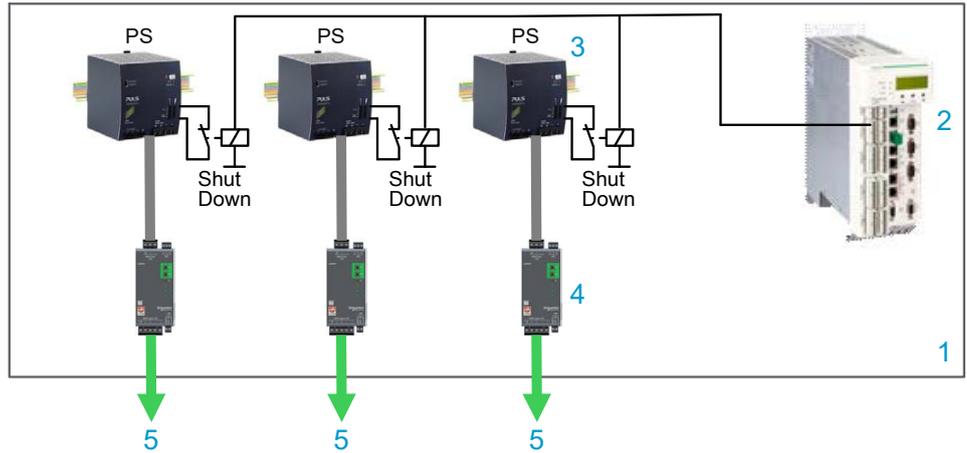
Also refer to *Coast Down Time of Carriers*, page 50.

Wiring Example (DC Ok + RDY)



Element	Description
1	Control cabinet
2	PacDrive LMC Pro2 Motion Controller
3	Power supply with DC ok relay contact
4	Lexium™ MC connection module with RDY relay Normally Open (NO) output
5	External braking resistor with over temperature switch (optional)
6	DC bus to the Lexium™ MC12 multi carrier track

Wiring Example (Shut Down)



Element	Description
1	Control cabinet
2	PacDrive LMC Pro2 Motion Controller
3	Power supply with Shut Down digital input NOTE: This input must not be controlled directly with a 24 V signal. It must be controlled via a potential-free contact.
4	Lexium™ MC connection module
5	DC bus to the Lexium™ MC12 multi carrier track

Lexium™ MC connection module

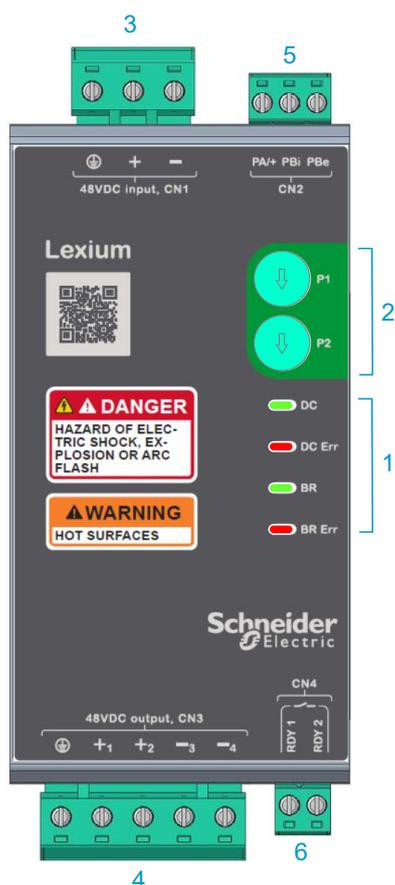
Overview

- The power supplies feed the Lexium™ MC12 multi carrier track. For each power supply, you must place a Lexium™ MC connection module between the power supply output and the Lexium™ MC12 multi carrier track.
- Up to a maximum of three power supply/Lexium™ MC connection module combinations can be used in parallel. If more than three power supplies are required, the track must be divided into power groups that are powered separately. For how to define power groups, refer to the different power interconnects (Lexium™ MC power interconnects / Power disconnecter, page 28).
- The Lexium™ MC connection module supplies the Lexium™ MC12 multi carrier track with power (DC bus).

The Lexium™ MC connection module limits the DC bus voltage to <60 Vdc, conforming to Functional Safety rules. Refer to Scope of Operation (Designated Safety Function), page 47.

Also refer to:

- Technical Data for Lexium™ MC connection modules, page 73
- Information About Power Supply/Connection Module, page 104
- Connecting the Connection Module to the Track, page 121



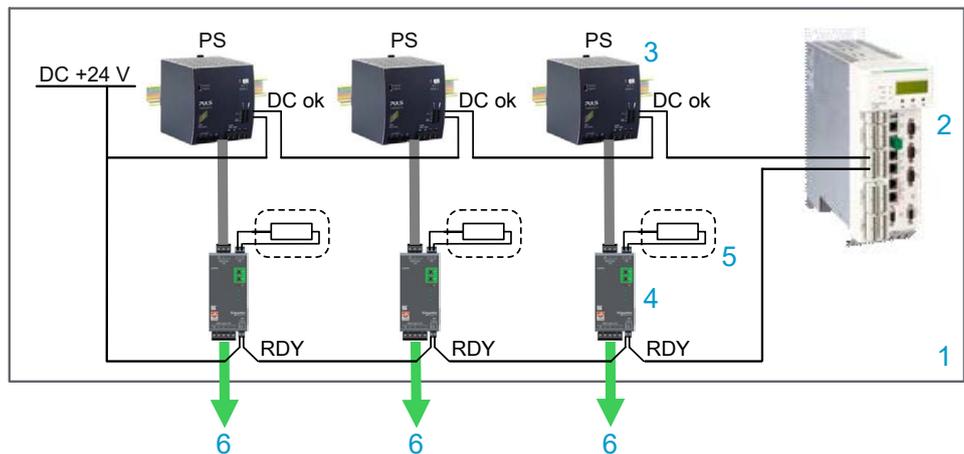
Element	Description
1	Status LEDs (DC, DC Err, BR, BR Err). Refer to Status LEDs, page 116.
2	Rotary switches (P1, P2) for the braking resistors and voltage level. Refer to Switches, page 116.
3	CN1: 48 Vdc input from power supply (PE connection, +, -)

Element	Description
4	CN3: 48 Vdc output to the Lexium™ MC12 multi carrier track (PE connection, +1, +2, -3, -4)
5	CN2: Connection for braking resistor (PA/+ , PBi , PBe) Also refer to Connecting a Braking Resistor (CN2), page 117.
6	CN4: Ready relay, Normally Open (NO) output (RDY 1, RDY 2). Connect this relay output to the PacDrive LMC Pro2 Motion Controller for diagnostic purposes. Refer to Wiring Example (RDY), page 115.

Connectors

Connector	Description	Wire cross section [mm ² (AWG)]	Stripped wire length [mm (in)]	Tightening torque [Nm (lbf-in)]	Screw driver style [mm (in)]
CN1	48 Vdc input from power supply	4.0 (12)	7 (0.28)	0.5 (4.5)	Slotted, 3.5 (0.14)
CN3	48 Vdc output to the Lexium™ MC12 multi carrier track				
CN2	Connection for braking resistor (PA/+ , PBi , PBe) The connection module is delivered with a jumper between PA/+ and PBi . This means that the internal braking resistor is used by default.	1.0 - 2.5 (18 - 14)			
CN4	Ready relay, Normally Open (NO) output (RDY 1, RDY 2)	0.25 - 2.5 (24 - 14)			

Wiring Example (RDY)



Element	Description
1	Control cabinet
2	PacDrive LMC Pro2 Motion Controller
3	Power supply
4	Lexium™ MC connection module with RDY relay Normally Open (NO) output
5	External braking resistor (optional)
6	DC bus to the Lexium™ MC12 multi carrier track

Status LEDs

Refer to connection module above.

Name	Color	Description	On	Slow flashing 2 Hz ⁽¹⁾	Fast flashing 4 Hz ⁽¹⁾
DC	Green	DC bus status	Steady on: Input supply OK, 40.8...60 V	Undervoltage	Overvoltage
DC Err	Red	General error detected	Steady on: Track could not be charged	Undervoltage during operation detected, stored	Incorrect setting of switches
BR	Green	Braking resistor activated	On for ≥ 500 ms: Braking resistor is activated	–	– ⁽²⁾
BR Err	Red	Braking resistor overload / short circuit	Steady on: Braking resistor short circuit	Braking resistor connection supervision ⁽³⁾	Braking resistor overload (I ² t)

(1) Switch off input voltage to acknowledge an error state:

- Wait until input voltage < 7 V or
- Wait ≥ 30 s

(2) Invalid voltage selection on the Lexium™ MC connection module.

(3) Braking resistor connection supervision:

- Internal braking resistor selected, but not connected
- External braking resistor selected, but internal braking resistor connected
- Internal transistor for braking error detected

Switches

Use the rotary switches (**P1**, **P2**) to set the parameters for the braking resistors. Refer to connection module above.

In the delivery state, both switches are set to the value zero.

Modifying the switch positions of P1 / P2 during operation may result in high temperatures and damage of the connection module and the braking resistor after the next power cycle of the module.

▲ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not put the connection module into service before the settings of the switches are established and verified.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

P1 (type)	Braking resistor type	P_Braking resistor [W]	R_Braking resistor [Ω]	Pulse energy capacity [J]
0	Internal (default)	10	1.56	60
2	External	50 ¹⁾	3.0	4000
4	External	100	3.0	4000
6	External	100 ¹⁾	1.5 ²⁾	8000
8	External	200	1.5 ²⁾	8000
1, 3, 5, 7, 9... E	Not allowed. An error is indicated.	–	–	–
F	Not allowed (special mode)	–	–	–

P_Braking = Continuous power value
R_Braking = Resistance value

¹⁾ In this switch position, the continuous power is reduced to 50%, resulting in a lower surface temperature.
²⁾ Two external 3 Ω braking resistors in parallel for higher peak and continuous power.

For the external braking resistor (LXMMCABR120S100), also refer to Technical Data for Lexium™ MC braking resistor, page 73.

P2 (level)	Braking resistor voltage	V_BR0 [V]	V_BR1 [V]
0	Increasing with load (default)	52	56
1	Increasing with load	54	58
2	Increasing with load	56	60
3	Constant	54	54
4	Constant	56	56
5	Constant	58	58
6	Constant	60	60
7...E	Not allowed. An error is indicated.	–	–
F	Not allowed. Braking resistor will be permanently off.	–	–

Dynamic load-dependent switch-on threshold for the braking resistor:
V_BR0 = Switch-on threshold value when the braking resistor is not yet loaded
V_BR1 = Switch-on threshold value when the braking resistor is fully loaded at its power limit

Connecting a Braking Resistor (CN2)

NOTE: The required braking resistor must be calculated depending on the desired braking capability and characteristics of your application. Refer to Dimensioning the Braking Resistor and the Interconnects, page 41. For setting the parameters for the braking resistor, refer to Switches, page 116.

An insufficiently rated braking resistor can cause overvoltage on the DC bus. Overvoltage on the DC bus causes the power stage to be disabled. The system is no longer actively decelerated.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Verify that the braking resistor has a sufficient rating by performing a test run under maximum load conditions.
- Verify that the parameter settings for the braking resistor are correct.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

During operation, the surface temperature of the housing of the Lexium™ MC connection module may exceed 70 °C (158 °F).

⚠ WARNING

HOT SURFACES

- Avoid unprotected contact with hot surfaces.
- Do not allow flammable or heat-sensitive parts in the immediate vicinity of hot surfaces.
- Verify that the heat dissipation is sufficient by performing a test run under maximum load conditions.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Internal braking resistor

A braking resistor is integrated in the Lexium™ MC connection module to absorb braking energy. The Lexium™ MC connection module is shipped with the internal braking resistor (10 W, continuous power) active (jumper between **PA/+** and **PBi**).

External Braking Resistor

An external braking resistor is required for applications in which the internal resistor is not able to absorb the braking energy.

Remove the jumper between **PA/+** and **PBi** and connect the external braking resistor between **PA/+** and **PBe**. Refer to Technical Data for Lexium™ MC braking resistor, page 73.

NOTE: Make sure to set switch **P1** to the correct values of the external braking resistor. Refer to *Switches*, page 116. The continuous power must be set to a value less or equal to the continuous power of the external braking resistor (depending on mounting: free air or on heat sink).

During operation, the surface temperature of the external braking resistor may exceed 250 °C (482 °F).

⚠ DANGER

EXTREMELY HOT SURFACES

- Do not make unprotected contact with the surfaces of the external braking resistor.
- Keep all flammable or heat-sensitive materials away from the external braking resistor.
- Verify that the heat dissipation is sufficient by performing a test run under maximum load conditions.

Failure to follow these instructions will result in death or serious injury.

Connecting an external braking resistor

⚡ ⚠ **DANGER**

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Disconnect all power from all equipment including connected devices prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires except under the specific conditions specified in the appropriate hardware guide for this equipment.
- Always use a properly rated voltage sensing device to confirm the power is off where and when indicated.
- Replace and secure all covers, accessories, hardware, cables, and wires and confirm that a proper ground connection exists before applying power to this unit.
- Use only the specified voltage when operating this equipment and any associated equipment.

