Lexium™ Cobot

Hardware Guide

Original instructions

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www.se.com

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The information provided in this document contains general descriptions, technical characteristics and/or recommendations related to products/solutions.

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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.

About the Book

Document Scope

This manual is to help you use the capabilities of the Lexium Cobot safely and properly.

Follow the instructions within this manual to help:

- Reduce risks
- Reduce repair costs and downtime of the Lexium Cobot
- Increase the service life of the Lexium Cobot
- Increase the reliability of the Lexium Cobot

Validity Note

This document has been updated for the release of EcoStruxure™ Cobot Expert V1.7.

The characteristics of the products described in this document are intended to match the characteristics that are available on www.se.com. As part of our corporate strategy for constant improvement, we may revise the content over time to enhance clarity and accuracy. If you see a difference between the characteristics in this document and the characteristics on www.se.com, consider www.se.com to contain the latest information.

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

Available Languages of this Document

This document is available in these languages:

- English (EIO0000004783)

Related Documents

Title of Documentation	Reference Number
EcoStruxure™ Cobot Expert Software Guide	EIO0000004780 (EN)
Cybersecurity Guidelines for EcoStruxure Machine Expert, Modicon and PacDrive Controllers and Associated Equipment, Software Guide	EIO0000004242 (EN)
Cybersecurity Best Practices	CS-Best-Practices-2019-340 (EN)
EcoStruxure Machine Expert Lexium Cobot Communication Library Guide	EIO0000005112
ABLU3A48200 Instruction Sheet	GEX92132

To find documents online, visit the Schneider Electric download center (www.se.com/ww/en/download/).

Trademarks

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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

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.
- After switching off the Lexium Cobot make sure to maintain a waiting time of at least 10 seconds for discharge of the DC bus.
- 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 the unit.
- Use only the specified voltage when operating this equipment and any associated products.
- Operate electrical components only with a connected protective ground (earth) cable.
- Verify the secure connection of the protective ground (earth) cable to the electrical devices so that connection complies with the wiring diagram.
- Do not touch the electrical connection points of the components when the module is energized.
- Provide protection against indirect contact.
- Insulate any unused conductors on both ends of the motor cable.
- Ensure that the power cables are correctly connected and connectors are locked in place during the operation time of the system.

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

⚠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.
- Apply all measures from the hazard and risk analysis before putting the system in service.

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.

Information on Non-Inclusive or Insensitive Terminology

As a responsible, inclusive company, Schneider Electric is constantly updating its communications and products that contain non-inclusive or insensitive terminology. However, despite these efforts, our content may still contain terms that are deemed inappropriate by some customers.

Terminology Derived from Standards

The technical terms, terminology, symbols and the corresponding descriptions in the information contained herein, 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 13849-1:2023	Safety of machinery: Safety related parts of control systems. General principles for design.
EN 61496-1:2020	Safety of machinery: Electro-sensitive protective equipment. Part 1: General requirements and tests.

Standard	Description
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 62061:2021	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 61784-3:2021	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.

Finally, terms used concerning robotics are derived from the following standards:

Standard	Description
EN ISO 10218-1:2011	Robots and robotic devices - Safety requirements for industrial robots - Part 1: Robots
EN ISO 10218-2:2011	Robots and robotic devices - Safety requirements for industrial robots - Part 2: Robot systems and integration
ISO/TS 15066:2016-02	Robots and robotic devices - Collaborative robots

Figures

Unless otherwise stated, the different types and variants of the Lexium Cobot Arm are represented in the figures by the type LXMRL03S0•••.

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 values in parentheses are rounded and are for reference only.

Hazard Information

What's in This Chapter

Proper Use 12
Qualification of Personnel 16
Residual Risks 17

Proper Use

Overview

This section contains information regarding the operation of the Lexium Cobot. Qualified personnel, page 16, working with the Lexium Cobot, must read and observe this information.

Installation and Intended Use

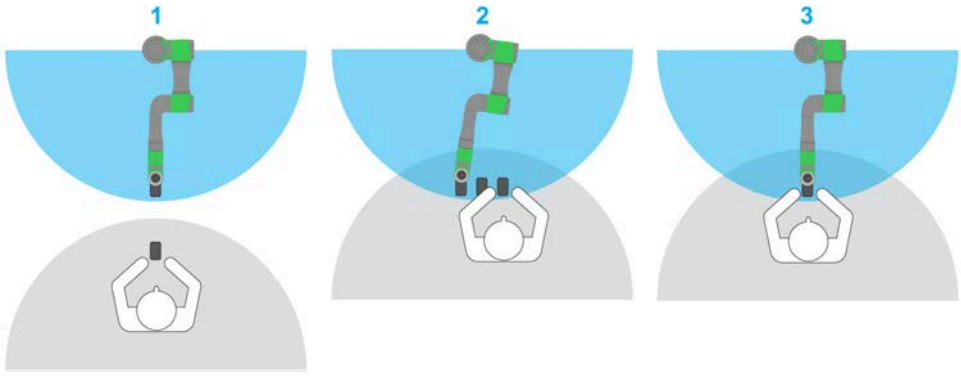
The Lexium Cobot is intended to be integrated into a manufacturing line and/or assembled with other components to build up a machine or process in an industrial environment for civilian end use cases. The Lexium Cobot is either an open type Lexium Cobot that is intended to be installed into an enclosure to provide access protection, or a collaborative operation product where a purposely designed Lexium Cobot system and an operator work within a collaborative workspace.

The Lexium Cobot is intended for usage in the following cases:

- Loading and unloading
- Packaging
- Case erecting
- Picking and placing
- Palletizing
- Assembling
- Inspecting
- Machine tending
- Material working
- Gluing and Bonding
- Polishing
- Soldering

The Lexium Cobot is equipped with safety-related functions, page 136, which are purposely designed for different types of interaction, when the Lexium Cobot Arm operates without fences and/or together with an operator.

In the context of Lexium Cobot, the following terms apply for different types of interaction:



1. Coexistence:

   Operators and robots work simultaneously or with a time lag in close proximity but have separate workspaces and do not work towards a common goal. There is no direct contact between operators and robots.

2. Cooperation:

   Operators and robots work at different times in the same workspace to achieve a common goal. There is no direct interaction between operators and robots.

3. Collaboration:

   Operators and robots work simultaneously in the same workspace to achieve a common goal, such as the assembly of a product. There is direct interaction between the operator and the robot.

Coexistent, cooperative, and collaborative operations are only intended for non-hazardous applications, where the complete application, including tool, work piece, obstacles and other machines is without any significant hazards according to the risk assessment of the specific application.

⚠WARNING

PERSONAL INJURY

Do not use the Lexium Cobot in a coexistent, cooperative, or collaborative operation if the application could potentially cause injuries according to your risk analysis.

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

Any other use is not an intended use.