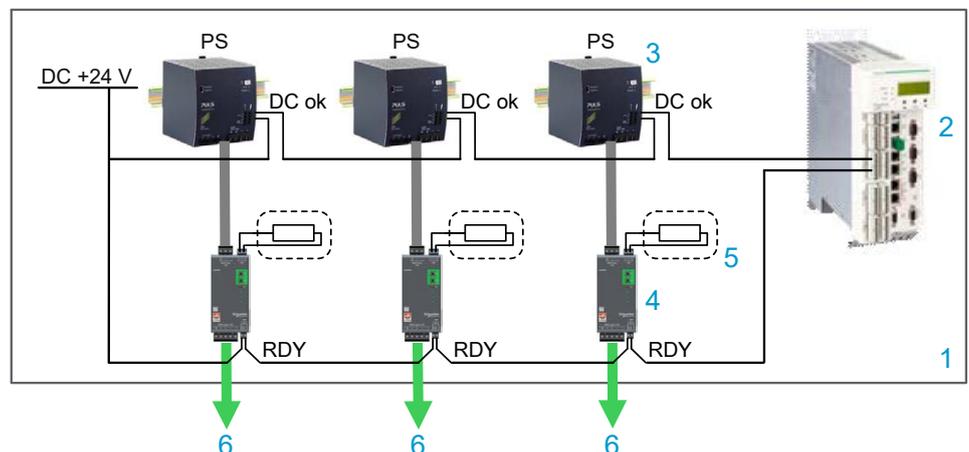
Failure to follow these instructions will result in death or serious injury.

Step	Action
1	Remove power from the supply voltages. Respect the safety instructions concerning electrical installation.
2	Verify that no voltages are present.
3	Remove the jumper between PA/+ and PBi and connect the external braking resistor between PA/+ and PBe to the Lexium™ MC connection module.
4	If the braking resistor is equipped with an over temperature switch, it can be connected to the PacDrive LMC Pro2 Motion Controller for diagnostic purposes and to de-energize the power supply in case of overheat. Refer to Wiring Example (Connecting an External Braking Resistor), page 119 and Wiring Example (Shut Down), page 113.
5	Use the switches P1 and P2 of the Lexium™ MC connection module to set the braking resistor type and the braking resistor voltage level. Refer to Switches, page 116.

Monitoring of the Braking Resistor

The braking resistor (internal or external) is monitored by the Lexium™ MC connection module. In case of overload and short circuit, the connection module signals a detected error (**BR Err**, refer to Status LEDs, page 116) and opens the **RDY** relay.

Wiring Example (Connecting an External Braking Resistor)



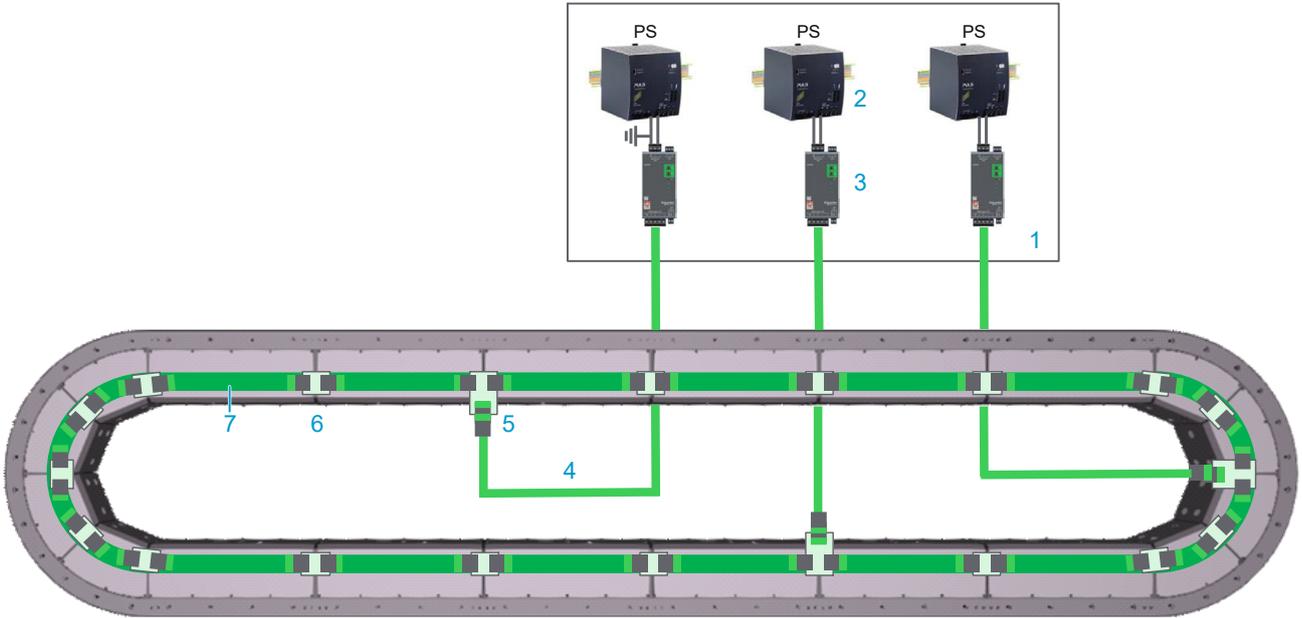
Element	Description
1	Control cabinet
2	PacDrive LMC Pro2 Motion Controller
3	Power supply
4	Lexium™ MC connection module
5	External braking resistor (optional)
6	DC bus to the Lexium™ MC12 multi carrier track

Connecting the Connection Module to the Track

Wiring Example

Also refer to Additional Wiring Examples, page 123.

Closed track



Element	Description
1	Control cabinet
2	Power supply
3	Lexium™ MC connection module
4	Lexium™ MC power cable with socket connector
5	Lexium™ MC power interconnect with plug connector
6	Lexium™ MC power interconnect without connector
7	Internal DC bus connection

Description

- The Lexium™ MC12 multi carrier track is connected to the Lexium™ MC connection module with pre-assembled cables.
 - NOTE:** The front covers of the segments are not connected to the PE (protective ground/earth). The electrical safety requirements are fulfilled by appropriate insulation measures (protective separation).
- The Lexium™ MC connection module supplies the Lexium™ MC12 multi carrier track with power (DC bus).
 - The Lexium™ MC connection module limits the DC bus voltage to <60 Vdc, conforming to Functional Safety rules. Refer to *Scope of Operation (Designated Safety Function)*, page 47.
- The DC bus (up to 60 A) in the Lexium™ MC12 multi carrier track is distributed from segment to segment via the Lexium™ MC power interconnects.

- The Lexium™ MC12 multi carrier requires that the power supply must be dimensioned according to the number of segments, segment groups, carriers, load and other pertinent parameters.

The maximum number of 24 segments per power supply/Lexium™ MC connection module combination must not be exceeded.

Also refer to Information About Power Supply/Connection Module, page 104.

Connecting the Lexium™ MC connection module to the Lexium™ MC12 multi carrier Track

The following describes the connection from the Lexium™ MC connection module to the Lexium™ MC12 multi carrier track (refer to Wiring Example, page 121):

Step	Action
1	Connect the Lexium™ MC power cable to the Lexium™ MC connection module CN3 (3) in the wiring example above.
2	Connect the Lexium™ MC power cable (4) to the Lexium™ MC power interconnect (5) at the bottom of a segment. Verify that connector of the cable is fixed with its four corresponding screws (M3x12) to the Lexium™ MC power interconnect, with a torque of 1.2 Nm (10.62 lbf-in).

Pinout and Cable Diagram

Pinout

Pre-assembled Lexium™ MC power cable. Refer to Type Code, page 32.

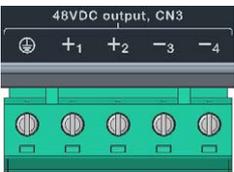
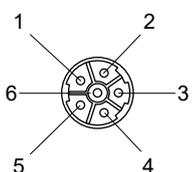
Only operate the Lexium™ MC12 multi carrier with approved, specified cables, accessories and replacement equipment by Schneider Electric.

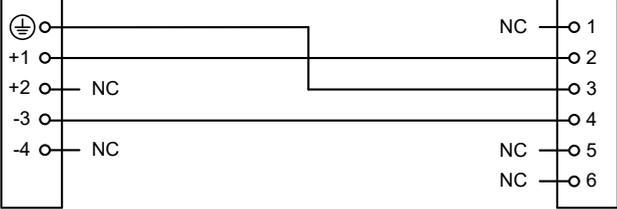
⚠ DANGER

ELECTRIC SHOCK OR ARC FLASH

Do not use non-Schneider Electric approved cables, accessories or any type of replacement equipment.

Failure to follow these instructions will result in death or serious injury.

Connector at the Lexium™ MC connection module (CN3)	Pin from CN3	Description	Pin from M23 connector	Connector (M23, plug) at the Lexium™ MC12 multi carrier track
		Protective ground (earth)	3	
	+1	48 Vdc DC bus voltage +	2	
	+2	Not connected	1	
	-3	48 Vdc DC bus voltage -	4	
	-4	Not connected	5	
		Not connected	6	

Connector at the Lexium™ MC connection module (CN3)	Pin from CN3	Description	Pin from M23 connector	Connector (M23, plug) at the Lexium™ MC12 multi carrier track
<p>Cable diagram</p> <p>Shield connected to housing on connector side.</p> 				

NOTE: If you have to remove a connector from the cable, for example, to lead the cable through a cable bushing, make sure to reconnect the wires of the cable correctly to the connector afterwards. Observe the requirements for the degree of protection and the EMC regulations.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not connect wires to unused terminals and/or terminals indicated as “No Connection (N.C.)”.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

An incorrect wiring may result in damage of components.

⚠ CAUTION

DAMAGE OF COMPONENTS DUE TO INCORRECT WIRING

Ensure and verify the correct wiring of power supplies, connection modules and segments.

Failure to follow these instructions can result in injury or equipment damage.

⚠⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

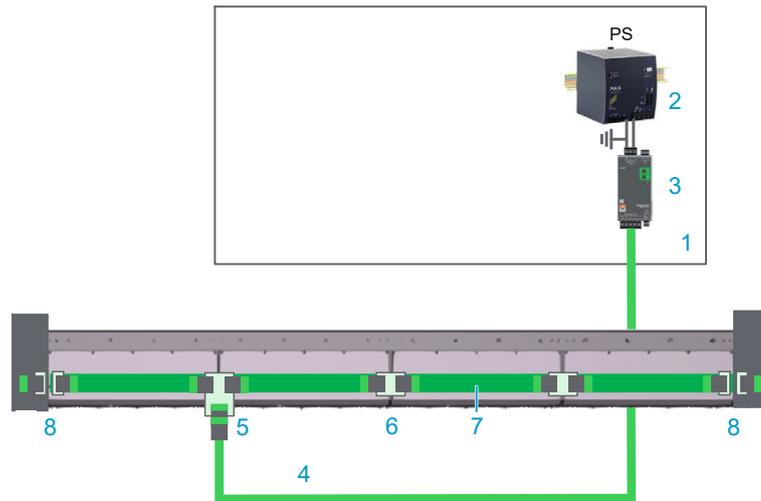
- Disconnect all power from all equipment including connected devices prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires except under the specific conditions specified in the appropriate hardware guide for this equipment.
- Always use a properly rated voltage sensing device to confirm the power is off where and when indicated.
- Replace and secure all covers, accessories, hardware, cables, and wires and confirm that a proper ground connection exists before applying power to this unit.
- Use only the specified voltage when operating this equipment and any associated equipment.

Failure to follow these instructions will result in death or serious injury.

Additional Wiring Examples

Open track

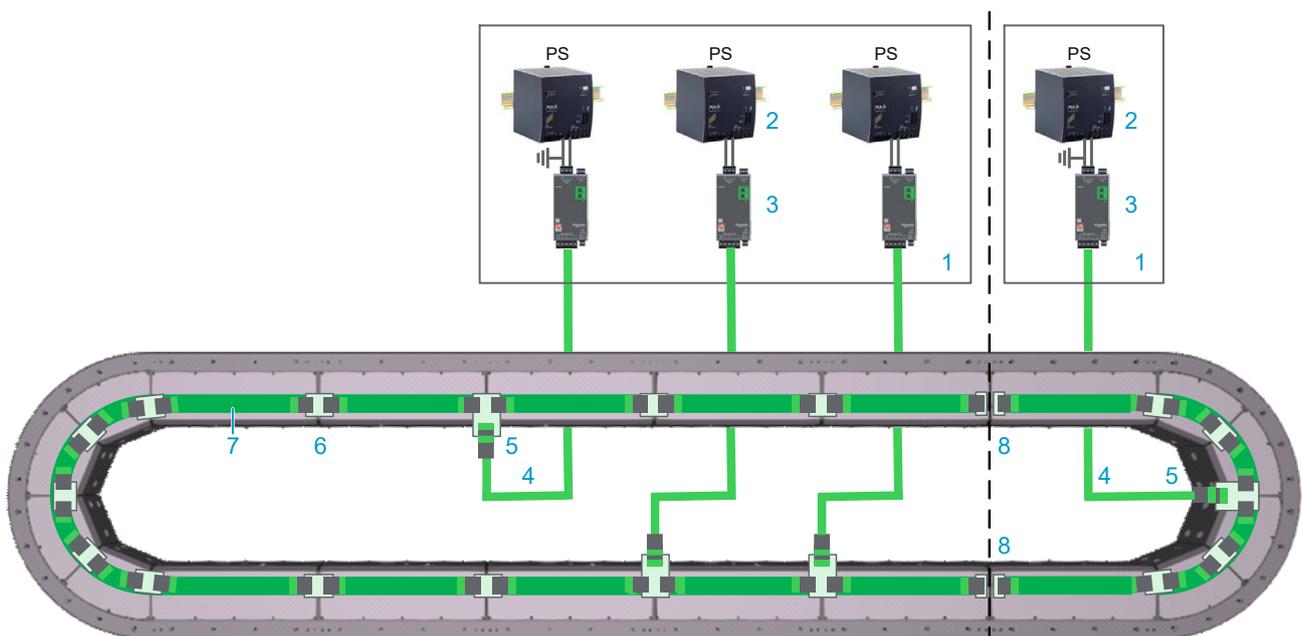
With an open track, you need a power disconnecter (8) at each end of your track.
 Also refer to Open Track, page 83.



Element	Description
1	Control cabinet
2	Power supply
3	Lexium™ MC connection module
4	Lexium™ MC power cable with socket connector
5	Lexium™ MC power interconnect with plug connector
6	Lexium™ MC power interconnect without connector
7	Internal DC bus connection
8	Power disconnecter

Track with two power supply groups

With a track with two power supply groups, you need power disconnecters (8) between the two power supply groups.



Element	Description
1	Control cabinet
2	Power supply
3	Lexium™ MC connection module
4	Lexium™ MC power cable with socket connector
5	Lexium™ MC power interconnect with plug connector
6	Lexium™ MC power interconnect without connector
7	Internal DC bus connection
8	Power disconnect

To ensure an equal load on the power supplies connected in parallel, the power cables in the same power group must have the same length.

NOTICE

INOPERABLE EQUIPMENT

Use the same length of power cables to the connection modules when using parallel power supplies.

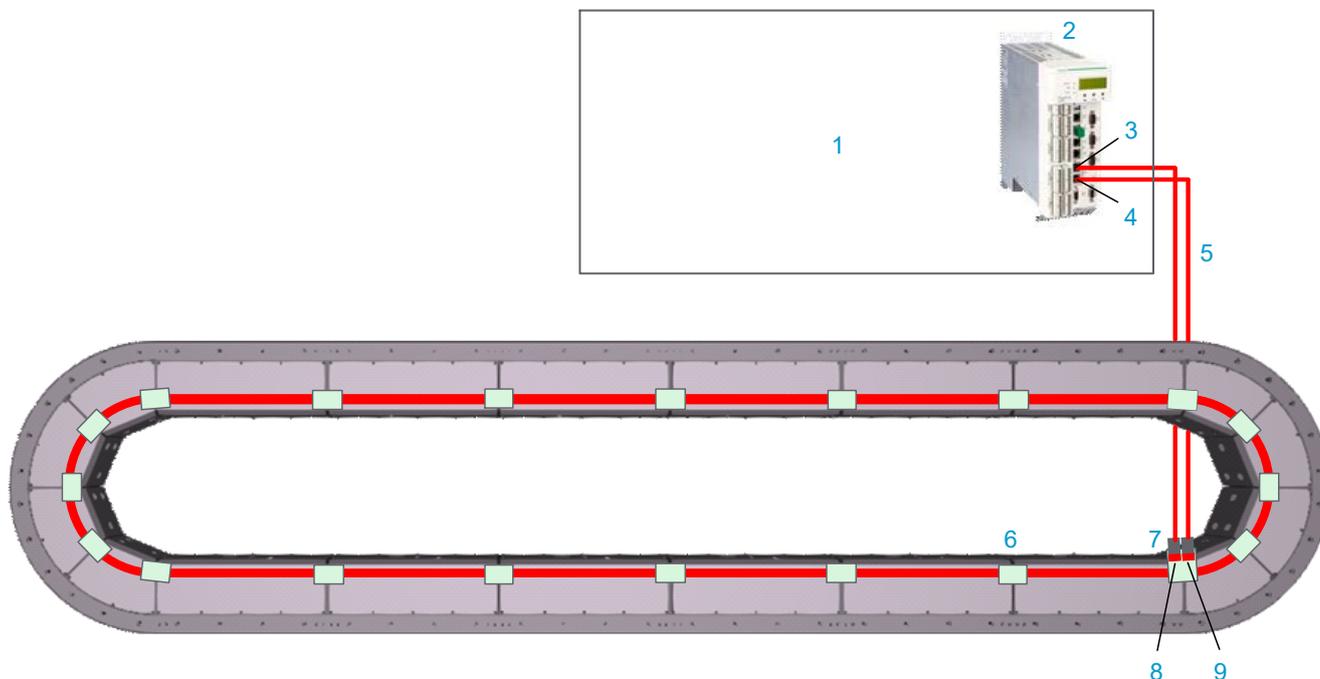
Failure to follow these instructions can result in equipment damage.

Connecting the Sercos Bus to the Track

Wiring Example

Also refer to Additional Wiring Example, page 128.

Closed track



Element	Description
1	Control cabinet
2	LMC Pro2 Motion Controller
3	Sercos port 1 (CN12) of the controller
4	Sercos port 2 (CN13) of the controller
5	Sercos cables
6	Lexium™ MC communication interconnect
7	Lexium™ MC communication interconnect with two Sercos connectors (in/out)
8	Sercos port P1 (infeed) of a closed Lexium™ MC12 multi carrier track
9	Sercos port P2 (outfeed) of a closed Lexium™ MC12 multi carrier track

Description

- The LMC Pro2 Motion Controller is installed in a cabinet.
- The LMC Pro2 Motion Controller is connected to the Lexium™ MC12 multi carrier track with pre-assembled cables. If you do not use pre-assembled cables, make sure not to exceed a Sercos cable length of 50 m (164 ft).
- The LMC Pro2 Motion Controller communicates with the Lexium™ MC12 multi carrier track via Sercos bus.
- The Sercos bus is distributed from segment to segment via the Lexium™ MC communication interconnects.

Connecting the Sercos Bus to the Lexium™ MC12 multi carrier Track

The following describes the Sercos bus connection from the LMC Pro2 Motion Controller to the Lexium™ MC12 multi carrier track:

Step	Action
1	Connect the Sercos cables (5) to the LMC Pro2 Motion Controller (2).
2	Connect the Sercos cables (5) to the Lexium™ MC communication interconnect with the two Sercos connectors (7) at the top of a segment. Verify that the Lexium™ MC communication interconnect is fixed with its four corresponding screws (M3x8) to the segment, with a torque of 0.6 Nm (5.31 lbf-in). The Sercos port P1 (CN12) of the controller must be connected to the Sercos port P1 of the Lexium™ MC12 multi carrier track.

Pinout and Cable Diagram

Pinout

Pre-assembled Sercos cable.

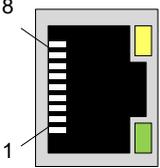
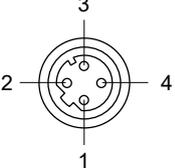
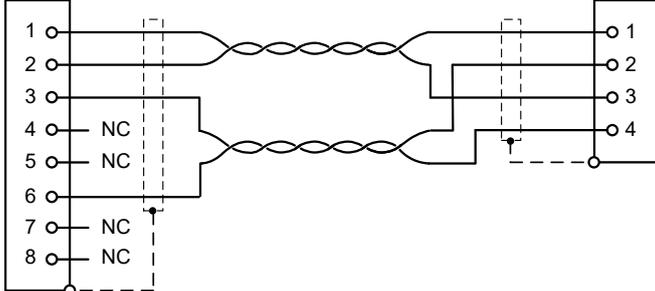
Only operate the Lexium™ MC12 multi carrier with approved, specified cables, accessories and replacement equipment by Schneider Electric.

⚠ DANGER

ELECTRIC SHOCK OR ARC FLASH

Do not use non-Schneider Electric approved cables, accessories or any type of replacement equipment.

Failure to follow these instructions will result in death or serious injury.

Connector at LMC Pro2 Motion Controller (RJ45, CN12/CN13)	Pin from CN12/ CN13	Designation	Description	Pin from M12 connector	Connector (M12, D-coded, socket) at the Lexium™ MC12 multi carrier track
	1	Tx+	Output transmit data +	1	
	2	Tx-	Output transmit data -	3	
	3	Rx+	Input receive data +	2	
	4	-	Reserved	N/A	
	5	-	Reserved	N/A	
	6	Rx-	Input receive data -	4	
	7	-	Reserved	N/A	
	8	-	Reserved	N/A	
<p>Cable diagram</p> <p>Shield connected to housing on connector side.</p> 					

NOTE: If you have to remove a connector from the cable, for example, to lead the cable through a cable bushing, make sure to reconnect the wires of the cable correctly to the connector afterwards. Observe the requirements for the degree of protection and the EMC regulations.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not connect wires to unused terminals and/or terminals indicated as “No Connection (N.C.)”.

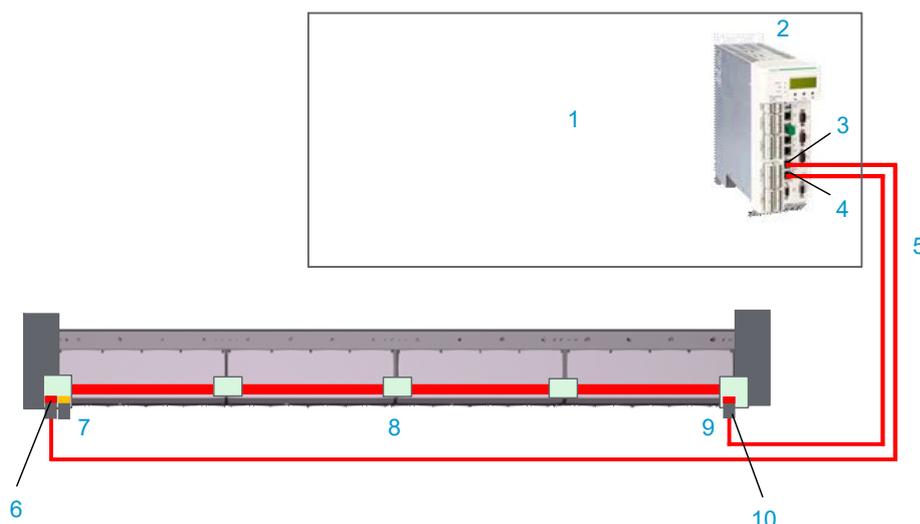
Failure to follow these instructions can result in death, serious injury, or equipment damage.

Additional Wiring Example

Open track

With an open track, you need a communication interconnect (7) at the beginning of the open track with one Sercos (and one SFO) connector and a communication interconnect (9) at the end of the open track with one Sercos connector.

Also refer to Open Track, page 83.



Element	Description
1	Control cabinet
2	LMC Pro2 Motion Controller
3	Sercos port P1 (CN12) of the controller
4	Sercos port P2 (CN13) of the controller
5	Sercos cables
6	Sercos port P1 (infeed) of an open Lexium™ MC12 multi carrier track
7	Lexium™ MC communication interconnect with one Sercos (and one SFO) connector.
8	Lexium™ MC communication interconnect
9	Lexium™ MC communication interconnect with one Sercos connector.
10	Sercos port P2 (outfeed) of an open Lexium™ MC12 multi carrier track

Connecting SFO (Safe Force Off) to the Track

General Information

Regardless of whether you use the SFO (Safe Force Off) function in your track or not, you must supply 24 V to the track permanently. To do this, install a Lexium™ MC communication interconnect with SFO connector to the first segment of the track and supply SFOin+ (24 V) and SFOin- (0 V). This puts the Lexium™ MC12 long stator motor segments in an energized state and allows them to apply electromagnetic force to the Lexium™ MC12 carriers.