Provide for Protective Measures

Before installing the Lexium Cobot, 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 Cobot integration into the machine such as (non exhaustive list):

- Directive 2006/42/EC on machinery
- Directive EMC 2014/30/EU
- Standard ISO 10218-1 Robots and Robotic devices - Safety requirements for industrial Robots - Part 1: Robots
- Standard ISO 10218-2 Robots and Robotic devices - Safety requirements for industrial Robots - Part 2: Robot systems and integration
- Standard ISO 13849-1 Safety of machinery - Safety related parts of control systems - Part 1: General Principles for Design

- Standard ISO/TS 15066 Robots and Robotic devices - Collaborative Robots
- Standard ISO 13857 Safety of machinery - Safety distances to prevent hazard zones being reached by upper and lower limbs
- Standard ISO 14120 Safety of machinery - Guards - General requirements for the design and construction of fixed and movable guards
- Standard EN ISO 13854 Safety of machinery - Minimum gaps to avoid crushing of parts of the human body
- Standard ISO 13855 Safety of machinery - Positioning of safeguards with respect to the approach speeds of parts of the human body
- Standard NFPA 79 Electrical Standard for Industrial Machinery
- Standard NFPA 70 National Electric Code
- Standard UL 1740 Standard for Robots and Robotic Equipment
- Standard UL 2011 Standard for Factory Automation Equipment

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

⚠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.
- Apply all measures from the hazard and risk analysis before putting the system in operation for the first time.

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

If circumstances arise that affect the safety or cause changes to the operating behavior of the Lexium Cobot, then immediately shut down the Lexium Cobot and contact your local Schneider Electric service representative.

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 Lexium Cobot in the manner intended and described in this documentation, and other documentation concerning any other associated equipment.

⚠WARNING

UNINTENDED EQUIPMENT OPERATION

- Only use software, firmware and hardware components approved by Schneider Electric for use with this equipment.
- Update your application program every time you change the physical hardware configuration.
- Validate and test your system every time you have applied safety-related or non-safety-related changes to your application program or modified the physical hardware configuration.

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

Misuse

The Lexium Cobot is not suitable for the manipulation of living organisms or explosive materials, nor is it suitable for impact movement.

Incompatible Environments

The components must not be used in the following environments:

- Hazardous (explosive) atmospheres
- Floating systems
- Medical, life critical or life support systems
- Domestic appliances
- Underground
- Highly saline environments (refer to *Technical Data*, page 39 for materials used)
- Environments with increased radioactive radiation
- Vacuum environments

This equipment has been designed to operate outside of any hazardous location. Only install this equipment 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.

Installation and Operating Conditions

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 process in which the Lexium Cobot is installed is in accordance to the applicable local regulations and standards.

⚠WARNING

UNINTENDED EQUIPMENT OPERATION

Only use the components in accordance with the installation conditions described in this documentation and other supporting documentation and standards.

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

Qualification of Personnel

Target Audience for This Manual

This documentation is intended for users having the following knowledge:

- Advanced knowledge in mechanical engineering
- Advanced knowledge in electrical engineering
- Knowledge of the Lexium Cobot control system, its installation and operation, as well as the construction of the machine/process in which it is intended

Qualified Person

Aside from skills and knowledge, 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 Lexium Cobot system.

Residual Risks

Overview

Risks arising from the robot have been reduced. However a residual risk remains since the robot 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

⚠⚠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.
- After switching off the Lexium Cobot make sure to maintain a waiting time of at least 10 seconds for discharge of the DC bus.
- 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 the unit.
- Use only the specified voltage when operating this equipment and any associated products.
- Operate electrical components only with a connected protective ground (earth) cable.
- Verify the secure connection of the protective ground (earth) cable to the electrical devices so that connection complies with the wiring diagram.
- Do not touch the electrical connection points of the components when the module is energized.
- Provide protection against indirect contact.
- Insulate any unused conductors on both ends of the motor cable.
- Ensure that the power cables are correctly connected and connectors are locked in place during the operation time of the system.

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

NOTE: The following standardized "dangerous voltage" alert symbol is attached to the Lexium Cobot Arm and the Lexium Cobot Controllers.

Emergency Stop

The Lexium Cobot Arm is equipped with internal holding brakes on every joint. The Lexium Cobot Arm is not equipped with other external brakes. An emergency stop switch to engage the internal holding brakes of the Lexium Cobot Arm is provided by the Control Stick. In case the Control Stick is not available to the operator of the Lexium Cobot, ensure that an external emergency stop is connected and operational. For more information of connecting an external emergency stop switch, refer to Emergency Stop Safety Functions, page 139.

⚠WARNING

ENTRAPMENT BY ROBOT MECHANICS

- Provide means for ensuring that the motors can be put into a voltage-free state with any internal holding brake released.
- Make available those means to allow one person to manually move the robot within reach of the zone of operation.

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

Enabling Device

An enabling device is not included in the scope of delivery of the robot.

If the Lexium Cobot is controlled from within the space defined by the perimeter safeguarding (safeguarded space), an enabling device is required.

If required by customer risk assessment, the Lexium Cobot provides a safety-related connection for usage of an enabling device. For further information, refer to chapter Add-on Handheld for Tablet, page 169.

⚠WARNING

- Perform a risk assessment of your application to determine if there are additional risks that must be sufficiently mitigated by an enabling device.
- Ensure the inherently safe design of your application.

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

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.

NOTE: The following hand pinching alert symbol is attached to the front door of the Lexium Cobot Cabinet Controller.

Installation

⚠WARNING

UNINTENDED EQUIPMENT OPERATION

- Ensure that the Lexium Cobot Arm and the end-effector are properly attached to one another.
- Set the correct installation settings for the Lexium Cobot Arm installation position, the payload mounted on the Tool Center Point (TCP), the TCP offset and the functional safety settings.

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

Robot Motion

Parts of the mechanics can move at high speeds. In such cases, the payload weight, additionally installed end-effector, and shifts in the center of gravity of the moving parts contribute to the total energy of the forces generated.

Each joint of the Lexium Cobot Arm has an internal holding brake. In case of power loss, the brake engages automatically to prevent the Lexium Cobot Arm from falling down.

Depending on the functional description of the Lexium Cobot operation, dedicated adjustments can be made by the software to be in accordance with the protection goals.

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

NOTE: The configuration of the robot mechanics, the Tool Center Point (TCP) velocity, as well as the additional payload have an effect on the total energy, which can potentially be a source of damage and injury.

⚠WARNING

CRUSHING, SHEARING, CUTTING AND IMPACT INJURY

- Define the clearance distance to the collaboration zone of operation of the Lexium Cobot Arm to be within the mechanical limits such that the operational staff do not have access to, nor can be enclosed between, the Lexium Cobot Arm user-defined collaboration zone and the mechanical limits of operation.
- Ensure that movement of the Lexium Cobot Arm is in accordance to the user-defined limits as soon as a person enters the collaboration zone of operation.
- All barriers, protective doors, contact mats, light barriers, visual protection system, and other protective equipment must be connected, configured correctly and enabled whenever the robot mechanics are under power.
- The Lexium Cobot Arm must always be considered active even though the Lexium Cobot Arm has reached an intermediate stop position waiting for a run command.

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

For detailed information about travel path and power loss, refer to Run-on Motions of the Robot for Risk Assessment, page 99.

The Lexium Cobot Cabinet Controller and Lexium Cobot Compact Controller may not be able to substitute one another, depending on your application.

⚠WARNING

INAPPROPRIATE SAFETY FUNCTIONS

- Ensure that each safety function is checked by parameters and procedure before putting the system in operation for the first time.
- Ensure that your intended combination of safety functions is available when using the Lexium Cobot Compact Controller.

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

NOTICE

INSUFFICIENT WORKING SPACE

Make sure the Lexium Cobot Arm has sufficient space to operate freely.

Failure to follow these instructions can result in equipment damage.

NOTE: The following impact hazard and hand pinching alert symbols are attached to Lexium Cobot Arm.

Heat Dissipation

The Lexium Cobot Arm surface and the housing of the Lexium Cobot Cabinet Controller or Lexium Cobot Compact Controller are parts of the heat dissipation

concept of the system. For this reason, the surfaces and the inlet/outlet grill must be kept clean and free of any coating or paint.

NOTICE

INOPERABLE EQUIPMENT

- Keep the surface and housing clean.
- Do not apply coating or painting to the surface and housing nor anything that would affect the heat dissipation properties of the Lexium Cobot Arm and the Lexium Cobot Controllers.
- Do not cover the inlet and outlet grill of the Lexium Cobot Controllers.

Failure to follow these instructions can result in equipment damage.

NOTICE

INOPERABLE EQUIPMENT / REDUCTION OF LIFETIME

Provide sufficient airflow for the Lexium Cobot controller, especially if the device is installed in an enclosure.

Failure to follow these instructions can result in equipment damage.

NOTE: For more information on providing sufficient airflow, see Mounting the Lexium Cobot Cabinet Controller, page 121 or Mounting the Lexium Cobot Compact Controller, page 123.

Hot Surfaces

The temperature on the following metal surfaces may exceed 50 °C (122 °F):

- Joints of the Lexium Cobot Arm
- Underside of the Lexium Cobot Cabinet Controller housing
- Housing of the Lexium Cobot Compact Controller

⚠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: The following hot surface alert symbol is attached to the Lexium Cobot Arm and the Lexium Cobot Controllers.

Hazardous Movements

There can be different sources of hazardous movements:

- No or incorrect calibration of the Lexium Cobot
- Wiring or cabling errors
- Errors in the application program
- Component errors
- Error in the measured value and signal transmitter
- Incorrect installation settings (for example, Lexium Cobot mounting angle, payload parameter, TCP offset, safety-related configuration)
- Combination of the Lexium Cobot with other equipment or integration into a machine or process

NOTE: Provide for personal safety by primary equipment monitoring or measures. Do not rely only on the internal monitoring of the Lexium Cobot system. 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 outside of the collaboration zone of operation with, for example, protective fencing, mesh guards, protective coverings, light barriers or visual protection systems.
- Dimension the protective devices properly and do not remove or modify them.
- Connect safety-related devices only to the dedicated safety-related inputs and outputs of the system.
- Do not make any modifications that can degrade, incapacitate, or in any way invalidate protection devices.
- Ensure that movement of the Lexium Cobot is in accordance to the user-defined limits as soon as a person enters the collaboration 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.
- Validate the collision protection settings before start-up and during maintenance periods.
- Prevent unintentional start-up by disconnecting the power connection of the Lexium Cobot system using the emergency stop circuit or using an appropriate lock-out tag-out sequence.
- Ensure to load the correct installation file along with the program.
- Validate the system and installation before the initial start-up.
- Avoid operating high-frequency, remote control, and radio devices close to the system electronics 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 Cobot Arm may perform unanticipated movements because of incorrect wiring, incorrect settings, incorrect data, or other errors.

⚠WARNING

UNINTENDED EQUIPMENT OPERATION

- Carefully install the wiring in accordance with EMC standards.
- Do not operate the Lexium Cobot with undetermined settings and data.
- Perform comprehensive commissioning tests that include verification of configuration settings and data that determine position and movement.
- Do not operate the Lexium Cobot by a higher payload than it is rated.

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

Noise Protection

The noise level of the mechanics depends on the basic cycle and the payload, as well as on further application-specific accessory parts. Be aware of the fact that noise emissions multiply when several mechanics are in use at the same time. If noise emissions reach a value of more than 70 dBA, wear hearing protection.

⚠CAUTION

NOISE EMISSIONS OF THE ROBOT MECHANICS

- Wear hearing protection in accordance with the locally applicable regulations.
- Ensure that operators are clearly warned of any potentially excessive noise emissions.

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

NOTE: Attach an alert symbol, such as depicted here, where it can easily be seen in the area where the Lexium Cobot is installed.

Emissions

Lubricant emissions on the Lexium Cobot Arm may be an indication of a damaged joint.

NOTICE

INOPERABLE EQUIPMENT INDICATED BY LUBRICANT EMISSIONS

- Verify the mechanics before, during, and after use.
- Shut down the mechanics immediately if lubricant emissions appear on the Lexium Cobot Arm.

Failure to follow these instructions can result in equipment damage.

Hanging Loads

The Lexium Cobot Arm is capable of suspending heavy loads.

⚠WARNING

FALLING LOADS

- Do not stand under hanging loads.
- Ensure that the Lexium Cobot Arm is properly bolted on the mounting surface.
- Ensure that the permissible payload is properly bolted on the Lexium Cobot Arm tool flange.

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

Attachments or Modifications

If different customer end products are transported by the robot mechanics, then the product pickup must be modified accordingly. For this reason, you can mount different product pickups (end-effector mounting) to the flange. In doing so, ensure that the articulation 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 EQUIPMENT OPERATION

- Do not drill into or modify the Lexium Cobot Arm and joints.
- Do not drill into or modify the Lexium Cobot Controllers.
- Do not modify the cable set.

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

Options for Moving the Robot Without Drive Energy

The robot mechanics are not equipped with an enclosure (see UL 1740).

NOTE: Take appropriate safety-related measures concerning the specific use before operating the Lexium Cobot Arm.

⚠WARNING

SAGGING OF THE LEXIUM COBOT ARM

- Ensure that the release of the internal holding brakes poses no subsequent risks in the zone of operation.
- Support the mechanic of the Lexium Cobot before releasing the holding brakes on joint 1, joint 2, and joint 3.

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

If you have to move the Lexium Cobot Arm manually, there are two options possible:

- Manual forcing of the mechanics (only available for joint 1, joint 2, and joint 3)
- Manual release of the holding brakes

  NOTE: Moving the Lexium Cobot Arm manually is intended only in emergency cases.

Option 1: Manual forcing of the mechanics (only available for joint 1, joint 2, and joint 3)

Step	Action
1	Put the robot into a torque-free state.
2	Manually hold the robot in position.
3	Manually move the robot. **NOTE:** The brakes on each joint are equipped by a friction clutch. A greater force (> 300 Nm (2655.23 lbf-in)) is necessary because the friction clutch may pose resistance to movement.

Option 2: Manual release of the holding brakes

Step	Action
1	Power off the Lexium Cobot controller.
2	Disconnect the Lexium Cobot Arm connection cable from the Lexium Cobot controller.
3	Remove the lid from the joint.
4	Press the core of the electromagnet. 
5	Move the single joint to the target position.

For detailed information, refer to the technical specification of the Mechanical and Electrical Data, page 40.