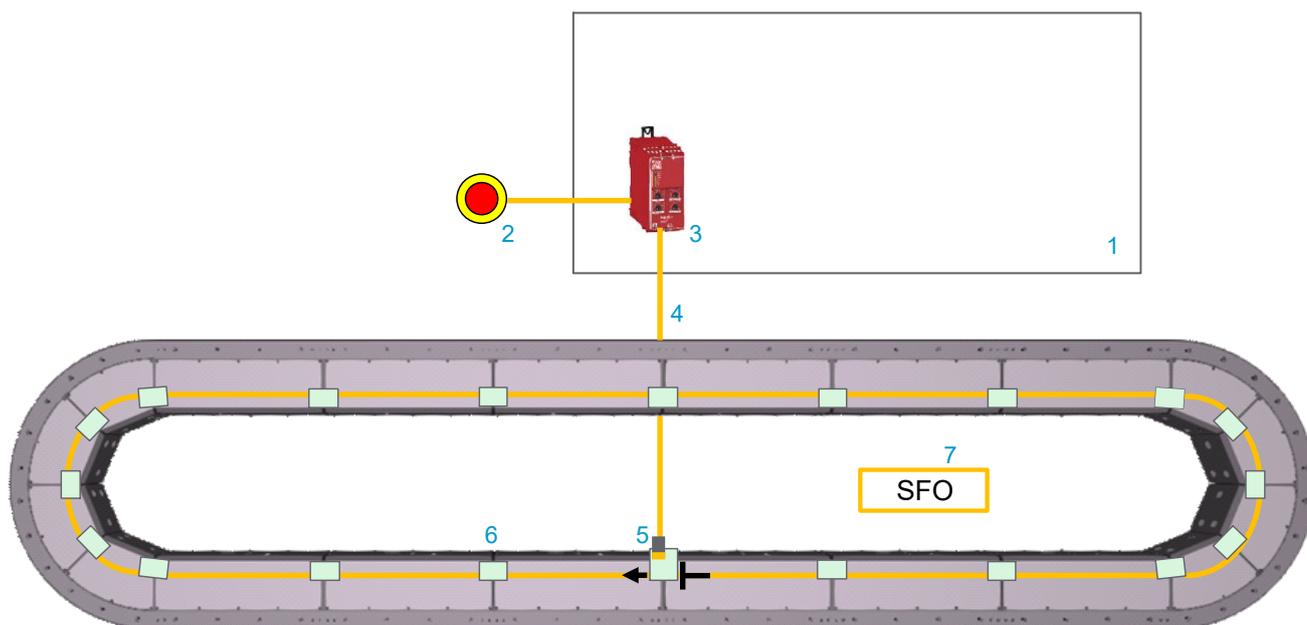
In case you use the SFO (Safe Force Off) function, the 24 V must be supplied by an appropriate safety-related switching device. In case you do not use the SFO (Safe Force Off) function, the 24 V can be provided by another power supply.

For more information on SFO (Safe Force Off), refer to Functional Safety, page 44.

Wiring Example (SFO)

Also refer to Additional Wiring Examples (No SFO), page 132.

Closed track



Element	Description
1	Control cabinet
2	Emergency stop switch
3	Safety-related switching device (for example, Harmony XPSUAT Safety Module)
4	SFO cable
5	Lexium™ MC communication interconnect with SFO (Safe Force Off) connector
6	Lexium™ MC communication interconnect
7	SFO group

Description

You must provide at least one SFO (Safe Force Off) signal to the Lexium™ MC12 multi carrier track. Otherwise the Lexium™ MC12 long stator motor segments remain in a defined safe state and do not exert an electromagnetic force to the Lexium™ MC12 carriers.

In addition, if you wish to use the SFO safety-related function, you must use safety-related devices, for example, to integrate emergency stop switches into your system.

- The safety-related devices are installed in a cabinet.
- The safety-related devices are connected to the Lexium™ MC12 multi carrier track with pre-assembled cables.

Make sure not to exceed a cable length of 20 m (65.6 ft).

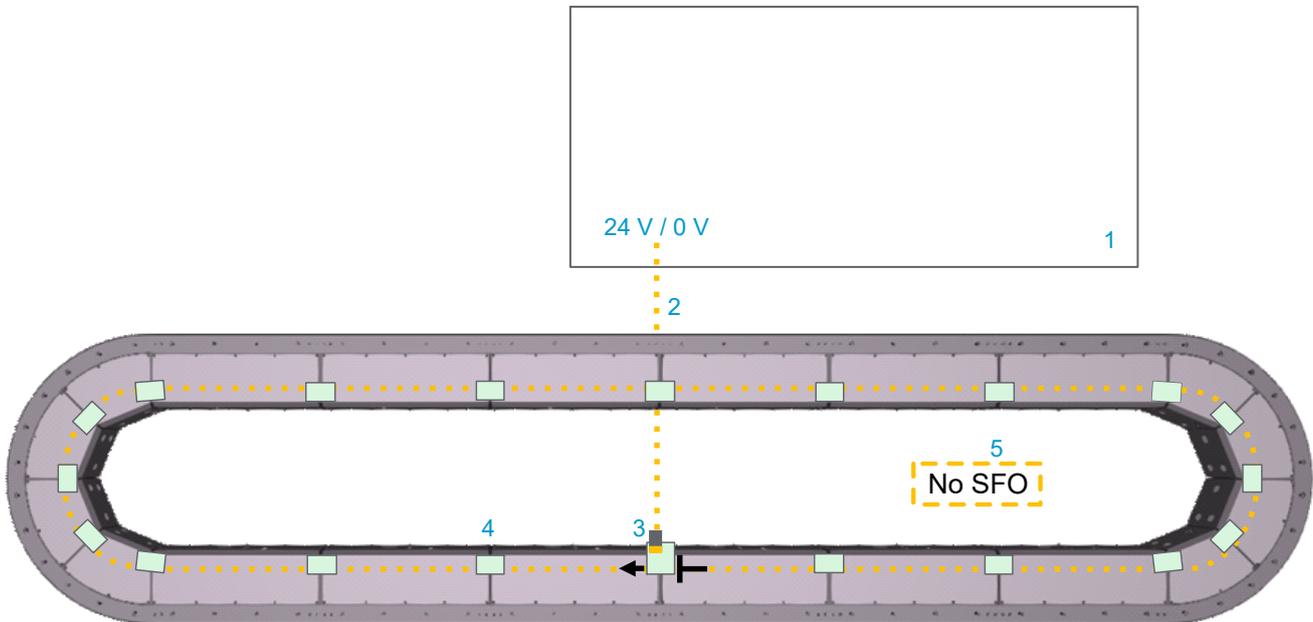
- The safety-related modules allow to perform safety-related functions, for example, to bring carriers moving on the track to a defined safe stop (SFO).
- The SFO signal is distributed from segment to segment via the Lexium™ MC communication interconnects.
- Several SFO groups can be set up for different sections of the track. An SFO group always starts at the Lexium™ MC communication interconnect with SFO connector and extends clockwise to the next Lexium™ MC12 long stator motor segment via the Lexium™ MC communication interconnect.
- Each segment must be provided with an SFO signal. Either with an SFO cable (with SFO) connector at the top of a segment) or via the Lexium™ MC communication interconnect from the segment before.
- Up to 68 segments can be controlled by one safety-related output.

Additional Wiring Examples (No SFO)

Even if you do not use the SFO (Safe Force Off) function in your track or in a group of segments of your track, you must supply 24 V to the track permanently.

Closed track

With a closed track, you need a Lexium™ MC communication interconnect with SFO connector.

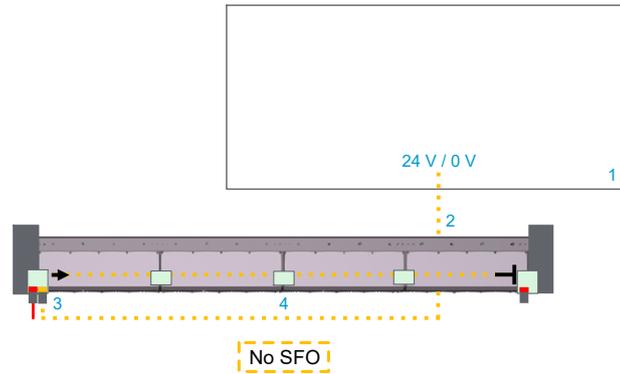


Element	Description
1	Control cabinet
2	SFO cable
3	Lexium™ MC communication interconnect with SFO (Safe Force Off) connector
4	Lexium™ MC communication interconnect
5	Non-SFO group

Open track

With an open track, you need a Lexium™ MC communication interconnect at the beginning of the open track with one SFO connector (and one Sercos connector).

Also refer to Open Track, page 83.



Element	Description
1	Control cabinet
2	SFO cable
3	Lexium™ MC communication interconnect with SFO (Safe Force Off) connector
4	Lexium™ MC communication interconnect

Connecting SFO (Safe Force Off) to the Lexium™ MC12 multi carrier Track

The following describes the SFO connection to the Lexium™ MC12 multi carrier track (refer to Additional Wiring Examples (No SFO), page 132):

Step	Action
1	Connect the SFO cable (2) in the wiring examples above to 24 V.
2	Connect the negative output voltage terminal of the power supply to the PE (protective ground/earth) of the cabinet.
3	Connect the SFO cable (2) to the Lexium™ MC communication interconnect with SFO connector (3) at the top of a segment. Verify that the Lexium™ MC communication interconnect is fixed with its four corresponding screws (M3x8) to the segment, with a torque of 0.6 Nm (5.31 lbf-in).

Pinout and Cable Diagram

Pinout

Pre-assembled SFO cable. Refer to Type Code, page 32.

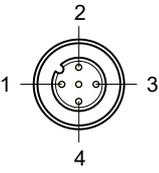
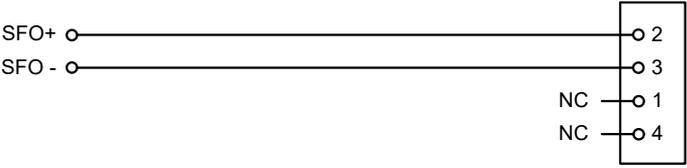
Only operate the Lexium™ MC12 multi carrier with approved, specified cables, accessories and replacement equipment by Schneider Electric.

⚠ DANGER

ELECTRIC SHOCK OR ARC FLASH

Do not use non-Schneider Electric approved cables, accessories or any type of replacement equipment.

Failure to follow these instructions will result in death or serious injury.

Open cable end with wire end ferrules	Wire color	Designation	Description	Pin from M12 connector	Connector (M12, A-coded, plug) at the Lexium™ MC12 multi carrier track
-	Brown	Not connected	Not connected	1	
	White	SFO+	Positive SFO signal	2	
	Blue	SFO-	Negative SFO signal	3	
	Black	Not connected	Not connected	4	
Cable diagram 					

NOTE: If you have to remove a connector from the cable, for example, to lead the cable through a cable bushing, make sure to reconnect the wires of the cable correctly to the connector afterwards. Observe the requirements for the degree of protection and the EMC regulations.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not connect wires to unused terminals and/or terminals indicated as “No Connection (N.C.)”.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

NOTE: Protected wiring, e.g., control cabinet, armored conduit, etc., is required if the safety-related module generating the SFO signal is not able to perform an error detection on the wiring. Refer to IEC 61800-5-2 and IEC 60204-1.

Initial Start-Up

Verifying the Installation

Overview

Verify that the components of the Lexium™ MC12 multi carrier are installed correctly. For more information, refer to [Specific Safety Information](#), page 12.

Pay special attention to:

- Properly bolted mechanical parts.
- Installation and wiring of the components of the Lexium™ MC12 multi carrier. Make sure that the mains connection, the DC bus, the Sercos bus, and the SFO (Safe Force Off) connections are wired correctly.
- Installation and connection of all cables and connectors. Make sure that the Lexium™ MC interconnects are properly inserted and secured with the associated screws.
- Wiring and settings of the Lexium™ MC connection modules (Refer to Lexium™ MC connection module, page 114).
 - Verify the correct wiring of the relay contacts at the connector **CN4 (RDY 1 / RDY 2)**.
 - Verify the correct wiring of the braking resistor at the connector **CN2** (jumper between **PA/+** and **PBi** for internal braking resistor. **PA/+** and **PBe** for external braking resistor).
 - Verify the correct settings of the switches **P1** and **P2** (parameters for the braking resistor).
- Wiring and settings of the power supplies (refer to [Power Supply](#), page 106):
 - Verify the correct wiring of the relay contacts **DC ok** and **Shut down**.
 - Verify the correct setting of the switch **Parallel Use/Single Use**.
 - Verify the correct setting of the potentiometer **Output voltage**.
- Connection of the protective ground (earth) cables.
- Use of correct fuses.
- Isolation of the unused cable ends.
- Unobstructed movement of the carriers along the entire track.

DANGER

ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Disconnect all power from all equipment including connected devices prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires except under the specific conditions specified in the appropriate hardware guide for this equipment.
- Always use a properly rated voltage sensing device to confirm the power is off where and when indicated.
- Operate electrical components only with a connected protective ground (earth) cable.
- Verify the secure connection of the protective ground (earth) cable to all electrical devices to ensure that connection complies with the connection diagram.
- Do not touch the electrical connection points of the components when the module is energized.
- Provide protection against indirect contact (EN 50178).
- Insulate any unused conductors on both ends of the power cable.

Failure to follow these instructions will result in death or serious injury.

⚡⚠ DANGER**LOOSE WIRING OR CABLING CAUSES ELECTRIC SHOCK**

Tighten wiring or cabling connections in conformance with the torque specifications.

Failure to follow these instructions will result in death or serious injury.

⚡⚠ DANGER**ELECTRIC SHOCK DUE TO IMPROPER GROUNDING**

- Ground the components of the system in accordance with local, regional and/or national standards and regulations at a single, central point.
- Verify that the components of the system are connected to the central ground.

Failure to follow these instructions will result in death or serious injury.

Start-Up

Overview

When the Lexium™ MC12 multi carrier is operated for the first time, there is a risk of unintended equipment operation caused by possible wiring errors or unsuitable parameters.