System Overview

What's in This Chapter

System Architecture 26
Product Overview 29
Commercial Reference 33
Type Plate 36

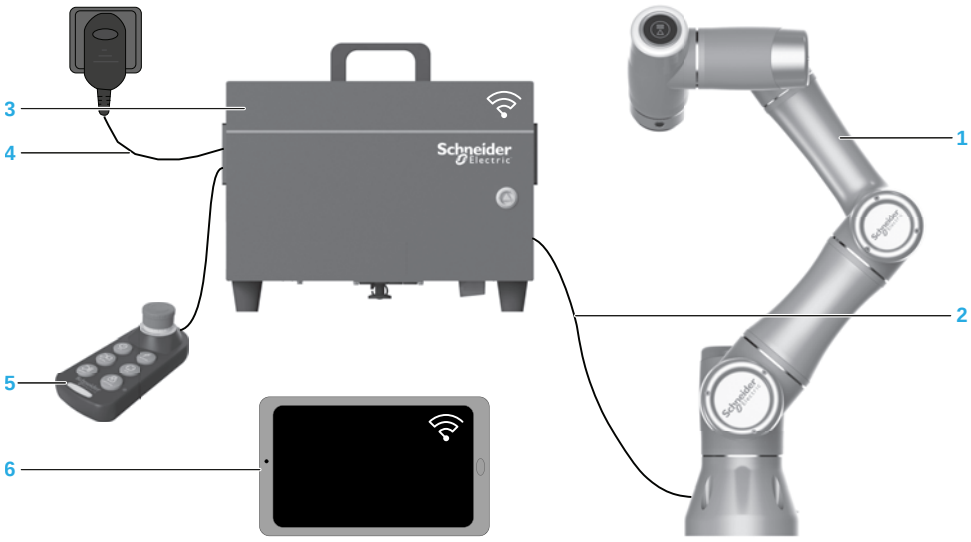
System Architecture

Overview

The control system consists of several components, depending on its application. The following graphics present examples of a Lexium Cobot system.

NOTE: To help keep your Schneider Electric products protected, refer to the *Cybersecurity Best Practices* and *Cybersecurity Guidelines* provided on the Schneider Electric website.

System Architecture with a Lexium Cobot Cabinet Controller



1 Lexium Cobot Arm

2 Lexium Cobot Arm connection cable

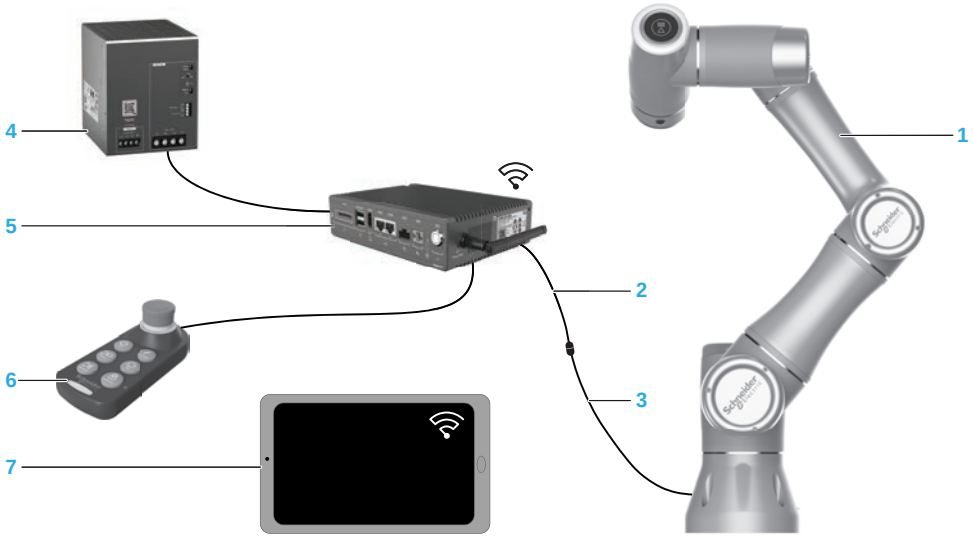
3 Lexium Cobot Cabinet Controller

4 Lexium Cobot Cabinet Controller 100...240 V ac power supply

5 Lexium Cobot Control Stick

6 EcoStruxure Cobot Expert on Android or Windows device (refer to WiFi Connection Considerations, page 27)

System Architecture with a Lexium Cobot Compact Controller



1 Lexium Cobot Arm

2 Lexium Cobot Arm connection cable

3 Lexium Cobot Compact Controller adapter cable

4 Modicon ABLU 48 V dc power supply (commercial reference: ABLU3A48200)

NOTE: The nominal voltage of the Lexium Cobot Compact Controller is 48 V dc. The voltage of the controller is between 46 V dc and 54.7 V dc. This allows for other supplies such as a 48 V dc lithium battery which may provide inrush voltages greater than 48 V dc. If required, contact your local Schneider Electric service representative.

5 Lexium Cobot Compact Controller

6 Lexium Cobot Control Stick

7 EcoStruxure Cobot Expert on Android or Windows device (refer to WiFi Connection Considerations, page 27)

WiFi Connection Considerations

EcoStruxure Cobot Expert can optionally be used through a WiFi connection between Android or Windows devices and the Lexium Cobot Controllers. The WiFi between these devices uses, and can radiate, radio frequency energy.

Since the frequencies used by 802.11a, 802.11b, 802.11g, 802.11n, and 802.16e wireless LAN devices may not yet be harmonized in all countries, 802.11a, 802.11b, 802.11g, 802.11n, and 802.16e products are designed for use only in specific countries and are not allowed to be operated in countries other than those of designated use.

As a user of these products, you are responsible for ensuring that the products are used only in the countries for which they were intended and for verifying that they are configured with the correct selection of frequency and channel for the country of use.

NOTICE
RADIO FREQUENCY INTERFERENCE Do not operate EcoStruxure Cobot Expert with the WiFi wireless LAN connection in non-designated countries. **Failure to follow these instructions can result in equipment damage.**

Designated countries are those for which the Lexium Cobot has been approved by the local administrative authority and to which the certification of that authority has been obtained. To determine the countries for which certification has been obtained, consult the product page of the Lexium Cobot on www.se.com.

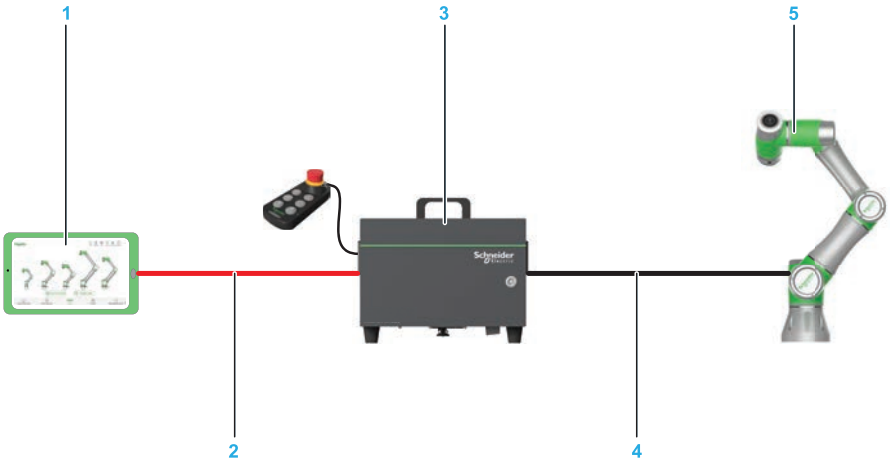
In addition, some countries recognize the certification authority of other countries. To determine if this is your case, contact the local authorities in the country of interest.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions in this hardware guide, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case you will be required to correct the interference at your own expense.