You must take care that the carriers (depending on the shape of the product, size, mass, center of mass, acceleration, deceleration, velocity) keep enough distance from each other to help prevent collisions. Verify that you have implemented a device like, for example, a sensor for identifying the carrier and the type of tool mounted on the carrier to help prevent collisions. In addition, depending on the load and center of gravity, the speed of the carriers must be reduced on arc segments to help prevent the carriers from leaving the track.

Use the related libraries to program your application. The libraries provide function blocks and interfaces to control the Lexium™ MC12 multi carrier. Refer to Libraries and Example Project, page 41.

⚠ WARNING**UNINTENDED EQUIPMENT OPERATION**

- Verify that the carriers, tools on the carriers, and products on the carrier tools are properly fastened so it cannot come loose even in the case of fast acceleration.
- Take all necessary measures to ensure that the moving parts cannot move in an unanticipated way.
- Verify that emergency stop equipment is operational and within reach of the zone of operation.
- Verify that the system is obstacle-free and ready for the movement before starting the system.
- Run initial tests at reduced velocity.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

If the power supply is disabled unintentionally, for example as a result of power outage, errors or functions, the carriers are no longer decelerated in a controlled way.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Verify that movements without active braking capabilities cannot cause injuries or equipment damage.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

The metal surfaces of the system may exceed 70 °C (158 °F) when subjected to heavy loads and/or high performance during operation.

⚠ WARNING

HOT SURFACES

- Avoid unprotected contact with hot surfaces.
- Do not allow flammable or heat-sensitive parts in the immediate vicinity of hot surfaces.
- Verify that the heat dissipation is sufficient by performing a test run under maximum load conditions.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

NOTE: Perform a start-up in case of an already configured Lexium™ MC12 multi carrier when it is used under modified operating conditions. For more information, refer to Specific Safety Information, page 12.

Commissioning Procedure

Step	Action
1	Verify the installation. For more information, refer to <i>Verifying the Installation</i> , page 135.
2	Verify that the loads conform to the appropriate specified forces and torques for components of the Lexium™ MC12 multi carrier before operating the system.
3	Perform initial tests at reduced velocity. During these tests, verify that the controller responds without any error or advisory message to the signals of the Lexium™ MC12 multi carrier.
4	Verify that the ambient conditions conform to the appropriate specified environments for the Lexium™ MC12 multi carrier. For details, refer to <i>Ambient Conditions</i> , page 65.

NOTE: The maximum permissible dynamic forces decrease with increasing velocities and depend on the load and the center of gravity.

Maintenance, Repair, and Cleaning

Maintenance and Repair

General Information About Maintenance, Repair, and Cleaning

Overview

The use and application of the information contained herein require expertise in the design and programming of automated control systems. Only you, the user, machine builder or integrator, can be aware of all the conditions and factors present during installation and setup, operation, repair, and maintenance of the machine or process.

You must also consider any applicable standards and/or regulations with respect to grounding of all equipment. Verify compliance with any safety information, different electrical requirements, and normative standards that apply to your machine or process in the use of this equipment.

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Disconnect all power from all equipment including connected devices prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires except under the specific conditions specified in the appropriate hardware guide for this equipment.
- Always use a properly rated voltage sensing device to confirm the power is off where and when indicated.
- Replace and secure all covers, accessories, hardware, cables, and wires and confirm that a proper ground connection exists before applying power to this unit.
- Use only the specified voltage when operating this equipment and any associated equipment.

Failure to follow these instructions will result in death or serious injury.

Insufficient maintenance can lead to premature wear, or even present potential safety hazards for production or maintenance operators.

WARNING

UNINTENDED EQUIPMENT OPERATION

Develop and follow a maintenance plan and associated protocols adapted to the requirements of your application and equipment.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Servicing

In case of issues which cannot be resolved, contact your local Schneider Electric service representative with the following information:

- Type plate information (type, identification number, serial number, date of manufacture)
- Detailed description of the issue
- Previous and associated circumstances

Maintenance Plan

Overview

The data given in the maintenance schedule are indicative only. The data have to be adapted depending on the application and the environmental conditions.

For the maintenance procedures, refer to:

Cleaning, page 141

Replacing Parts, page 142

Lubrication, page 152

Maintenance Schedule

Perform the following maintenance tasks after delivery or long storage:

Interval (distance data refer to the performance of one carrier)	Action
After delivery	<ul style="list-style-type: none"> Fill the lubrication reservoirs of the carriers. Refer to Lubrication, page 152.
After delivery, every 1000 km (621 miles) or within the first two months of service life	<ul style="list-style-type: none"> Verify the Lexium™ MC12 multi carrier by visual inspection for any damage or missing parts, especially for moving parts and parts at risk for collisions such as mounting elements.
After ≥ two years of storage	<ul style="list-style-type: none"> Verify the lubrication pads of the carriers and replace if necessary. Refer to Replacing Parts, page 142.

Perform the following maintenance tasks within the stated intervals.

NOTE: The intervals in the following table are only guidelines. The intervals can be adjusted depending on your application and the environmental conditions (track length, number of carriers, motion profile, temperature, and so on).

Interval (distance data refer to the performance of one carrier)	Action
Every 1000 km (621 miles) of operation	<ul style="list-style-type: none"> Clean the Lexium™ MC12 multi carrier if necessary. Refer to Cleaning, page 141. Verify that the floating bearing of the lower carrier rollers moves freely in axial direction. Clean if necessary and make the rollers run smoothly. Refer to Cleaning the Carrier Rollers, page 141. Verify the lubrication pads of the carriers for dirt and clean if necessary. Verify the lubrication pads of the carriers for wearing and replace if necessary. Refer to Replacing Parts, page 142. Lubricate the carrier. Refer to Lubrication, page 152.
Every 4000 km (2485 miles) of operation	<ul style="list-style-type: none"> Clean the Lexium™ MC12 multi carrier. Refer to Cleaning, page 141. <ul style="list-style-type: none"> Verify the covers of the segments and the drive magnets of the carriers for dirt and magnetic abrasion. Clean the covers and the magnets and remove the magnetic abrasion if necessary. Refer to Removing Particles from the Magnets, page 141. Verify the carrier rollers for dirt and clean if necessary. Verify the lubrication pads of the carriers for dirt and clean if necessary. Verify the area of encoder magnets of the carriers for dirt, and clean if necessary. Verify the rails for dirt, and clean if necessary. Verify the Lexium™ MC12 multi carrier by visual inspection for any damage or missing parts, especially moving parts and parts at risk for collisions such as mounting elements. <ul style="list-style-type: none"> Verify the drive magnets of the carriers for damage. The drive magnets cannot be replaced individually. Replace the plate with the two magnets as a whole if necessary. Refer to Replacing the Drive Magnets of the Carrier, page 149. Verify the encoder magnets of the carriers for correct seating and for damage. Adjust or replace if necessary. Refer to Replacing the Encoder Magnet of a Carrier, page 151. Verify the rails for wearing or damage and replace if necessary. Verify all parts for bolted connections.
Every 20,000 km (12,427 miles) of operation	<ul style="list-style-type: none"> Verify the carrier rollers for wearing and replace the carrier rollers if necessary. Refer to Replacing the Rollers of a Carrier, page 145.

Perform the following maintenance tasks if your carriers have exceptional movement profiles:

Movement profile	Action
Reversing movements in which the carriers travel a distance of less than 200 mm (7.88 in).	<ul style="list-style-type: none"><li data-bbox="533 262 1433 309">• If a distance of less than 200 mm (7.88 in) is travelled, perform a lubrication run after 20,000 traverse cycles at the latest. <p data-bbox="561 320 1426 367">NOTE: Sufficient lubrication during reversing movements can only be reached if the carriers travel a distance of at least 200 mm (7.88 in).</p>

Cleaning

Overview

Care must be taken with cleaning products as some active agents may have harmful effects on the materials of the Lexium™ MC12 multi carrier.

NOTICE

CORROSION CAUSED BY CLEANING AGENTS

Perform a compatibility test in relation to the cleaning agent and the component affected before using a cleaning agent.

Failure to follow these instructions can result in equipment damage.

Schneider Electric provides samples of the different materials used for the Lexium™ MC12 multi carrier.

For the material samples (Material test kit 1), refer to Lexium™ MC accessories, page 30.

Test kit materials:

- Aluminum die casting, anodized black or no coloring
- Stainless steel
- Plastic (PBT, Polybutylene terephthalate), injection moulding
- Carbon steel, milled, surface treatment black
- Carbon steel, machined, no coloring
- Carbon steel, machined, electroless nickel
- Zinc alloy, die casting, cathodic dip painted, black
- Magnets, nickel plated
- Bumper, rubber, black

Cleaning the Lexium™ MC12 multi carrier

The Lexium™ MC12 multi carrier must be inspected, large particles and dirt must be removed from the surface, and the system must be cleaned at regular intervals (refer to Maintenance Plan, page 139). When cleaning the Lexium™ MC12 multi carrier, note the following:

- Do not use compressed air for cleaning.
- Use only damp, soft, and lint-free cleaning cloths to wipe the surface.

NOTE: Depending on the operating conditions and requirements, verifying and cleaning may be necessary on a more frequent basis.

Removing Particles from the Magnets

The drive magnets of the carriers and the electromagnets of the segments can attract ferrous particles. These impurities can impair the function of the magnets.

Remove the particles from the magnets with an adhesive tape or another suitable means.

Cleaning the Carrier Rollers

Particularly during the first runs, there may be increased abrasion of the oxide layer of the rail surface, so that the free movement in the axial direction of the lower floating bearings of the carrier rollers is impaired by the abrasion. Verify that

the floating bearing of the lower carrier rollers moves freely in axial direction. Clean if necessary and make the rollers run smoothly. Also refer to Maintenance Schedule, page 139.

You may need to remove the lower carrier rollers for cleaning. Refer to Replacing the Rollers of a Carrier, page 145.

Replacing Parts

Information About Replacing Parts

Overview

The use and application of the information contained herein require expertise in the design and programming of automated control systems. Only you, the user, machine builder or integrator, can be aware of all the conditions and factors present during installation and setup, operation, repair, and maintenance of the machine or process.

You must also consider any applicable standards and/or regulations with respect to grounding of all equipment. Verify compliance with any safety information, different electrical requirements, and normative standards that apply to your machine or process in the use of this equipment.

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Disconnect all power from all equipment including connected devices prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires except under the specific conditions specified in the appropriate hardware guide for this equipment.
- Always use a properly rated voltage sensing device to confirm the power is off where and when indicated.
- Replace and secure all covers, accessories, hardware, cables, and wires and confirm that a proper ground connection exists before applying power to this unit.
- Use only the specified voltage when operating this equipment and any associated equipment.

Failure to follow these instructions will result in death or serious injury.

The segments and the carriers of the Lexium™ MC12 multi carrier may exceed 70 °C (158 °F) when subjected to heavy loads and/or high performance during operation.

WARNING

HOT SURFACES

- Avoid unprotected contact with hot surfaces.
- Do not allow flammable or heat-sensitive parts in the immediate vicinity of hot surfaces.
- Verify that the heat dissipation is sufficient by performing a test run under maximum load conditions.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Information About Replacing Parts of the Carrier

Electromagnetic Fields

NOTE: Exposed or uninstalled carriers must have the protective cover of the drive magnets installed at all times. The cover is only removed at the time of carrier installation.

- Carriers have strong local magnetic fields. Refer to *Transporting the Lexium™ MC12 carriers*, page 78.
- The carriers have strong drive magnets and can attract metal objects that are in their proximity.
- A carrier can move suddenly and fast due to magnetic attraction.

▲ WARNING
MAGNETIC FIELDS <ul style="list-style-type: none">• Keep persons with medical implants (for example, pace makers or metal implants) or metallic body jewelry away from the carriers and segments with a minimum distance of 30 cm (11.9 in).• Always leave the protective cover of the drive magnets in place for all exposed or uninstalled carriers.• Do not put your hands or fingers between the carriers and segments.• Do not place metallic tools in the vicinity of the carriers and segments.• Do not place electromagnetically sensitive devices in the vicinity of the carriers and segments.• Do not place credit cards or electronic/magnetic media in the vicinity of the carriers and segments. <p>Failure to follow these instructions can result in death, serious injury, or equipment damage.</p>

Use Original Equipment Only

Use only the accessories and mounting parts specified in the documentation and only third-party devices or components that have been expressly approved by Schneider Electric.

▲ WARNING
UNINTENDED EQUIPMENT OPERATION <p>Only use hardware components approved by Schneider Electric for use with the system.</p> <p>Failure to follow these instructions can result in death, serious injury, or equipment damage.</p>

Handle the Carrier with Care

The carrier has two magnets which, together with the magnetic fields in the segments, move the carrier on the track. These two magnets are glued onto the carrier. A shock to the carrier can cause the glued-on magnets to flake off and the magnets can splinter.

In addition, the carrier has an encoder magnet. This can be demagnetized by improper handling, for example, if the magnets of another carrier come too close.

▲ WARNING

INOPERABLE EQUIPMENT

- Handle the carrier with care.
- Do not drop the carrier.
- Do not strike the carrier.
- Keep a minimum distance of 50 mm (1.97 in) between the encoder magnet and other magnets.
- Ensure to fill the lubrication reservoirs of the carriers before first use.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

For information on filling the lubrication reservoirs refer to Filling the Lubrication Reservoirs, page 154.