Product Overview

System Requirements

The following figure presents an example of a system setup for one Lexium Cobot. At a minimum, this is the equipment required to achieve performances described in this guide.



Number	Device name	Device type	Description
1	Operator terminal (not included)	–	Device used to program and set the Lexium Cobot (Android or Windows device). Refer to Operator Terminal, page 30.
2	WiFi connection or direct connection by Ethernet network cable (not included)	–	The operator terminal can be connected by WiFi or using a direct connection by network cable to the Ethernet port of the Lexium Cobot Controllers. Refer to WiFi Connection Considerations, page 27, for more information concerning the use of a wireless connection.
3	Lexium Cobot controller and Control Stick	Lexium Cobot Cabinet Controller (for example, LXMRL03C1000) or Lexium Cobot Compact Controller (LXMRL00C2000)	The Lexium Cobot controller provides different kinds of interfaces. A Control Stick is connected for specific operations (for example, teaching, maintenance, commissioning) and provides an emergency stop for the Lexium Cobot system.
4	Connection cable	Included with the Lexium Cobot Arm.	The length of the connection cable is 6 m (19.7 ft). For LXMRL03: The cable is pre-mounted on the Lexium Cobot Arm and equipped with a specific connector to interface with the Lexium Cobot Controllers.
5	Lexium Cobot Arm	LXMRL03S0000	The Lexium Cobot Arm is intended to achieve designated movements. On the opposite side of the tool flange a ring indicator shows the status of the Lexium Cobot operation and can be used to interact with the Lexium Cobot.

Operator Terminal

The following table presents minimum system requirements for the operator terminal.

NOTE: EcoStruxure Cobot Expert is intended to be used either on Android or Windows devices.

Terminal type	Android device	Windows device
Operating System	Android 8.0	Windows 10 64 bit
Processor	Kirin 659 or Snapdragon 660	Intel Core i3
Storage capacity	32 GB	32 GB
System memory	4 GB	4 GB
Screen size / graphics	8.0 inches	Intel HD Graphics 4000
Network	WiFi standard: 802.11 b/g/n	WiFi standard 802.11 b/g/n or cable bound network card

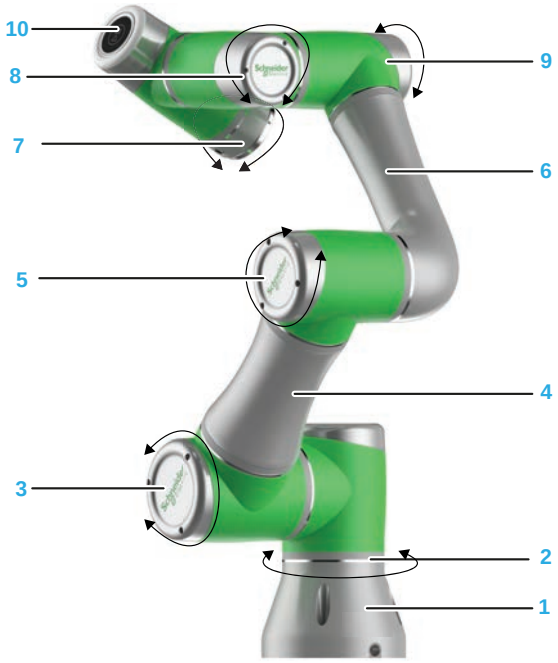
NOTE: Refer to WiFi Connection Considerations, page 27, for more information concerning the use of a wireless connection.

Components Overview

The Lexium Cobot Arm consists of six rotation joints, a lower tube between joint 2 and joint 3 and an upper tube between joint 3 and joint 4. The base is intended to mount the Lexium Cobot Arm to a mounting surface, and the tool flange is intended to mount the customer end-effector.

At the opposite side of the tool flange an illuminated ring indicates the state of the Lexium Cobot Arm. In addition, in total two buttons are located on joint 6 for teaching and dragging the Lexium Cobot Arm. Close to the tool flange, an M8 connector interface can be used to control inputs and outputs on the end-effector.

An I/O interface cable equipped with an 8-pole M8 connector on one end is included with the Lexium Cobot Arm for various applications.



1 Base	**6** Upper tube
2 Joint 1	**7** Joint 6 / tool flange
3 Joint 2	**8** Joint 5
4 Lower tube	**9** Joint 4
5 Joint 3	**10** Illuminated ring

The Lexium Cobot Cabinet Controller and the Lexium Cobot Compact Controller provide:

- Power supply for the Lexium Cobot Arm
- Interface to connect the Control Stick
- Interface for the operator terminal either via cable or WiFi connection

  NOTE: Refer to WiFi Connection Considerations, page 27, for more information concerning the use of a wireless connection.
- Interfaces for several inputs and outputs of different kinds

A Control Stick is included in the scope of delivery of the Lexium Cobot Controllers, which can be used for various operations. After commissioning is completed, the Control Stick is intended to control the Lexium Cobot Arm.

Characteristics of the Lexium Cobot

The Lexium Cobot provides the following features:

- Rounded-edge design
- High positioning repeatability
- Integrated safety functions
- Collision protection
- Free-drive and teaching
- Intuitive programming
- Integration to EcoStruxure architecture

Functional Safety Features of Lexium Cobot

The Lexium Cobot features the following functions:

- Safety-related monitored stop
- Hand guiding
- Speed and separation monitoring
- Power and force limiting

For detailed information about the functional safety features, refer to the chapter Functional Safety, page 136.

Commercial Reference

Overview

Example of a type code for the Lexium Cobot Arm:

Character position	1	2	3	4	5	6	7	8	9	10	11	12
Example	L	X	M	R	L	0	3	S	0	0	0	0

Description of the commercial reference structure with reference to the example stated above:

Character position	Example	Item	Meaning
1…3	LXM	Family	Lexium
4, 5	RL	Robot/product type	Robot Collaborative
6, 7	03	Payload	00 = without dedicated payload 03 = maximum payload 3 kg 05 = maximum payload 5 kg 07 = maximum payload 7 kg 12 = maximum payload 12 kg 18 = maximum payload 18 kg
8, 9	S0	Variant	S0 = Lexium Cobot Arm C1 = Lexium Cobot Cabinet Controller C2 = Lexium Cobot Compact Controller
10...12	000	Miscellaneous	••• = Reserved

If you have questions concerning the commercial reference, contact your local Schneider Electric service representative.

Lexium Cobot Arm References

Presentation	Reference	Description
	LXMRL03S0000	Lexium Cobot Arm maximum 3 kg
	LXMRL05S0000	Lexium Cobot Arm maximum 5 kg

Presentation	Reference	Description
	LXMRL07S0000	Lexium Cobot Arm maximum 7 kg
	LXMRL12S0000	Lexium Cobot Arm maximum 12 kg
	LXMRL18S0000	Lexium Cobot Arm maximum 18 kg

Lexium Cobot Controllers References

Presentation	Reference	Description
	LXMRL03C1000	Lexium Cobot Cabinet Controller RL03
	LXMRL07C1000	Lexium Cobot Cabinet Controller RL05 – RL07
	LXMRL12C1000	Lexium Cobot Cabinet Controller RL12 – RL18
	LXMRL00C2000	Lexium Cobot Compact Controller

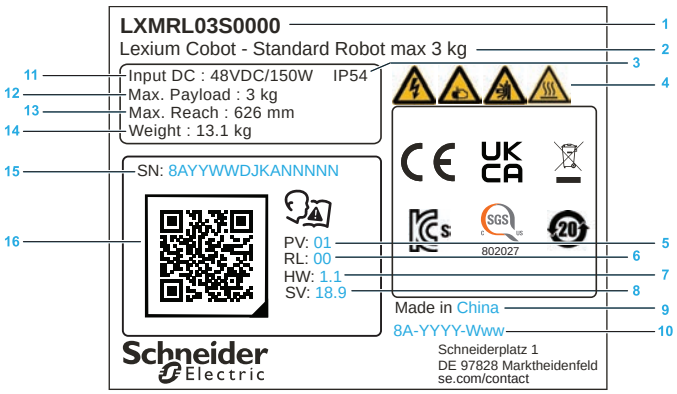
Combination of Devices

		Lexium Cobot Arm				
		LXMRL03S0000	LXMRL05S0000	LXMRL07S0000	LXMRL12S0000	LXMRL18S0000
Lexium Cobot Cabinet Controller	LXMRL03C1000	✓				
	LXMRL07C1000		✓	✓		
	LXMRL12C1000				✓	✓
Lexium Cobot Compact Controller	LXMRL00C2000	✓	✓	✓	✓ 1)	✓ 1)

1) The combination of these two devices is possible with performance limitations. For further information, refer to Cycle Times of Lexium Cobot Arm LXMRL12S0••• with Lexium Cobot Compact Controller, page 87 and Cycle Times of Lexium Cobot Arm LXMRL18S0••• with Lexium Cobot Compact Controller, page 88.

Type Plate

Description of the Lexium Cobot Arm Type Plate



1 Commercial reference*

2 Name

3 Ingress of Protection

4 Alert symbols

5 Product version

6 Release version

7 Hardware version

8 Software version

9 Country of origin

10 Date of manufacturing

11 Input power

12 Maximum payload

13 Radius of the working space

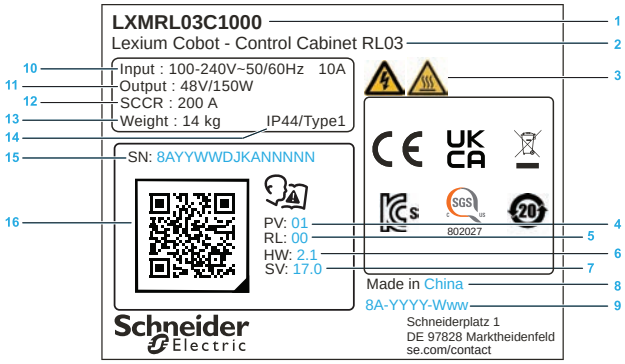
14 Weight of the Lexium Cobot Arm

15 Serial number

16 QR code on commercial reference and serial number

* For detailed information about the meaning of the particular digits, refer to Commercial Reference, page 33.

Description of the Lexium Cobot Cabinet Controller Type Plate



1 Commercial reference*

2 Name

3 Alert symbols

4 Product version

5 Release version

6 Hardware version

7 Software version

8 Country of origin

9 Date of manufacturing

10 Input power

11 Output power

12 Short Circuit Current Rating (SCCR)

13 Weight of the controller

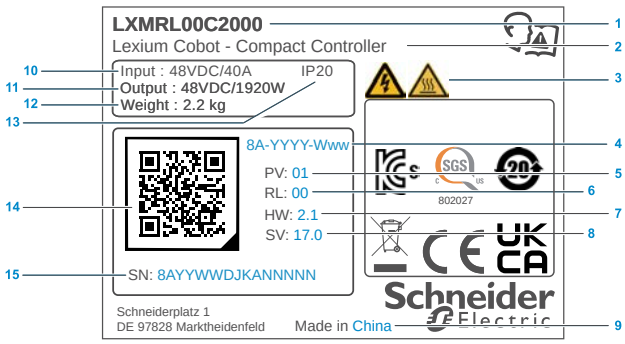
14 Ingress of Protection

15 Serial number

16 QR code on commercial reference and serial number

* For detailed information about the meaning of the particular digits, refer to Commercial Reference, page 33.

Description of the Lexium Cobot Compact Controller Type Plate



1 Commercial reference*

2 Name

3 Alert symbols

4 Date of manufacturing

5 Product version

6 Release version

7 Hardware version

8 Software version

9 Country of origin

10 Input power

11 Output power

12 Weight of the controller

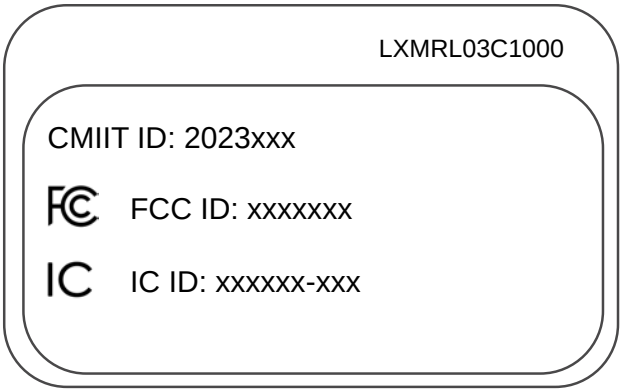
13 Ingress of Protection

14 QR code on commercial reference and serial number

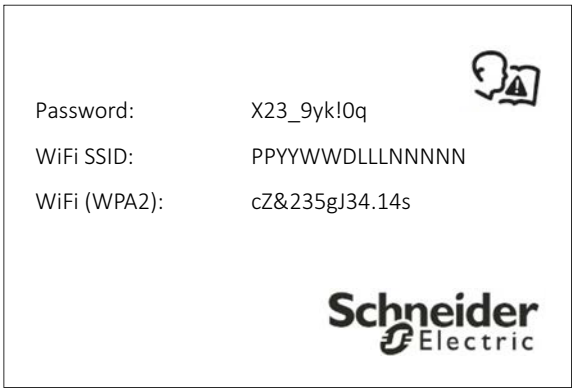
15 Serial number

* For detailed information about the meaning of the particular digits, refer to Commercial Reference, page 33.

Example of the WiFi Certification Type Plate



Example of the Controller WiFi Access Label



For details on the WiFi connection, refer to the chapter *WiFi Service Webserver Connection* in the *EcoStruxure Cobot Expert Software Guide*.