Replacing the Rollers of a Carrier

Overview

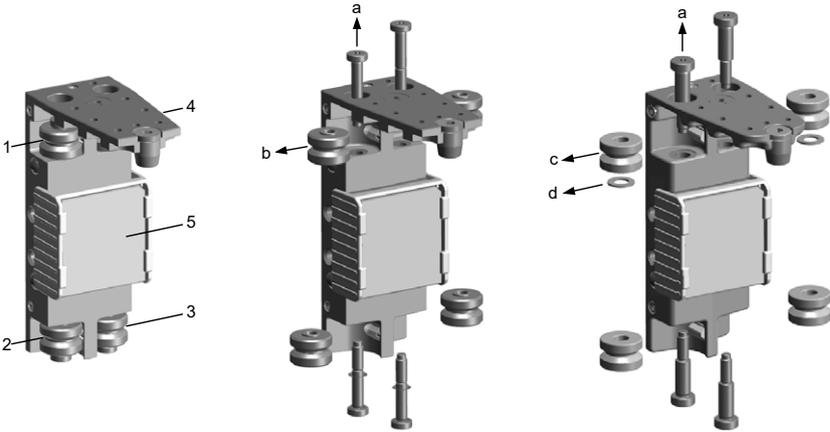
A Lexium™ MC12 carrier has four rollers which must be replaced at the same time.

Refer to the Maintenance Plan, page 139.

NOTE: Also refer to Information About Replacing Parts of the Carrier, page 143.

Replacing the Rollers

NOTE: Exposed or uninstalled carriers must have the protective cover of the drive magnets installed at all times. The cover is only removed at the time of carrier installation.

Step	Action
1	<p>Install the protective cover (5) of the drive magnets by sliding it onto the magnets if it is not already installed. Refer to Removing the Protective Cover of the Drive Magnets, page 93.</p> <p>NOTE: A Lexium™ MC12 carrier has four rollers (1–4) which must be replaced at the same time.</p> <p>NOTE: The rollers are available in two versions:</p> <ul style="list-style-type: none"> • Version 1: rollers with a small flange (b) • Version 2: rollers without a flange (c); upper rollers of type (c) require an additional washer (d) 
2	Loosen and remove the screw (M6) with which the roller is fixed (a).
3	<p>Version 1: Remove the roller (b).</p> <p>Version 2: Remove the roller (c) and the corresponding washer (d).</p> <p>NOTE: The lower rollers of type (c) are not provided with a washer (d).</p>
4	Proceed in this way for all four rollers.
5	<p>Version 1: Insert a new roller (b) to the carrier and fix the roller with a new screw.</p> <p>Version 2, upper rollers (c) with a washer (d): First, insert the washer (d) in the hole. Then fix the roller with a new screw.</p> <p>Version 2, lower rollers (c) without washer (d): Insert a new roller (c) to the carrier and fix the roller with a new screw.</p> <p>NOTE: Make sure that the hole thread is free of any residue.</p> <p>NOTE: Use new screws (supplied by Schneider Electric) which already have locking adhesive applied.</p>
6	Tighten the screw with a torque of 6 Nm (53.1 lbf-in).
7	Proceed in this way for all four rollers.

Replacing the Lubrication Pads of a Carrier

Overview

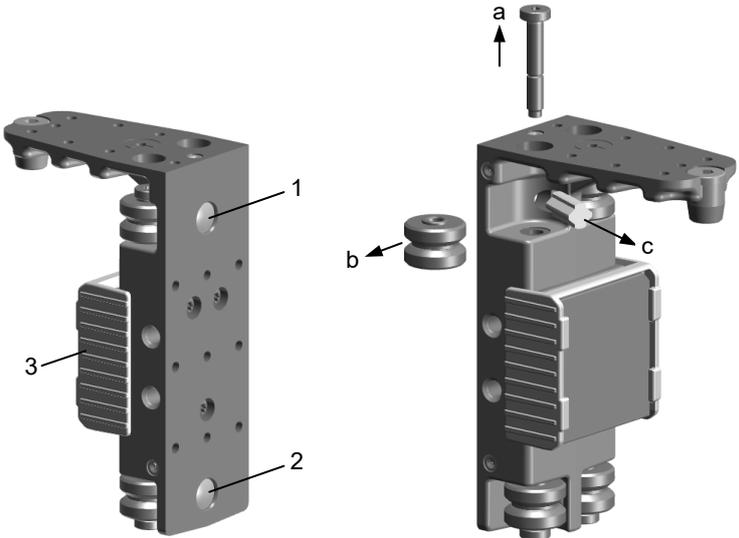
A Lexium™ MC12 carrier has two lubrication pads which must be replaced at the same time.

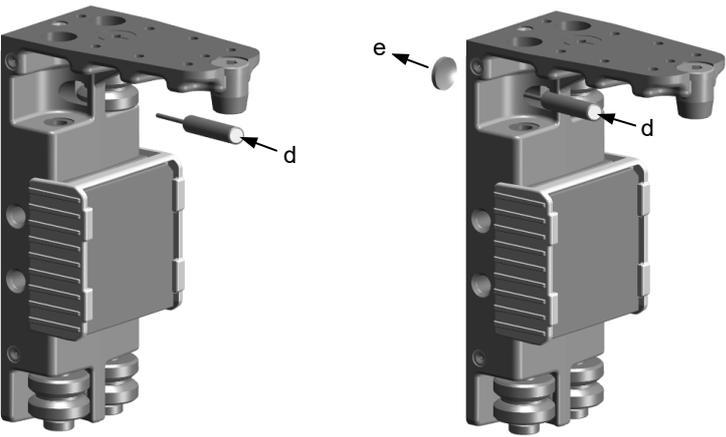
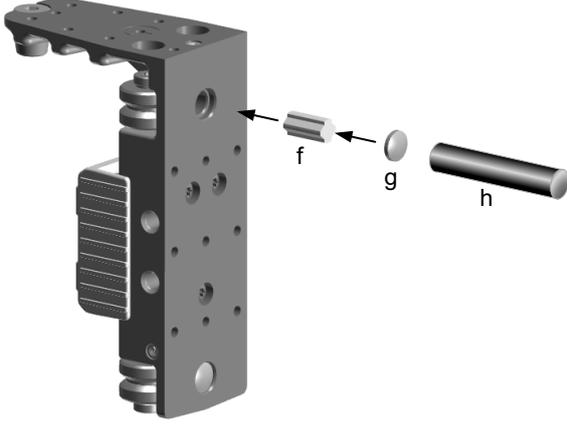
Refer to the Maintenance Plan, page 139.

NOTE: Also refer to Information About Replacing Parts of the Carrier, page 143.

Replacing the Lubrication Pads

NOTE: Exposed or uninstalled carriers must have the protective cover of the drive magnets installed at all times. The cover is only removed at the time of carrier installation.

Step	Action
1	<p>Install the protective cover (3) of the drive magnets by sliding it onto the magnets if it is not already installed. Refer to Removing the Protective Cover of the Drive Magnets, page 93.</p> <p>NOTE: A Lexium™ MC12 carrier has two lubrication pads (1–2) which must be replaced at the same time.</p> 
2	Loosen and remove the screw (M6) with which the roller is fixed (a).
3	Remove the roller (b).
4	<p>Use suitable tweezers to remove the lubrication pad (c).</p> <p>NOTE: Do not reuse the removed lubrication pad.</p>

Step	Action
5	 <p data-bbox="582 660 1260 683">Use a suitable drift punch (d) to press the plug (e) out of the carrier body.</p> <p data-bbox="622 694 997 716">NOTE: Do not reuse the removed plug.</p>
6	<p data-bbox="582 739 1276 761">Reinsert the roller to the carrier and fix the roller with the associated screw.</p> <p data-bbox="622 772 1412 817">NOTE: Make sure that the screw thread and hole thread are free of any residue and that thread locking adhesive has been applied to the screw.</p>
7	<p data-bbox="582 840 1069 862">Tighten the screw with a torque of 6 Nm (53.1 lbf-in).</p>
8	 <p data-bbox="582 1366 1404 1422">Insert a new lubrication pad (f) into the carrier and close the hole again with the plug (g). Make sure that the plug is not tilted during insertion.</p> <p data-bbox="582 1433 1212 1467">Use a suitable drift punch (h) to press the plug into the carrier body.</p> <p data-bbox="622 1467 1141 1489">NOTE: Saturate the pad with lubricant before insertion.</p> <p data-bbox="582 1500 909 1534">Also refer to Lubrication, page 152.</p>
9	<p data-bbox="582 1556 1005 1579">Proceed in this way for both lubrication pads.</p>

Replacing the Drive Magnets of the Carrier

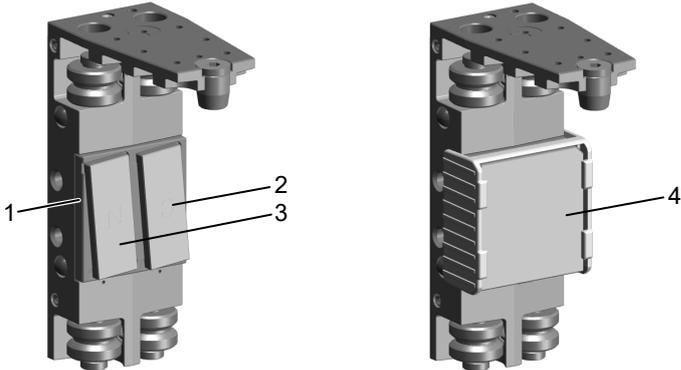
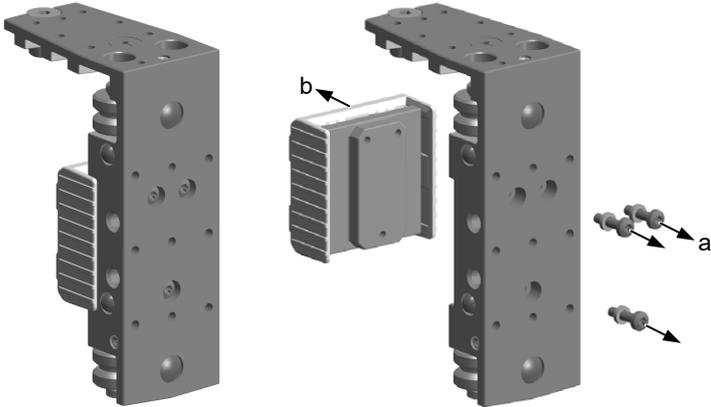
Overview

A Lexium™ MC12 carrier has two drive magnets which are firmly mounted on a supporting plate. The drive magnets cannot be replaced individually. The supporting plate with the two magnets can only be replaced as a whole.

NOTE: Also refer to Information About Replacing Parts of the Carrier, page 143.

Replacing the Drive Magnets of the Carrier

NOTE: Exposed or uninstalled carriers must have the protective cover of the drive magnets installed at all times. The cover is only removed at the time of carrier installation.

Step	Action
1	<p>NOTE: A Lexium™ MC12 carrier has two drive magnets (2+3) which are firmly mounted on a supporting plate (1).</p> <p>First install the protective cover (4) of the drive magnets by sliding it onto the magnets if it is not already installed. Refer to Removing the Protective Cover of the Drive Magnets, page 93.</p> 
2	 <p>Loosen and remove the three screws (M4x16 class 8.8) (a) with which the supporting plate is fixed, and the associated washers.</p>
3	Remove the supporting plate (b) with the two drive magnets.
4	Insert a new supporting plate and fix the supporting plate with the associated screws. Make sure to add the associated washers as well.
5	Tighten the screws with a torque of 3 Nm (26.56 lbf-in).

Replacing the Encoder Magnet of a Carrier

Overview

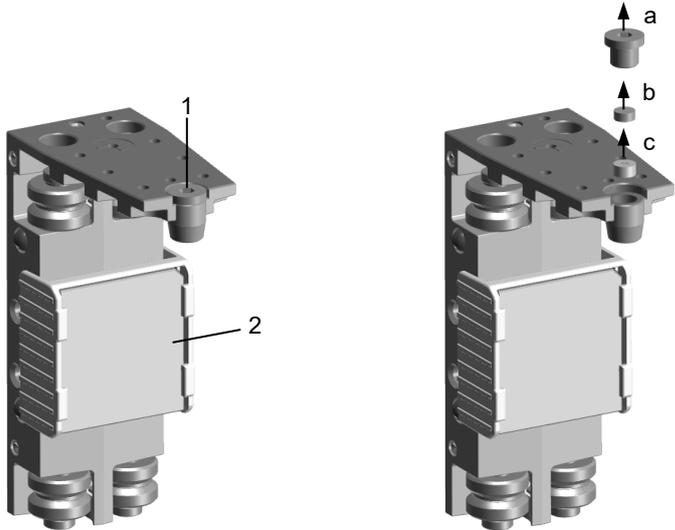
A Lexium™ MC12 carrier carrier has a highly accurate magnet to sense the position of the carrier on the track.

Refer to the Maintenance Plan, page 139.