Technical Data

What's in This Chapter

Ambient Conditions 39
Mechanical and Electrical Data 40
Dimensional Drawings 58
Electrical Connections 63
Performance Data 85
Design of the Mounting Surface 93
Run-On Motions of the Lexium Cobot Arm for Risk Assessment 99

Ambient Conditions

The following parameters are for all references of the Lexium Cobot Controllers and Lexium Cobot Arm:

Procedure	Parameter	Unit	Value
Operation[1)]	Ambient temperature	°C (°F)	0...50 (32...122)
	Condensation	–	prohibited
	Formation of ice	–	prohibited
	Relative humidity	%	10...90
	Vibration according to IEC 60721–3–3	m/s² (ft/s²)	20 (65.62)
Transport	Ambient temperature	°C (°F)	-10...50 (14...122) [2)]
	Condensation	–	prohibited
	Precipitation	–	prohibited
	Formation of ice	–	prohibited
	Other liquid	–	prohibited
	Wetness	–	prohibited
	Relative humidity	%	20...80
Long-term storage in transport packaging	Ambient temperature	°C (°F)	-10...50 (14...122) [2)]
	Condensation	–	prohibited
	Precipitation	–	prohibited
	Formation of ice	–	prohibited
	Other liquid	–	prohibited
	Relative humidity	%	20...80
	Maximum storage period	months	12

[1)] Installation altitude without power reduction < 1000 m (3281 ft).

[2)] Limit rapid temperature change to maximum 10 °C per hour.

For further information about transport and storage conditions, refer to Transport and Storage, page 115.

Mechanical and Electrical Data

Mechanical and Electrical Data of the Lexium Cobot Arm LXMRL03S0•••

Category	Parameter	Unit	LXMRL03S0•••
General data	Maximum payload	kg (lb)	3 (6.6)
	Maximum velocity on the tool flange	m/s (ft/s)	1.5 (4.9)
	Number of axes	–	6
	Position repeatability (ISO 9283)	mm (in)	Position: ± 0.02 (0.00079)
	Programming	–	Graphical drag and drop
	Operator terminal	–	Android or Windows device
	Maximum torque on joint 6 (for torque related applications)	Nm (lbf*in)	18.2 (161.1)
Electrical data	Supply voltage by Lexium Cobot Controllers	V dc	48
	Tool flange inputs/outputs (TIO) by M8 connector interface	–	Digital inputs: 2 [1)] Digital outputs: 2 [1)] Analog inputs: 2 [1)]
	Tool flange inputs/outputs (TIO) power	V dc	24
	Tool flange inputs/outputs (TIO) size	–	M8 connector
	Minimum bending radius of connector cable (drag chain suitable) from Lexium Cobot Controllers to the Lexium Cobot Arm	mm (in)	Fixed installation: 55 (2.17) Movable installation: 88 (3.46)

Category	Parameter		Unit	LXMRL03S0•••
Mechanical data	Mounting position		-	No pre-defined mounting position
	Pollution degree IEC 60664-1		-	2
	Overvoltage category IEC 60664-1		-	II
	Ingress of protection		-	IP54
	Joint 1	Working range	°	±270
		Working range with restrictions[2)]	°	±360
		Maximum speed	°/s	180
	Joint 2	Working range	°	-85...+265
		Maximum speed	°/s	180
	Joint 3	Working range	°	±175
		Maximum speed	°/s	180
	Joint 4	Working range	°	-85...+265
		Maximum speed	°/s	220
	Joint 5	Working range	°	±270
		Working range with restrictions[2)]	°	±360
		Maximum speed	°/s	220
	Joint 6	Working range	°	±270
		Working range with restrictions[2)]	°	±360
		Maximum speed	°/s	220
Working space	Radius		mm (in)	626 (24.6)
	Base diameter		mm (in)	129 (5.1)
Weight	–		kg (lb)	approximately 13 (28.7)
Noise level	–		dB(A)	< 58
Material	External casing		–	Aluminum alloy, POM, PC, silicone

[1)] For detailed information on the tool flange input and output characteristics, refer to Electrical Connections of the Lexium Cobot Arm, page 63.

[2)] Extended working range is possible with restrictions on lifetime. If required, contact your local Schneider Electric service representative.

Mechanical and Electrical Data of the Lexium Cobot Arm LXMRL05S0•••

Category	Parameter		Unit	LXMRL05S0•••
General data	Maximum payload		kg (lb)	5 (11)
	Maximum velocity on the tool flange		m/s (ft/s)	3 (9.8)
	Number of axes		–	6
	Position repeatability (ISO 9283)		mm (in)	Position: ± 0.02 (0.00079)
	Programming		–	Graphical drag and drop
	Operator terminal		–	Android or Windows device
	Maximum torque on joint 6 (for torque related applications)		Nm (lbf*in)	34 (300.1)
Electrical data	Supply voltage by Lexium Cobot Controllers		V dc	48
	Tool flange inputs/outputs (TIO) by M8 connector interface		–	Digital inputs: 2 [1)] Digital outputs: 2 [1)] Analog inputs: 2 [1)]
	Tool flange inputs/outputs (TIO) power		V dc	24
	Tool flange inputs/outputs (TIO) size		–	M8 connector
	Minimum bending radius of connector cable (drag chain suitable) from Lexium Cobot Controllers to the Lexium Cobot Arm		mm (in)	Fixed installation: 55 (2.17) Movable installation: 88 (3.46)
Mechanical data	Mounting position		-	No pre-defined mounting position
	Pollution degree IEC 60664-1		-	2
	Overvoltage category IEC 60664-1		-	II
	Ingress of protection		-	IP54
	Joint 1	Working range	°	±270
		Working range with restrictions[2)]	°	±360
		Maximum speed	°/s	180
	Joint 2	Working range	°	-85...+265
		Maximum speed	°/s	180
	Joint 3	Working range	°	±175
		Maximum speed	°/s	180
	Joint 4	Working range	°	-85...+265
		Maximum speed	°/s	180
	Joint 5	Working range	°	±270
		Working range with restrictions[2)]	°	±360
		Maximum speed	°/s	180
	Joint 6	Working range	°	±270
		Working range with restrictions[2)]	°	±360
		Maximum speed	°/s	180

Category	Parameter	Unit	LXMRL05S0•••
Working space	Radius	mm (in)	954 (37.6)
	Base diameter	mm (in)	158 (6.2)
Weight	–	kg (lb)	22.6 (50)
Noise level	–	dB(A)	< 58
Material	External casing	–	Aluminum alloy, POM, PC, silicone

1) For detailed information on the tool flange input and output characteristics, refer to Electrical Connections of the Lexium Cobot Arm, page 63.

2) Extended working range is possible with restrictions on lifetime. If required, contact your local Schneider Electric service representative.