NOTE: Also refer to Information About Replacing Parts of the Carrier, page 143.

Replacing the Encoder Magnet

NOTE: Exposed or uninstalled carriers must have the protective cover of the drive magnets installed at all times. The cover is only removed at the time of carrier installation.

Step	Action
1	<p>Install the protective cover (2) of the drive magnets by sliding it onto the magnets if it is not already installed. Refer to Removing the Protective Cover of the Drive Magnets, page 93.</p> <p>A Lexium™ MC12 carrier has a highly accurate magnet (c) to sense the position of the carrier on the track.</p> 
2	Loosen and remove the screw (a) with which the magnet is fixed. The screw has size M10x1 and class A2 (non-magnetic stainless steel).
3	Remove the plastic bumper (b).
4	Remove the encoder magnet (c).
5	<p>Insert a new encoder magnet and a plastic bumper to the carrier and fix the magnet with the associated screw.</p> <p>NOTE: Verify that you do not tilt the magnet when inserting it and that the marked north pole on the encoder magnet is facing up.</p>
6	Tighten the screw with a torque of 10.1 Nm (89.4 lbf-in). Use screw locking adhesive to secure the screw.

Lubrication

Information About Lubrication

Overview

Lubricant is consumed continuously during operation of the Lexium™ MC12 multi carrier. The lubrication reservoirs of the carriers must be filled at regular intervals (refer to *Lubricating the Carrier*, page 154). The rails are lubricated via the carriers. Execute a carrier lubrication run on the rails after cleaning the rails.

NOTE: The carriers are shipped without lubricant in the lubrication reservoirs. The lubrication reservoirs of the carriers must be filled before first use.

Incorrect lubricants may damage the carriers and the rails. Insufficient lubrication or incorrect lubricants increase wear and reduce the service life.

NOTICE

INOPERABLE EQUIPMENT

Only use the specified type and amount of lubricant.

Failure to follow these instructions can result in equipment damage.

For lubricating the carriers/rails you can use either:

- Klüberoil GEM 1-320 N
- An oil of your choice with similar characteristics (refer to *Lubricant Specification*, page 152)

If the ambient temperature is at the lower or upper limit of the permissible ambient temperature (*Ambient Conditions*, page 65), it is a good practice to select an oil with a higher or lower viscosity.

NOTE: Always wear protective clothing when working on the system. Repeated and prolonged exposure to the product can cause skin irritation, or sickness if ingested.

CAUTION

EYE OR SKIN CONTACT WITH, OR INGESTION OF, LUBRICANTS

- In the event of contact with the eyes or the skin, consult the data sheet of the lubricant for treatment.
- In the event of swallowing, do not provoke vomiting or administer any products orally; consult a doctor as soon as possible.

Failure to follow these instructions can result in injury or equipment damage.

Lubricant Specification

Characteristics	Value
Service temperature, lower limit	-5 °C (23 °F)
Service temperature, upper limit	100 °C (212 °F)
ISO viscosity grade, DIN ISO 3448, ISO VG	320
Kinematic viscosity, DIN EN ISO 3104 / DIN 51562-1 / ASTM D445 / ASTM D7042, 100 °C (212 °F)	approximately 25 mm ² /s
Kinematic viscosity, DIN EN ISO 3104 / DIN 51562-1 / ASTM D445 / ASTM D7042, 40 °C (104 °F)	approximately 320 mm ² /s

Lubricating the Carrier

Overview

The running surfaces of the upper two and lower two rollers of the Lexium™ MC12 carrier and the running surfaces of the rails must be lubricated.

This is done by an upper and a lower lubrication pad. The pads are supplied with lubricant by two reservoirs in the carrier. The reservoirs must be filled regularly.

Refer to the Maintenance Plan, page 139.

NOTE: Also refer to Information About Lubrication, page 152 and Information About Replacing Parts of the Carrier, page 143.

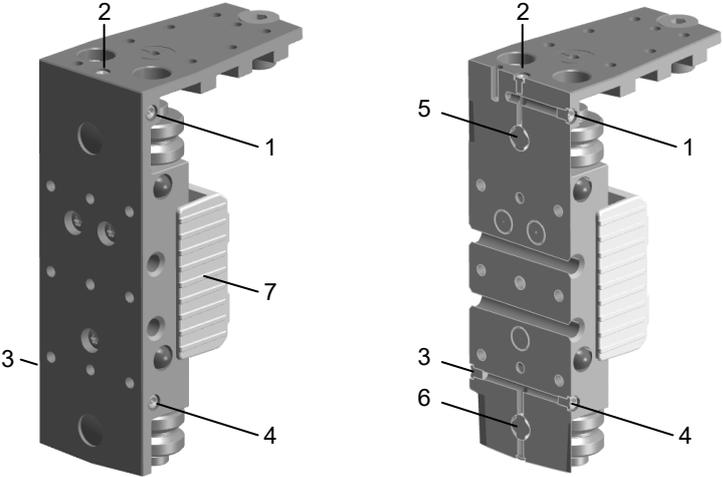
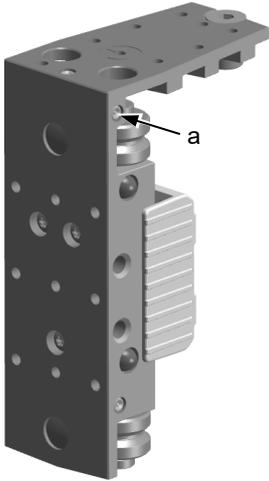
For how to replace the lubrication pads, refer to Replacing the Lubrication Pads of a Carrier, page 147.

Filling the Lubrication Reservoirs

The lubrication reservoirs of the Lexium™ MC12 carrier must be filled before first use and refilled as necessary. This can be done both with the carrier mounted on the rail or removed from the rail.

If the lubrication nipples are covered by a tool mounted on the carrier, you must disassemble the tool.

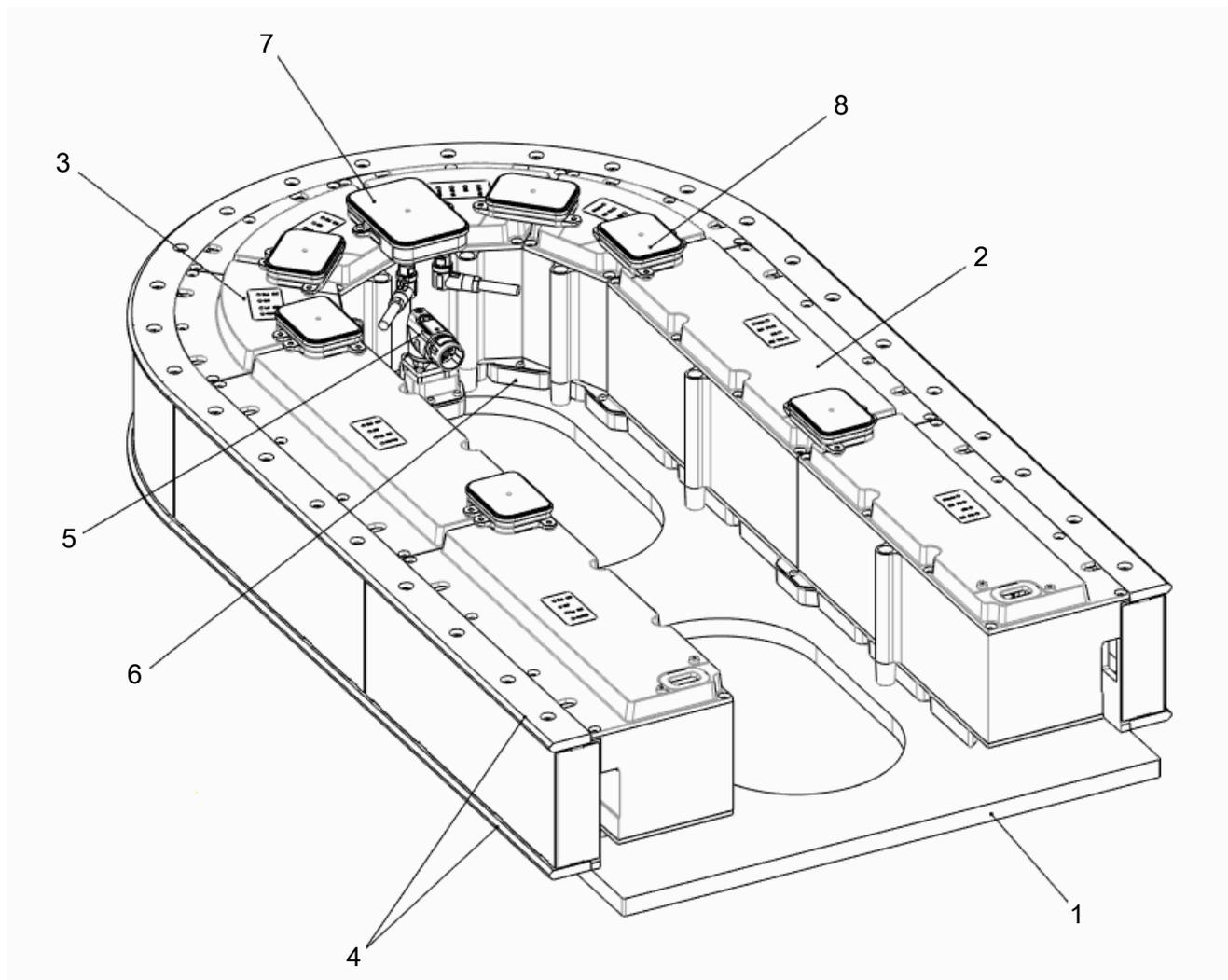
NOTE: Exposed or uninstalled carriers must have the protective cover of the drive magnets installed at all times. The cover is only removed at the time of carrier installation.

Step	Action
1	<p>If removing the carrier from the track to fill the lubrication reservoirs, install the protective cover (7) of the drive magnets by sliding it onto the magnets if it is not already installed. Refer to Removing the Protective Cover of the Drive Magnets, page 93.</p> <p>A Lexium™ MC12 carrier has four lubrication nipples (1–4) to fill the two lubrication reservoirs. The upper lubrication reservoir (5) is filled by lubrication nipple 1 or 2, the lower lubrication reservoir (6) is filled by lubrication nipple 3 or 4.</p> 
2	 <p>Press the nozzle of a single-hand lubrication gun in a right angle against one of the lubrication nipples (a) and inject the lubricant.</p>
3	<p>Fill the lubrication reservoir with lubricant.</p> <p>NOTE: Verify that you do not overfill the reservoirs.</p>
4	<p>Proceed in this way to fill the upper and the lower lubrication reservoirs.</p>

Appendices

Dimensions and Drilling Templates

Layout Example – Components Overview



1 Mounting plate

2 Lexium™ MC12 long stator motor segment straight

3 Lexium™ MC12 long stator motor segment arc

4 Lexium™ MC guide rails

5 Lexium™ MC power interconnect (with power infeed connector)

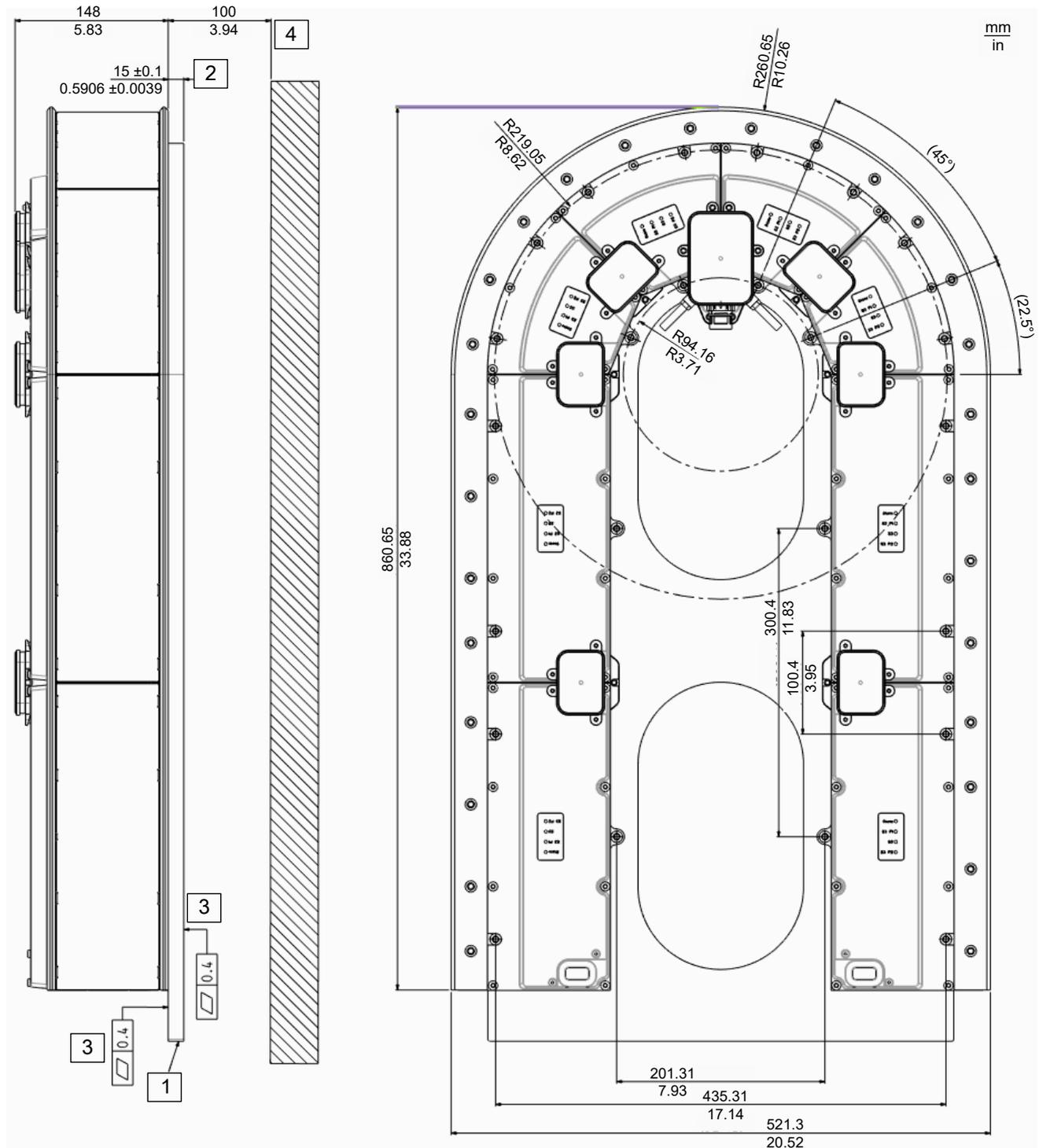
6 Lexium™ MC power interconnect (plain)

7 Lexium™ MC communication interconnect (with two Sercos connectors)

8 Lexium™ MC communication interconnect (plain)

Dimensions

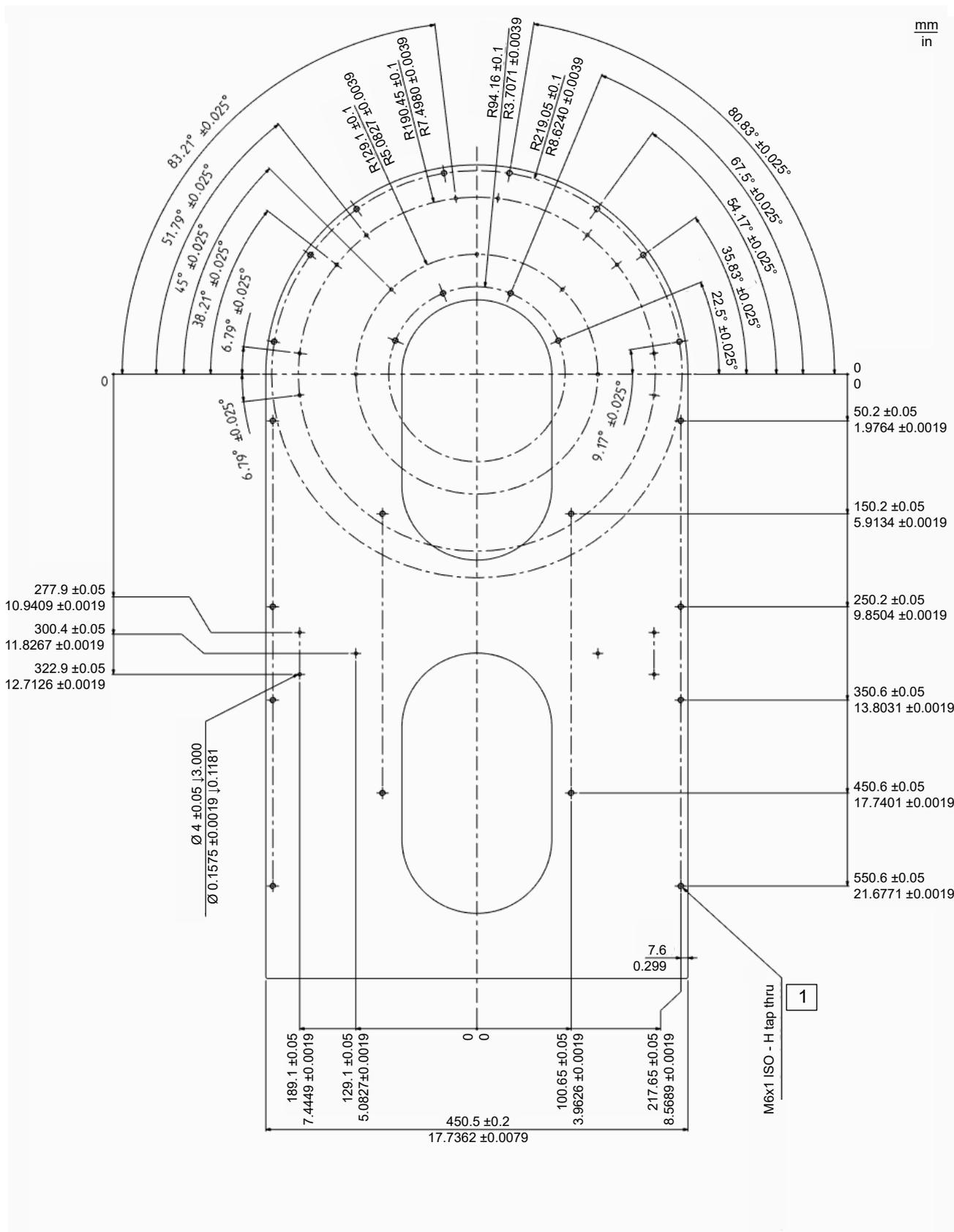
You can download the CAD files of the individual components from the Schneider Electric homepage.



- 1 Aluminum alloy Al 5754-0 H111 or an alloy with similar mechanical properties
- 2 Minimum required thickness of the mounting plate (aluminium)
- 3 Minimum required mounting plate flatness per meter
- 4 Minimum required free space below the rails

Drilling Template – Mounting Plate

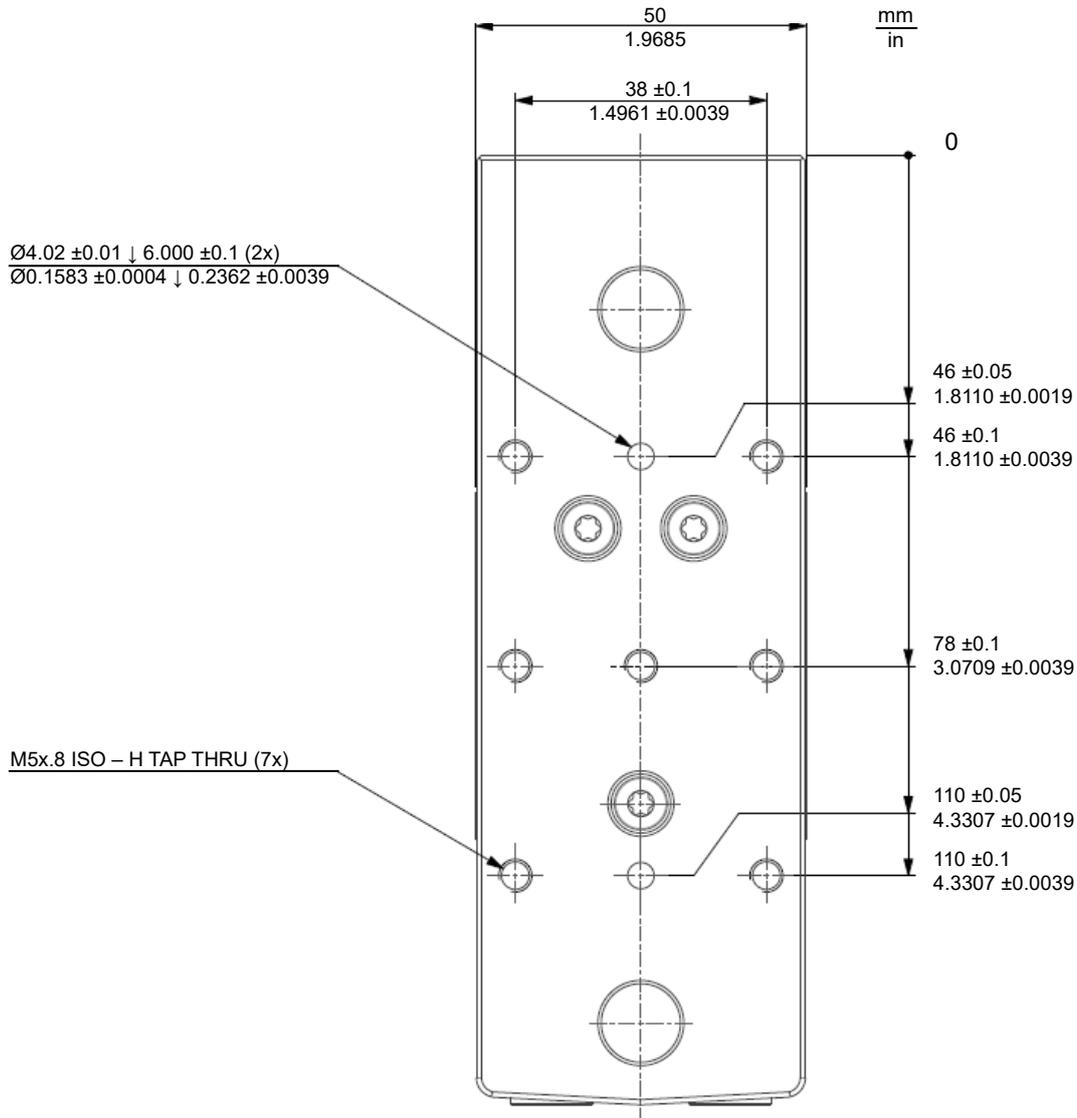
You can download the CAD files of the individual components from the Schneider Electric homepage.



1 Required hole depth = 15 mm (0.59 in)

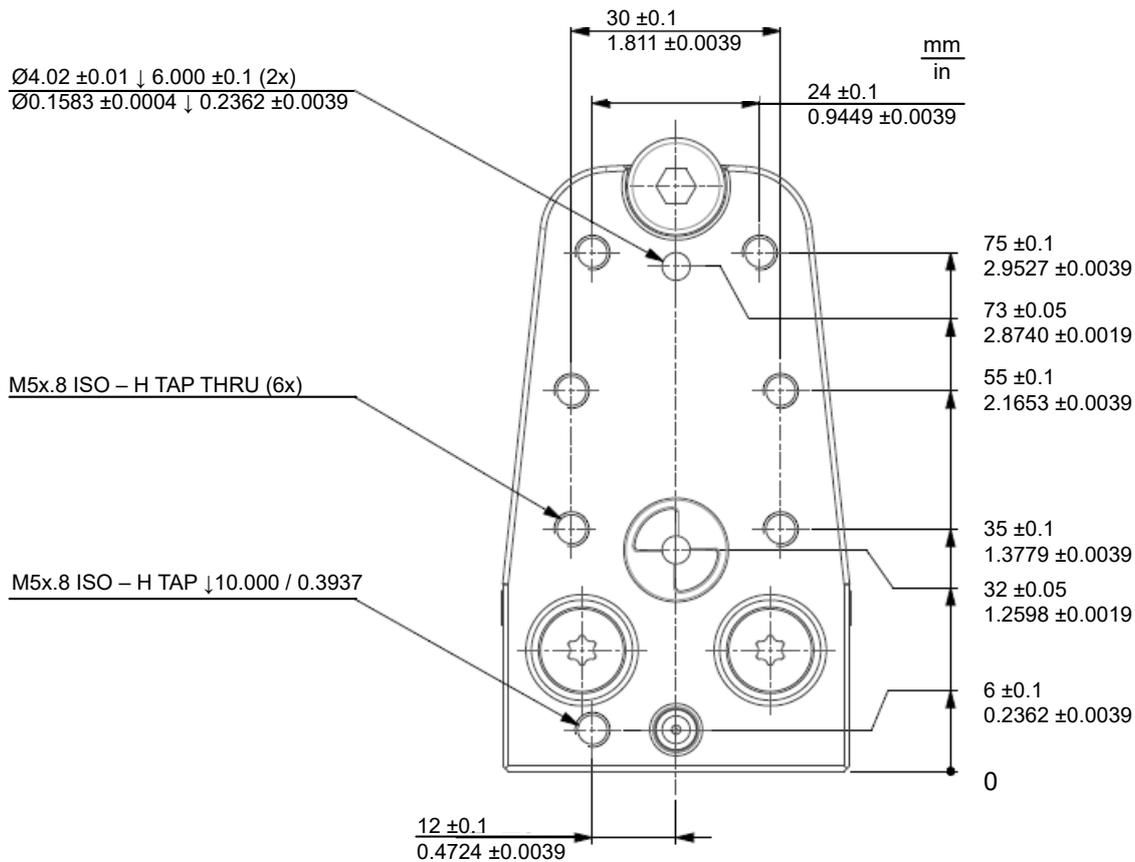
Drilling Template – Carrier (Side view)

You can download the CAD files of the individual components from the Schneider Electric homepage.



Drilling Template – Carrier (Top view)

You can download the CAD files of the individual components from the Schneider Electric homepage.



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