Mechanical and Electrical Data of the Lexium Cobot Arm LXMRL07S0•••

Category	Parameter		Unit	LXMRL07S0•••
General data	Maximum payload		kg (lb)	7 (15.4)
	Maximum velocity on the tool flange		m/s (ft/s)	2.5 (8.2)
	Number of axes		–	6
	Position repeatability (ISO 9283)		mm (in)	Position: ± 0.02 (0.00079)
	Programming		–	Graphical drag and drop
	Operator terminal		–	Android or Windows device
	Maximum torque on joint 6 (for torque related applications)		Nm (lbf*in)	34 (300.1)
Electrical data	Supply voltage by Lexium Cobot Controllers		V dc	48
	Tool flange inputs/outputs (TIO) by M8 connector interface		–	Digital inputs: 2 [1)] Digital outputs: 2 [1)] Analog inputs: 2 [1)]
	Tool flange inputs/outputs (TIO) power		V dc	24
	Tool flange inputs/outputs (TIO) size		–	M8 connector
	Minimum bending radius of connector cable (drag chain suitable) from Lexium Cobot Controllers to the Lexium Cobot Arm		mm (in)	Fixed installation: 55 (2.17) Movable installation: 88 (3.46)
Mechanical data	Mounting position		-	No pre-defined mounting position
	Pollution degree IEC 60664-1		-	2
	Overvoltage category IEC 60664-1		-	II
	Ingress of protection		-	IP54
	Joint 1	Working range	°	±270
		Working range with restrictions[2)]	°	±360
		Maximum speed	°/s	180
	Joint 2	Working range	°	-85...+265
		Maximum speed	°/s	180
	Joint 3	Working range	°	±175
		Maximum speed	°/s	180
	Joint 4	Working range	°	-85...+265
		Maximum speed	°/s	180
	Joint 5	Working range	°	±270
		Working range with restrictions[2)]	°	±360
		Maximum speed	°/s	180
	Joint 6	Working range	°	±270
		Working range with restrictions[2)]	°	±360
		Maximum speed	°/s	180

Category	Parameter	Unit	LXMRL07S0•••
Working space	Radius	mm (in)	819 (32)
	Base diameter	mm (in)	158 (6.2)
Weight	–	kg (lb)	22.7 (50)
Noise level	–	dB(A)	< 58
Material	External casing	–	Aluminum alloy, POM, PC, silicone

1) For detailed information on the tool flange input and output characteristics, refer to Electrical Connections of the Lexium Cobot Arm, page 63.

2) Extended working range is possible with restrictions on lifetime. If required, contact your local Schneider Electric service representative.

Mechanical and Electrical Data of the Lexium Cobot Arm LXMRL12S0•••

Category	Parameter		Unit	LXMRL12S0•••
General data	Maximum payload		kg (lb)	12 (26.5)
	Maximum velocity on the tool flange		m/s (ft/s)	3 (9.8)
	Number of axes		–	6
	Position repeatability (ISO 9283)		mm (in)	Position: ± 0.03 (0.0011)
	Programming		–	Graphical drag and drop
	Operator terminal		–	Android or Windows device
	Maximum torque on joint 6 (for torque related applications)		Nm (lbf*in)	66 (584.1)
Electrical data	Supply voltage by Lexium Cobot Controllers		V dc	48
	Tool flange inputs/outputs (TIO) by M8 connector interface		–	Digital inputs: 2 [1)] Digital outputs: 2 [1)] Analog inputs: 2 [1)]
	Tool flange inputs/outputs (TIO) power		V dc	24
	Tool flange inputs/outputs (TIO) size		–	M8 connector
	Minimum bending radius of connector cable (drag chain suitable) from Lexium Cobot Controllers to the Lexium Cobot Arm		mm (in)	Fixed installation: 55 (2.17) Movable installation: 88 (3.46)
Mechanical data	Mounting position		-	No pre-defined mounting position
	Pollution degree IEC 60664-1		-	2
	Overvoltage category IEC 60664-1		-	II
	Ingress of protection		-	IP54
	Joint 1	Working range	°	±270
		Working range with restrictions[2)]	°	±360
		Maximum speed	°/s	120
	Joint 2	Working range	°	-85...+265
		Maximum speed	°/s	120
	Joint 3	Working range	°	±175
		Maximum speed	°/s	120
	Joint 4	Working range	°	-85...+265
		Maximum speed	°/s	180
	Joint 5	Working range	°	±270
		Working range with restrictions[2)]	°	±360
		Maximum speed	°/s	180
	Joint 6	Working range	°	±270
		Working range with restrictions[2)]	°	±360
		Maximum speed	°/s	180

Category	Parameter	Unit	LXMRL12S0•••
Working space	Radius	mm (in)	1328 (52)
	Base diameter	mm (in)	188 (7.4)
Weight	–	kg (lb)	42.5 (94)
Noise level	–	dB(A)	< 58
Material	External casing	–	Aluminum alloy, POM, PC, silicone

1) For detailed information on the tool flange input and output characteristics, refer to Electrical Connections of the Lexium Cobot Arm, page 63.

2) Extended working range is possible with restrictions on lifetime. If required, contact your local Schneider Electric service representative.

Mechanical and Electrical Data of the Lexium Cobot Arm LXMRL18S0•••

Category	Parameter		Unit	LXMRL18S0•••
General data	Maximum payload		kg (lb)	18 (39.68)
	Maximum velocity on the tool flange		m/s (ft/s)	3.5 (11.5)
	Number of axes		–	6
	Position repeatability (ISO 9283)		mm (in)	Position: ± 0.03 (0.0011)
	Programming		–	Graphical drag and drop
	Operator terminal		–	Android or Windows device
	Maximum torque on joint 6 (for torque related applications)		Nm (lbf*in)	66 (584.1)
Electrical data	Supply voltage by Lexium Cobot Controllers		V dc	48
	Tool flange inputs/outputs (TIO) by M8 connector interface		–	Digital inputs: 2 [1)] Digital outputs: 2 [1)] Analog inputs: 2 [1)]
	Tool flange inputs/outputs (TIO) power		V dc	24
	Tool flange inputs/outputs (TIO) size		–	M8 connector
	Minimum bending radius of connector cable (drag chain suitable) from Lexium Cobot Controllers to the Lexium Cobot Arm		mm (in)	Fixed installation: 55 (2.17) Movable installation: 88 (3.46)
Mechanical data	Mounting position		-	No pre-defined mounting position
	Pollution degree IEC 60664-1		-	2
	Overvoltage category IEC 60664-1		-	II
	Ingress of protection		-	IP54
	Joint 1	Working range	°	±270
		Working range with restrictions[2)]	°	±360
		Maximum speed	°/s	120
	Joint 2	Working range	°	-85...+265
		Maximum speed	°/s	120
	Joint 3	Working range	°	±175
		Maximum speed	°/s	120
	Joint 4	Working range	°	-85...+265
		Maximum speed	°/s	180
	Joint 5	Working range	°	±270
		Working range with restrictions[2)]	°	±360
		Maximum speed	°/s	180
	Joint 6	Working range	°	±270
		Working range with restrictions[2)]	°	±360
		Maximum speed	°/s	180

Category	Parameter	Unit	LXMRL18S0•••
Working space	Radius	mm (in)	1073 (42.2)
	Base diameter	mm (in)	188 (7.4)
Weight	–	kg (lb)	35.8 (78.9)
Noise level	–	dB(A)	< 58
Material	External casing	–	Aluminum alloy, POM, PC, silicone

1) For detailed information on the tool flange input and output characteristics, refer to Electrical Connections of the Lexium Cobot Arm, page 63.

2) Extended working range is possible with restrictions on lifetime. If required, contact your local Schneider Electric service representative.

Lexium Cobot Arm Tool Flange Details

Shutting Down the Lexium Cobot System

Removing power from the Lexium Cobot controller during operation of the Lexium Cobot Arm may cause a loss of control of the end-effector. The Lexium Cobot Arm must be disabled and powered off before removing power from the Lexium Cobot controller.

⚠WARNING

UNCONTROLLED EQUIPMENT OPERATION

Ensure that the Lexium Cobot Arm is disabled and powered off before removing power from the Lexium Cobot Controllers.

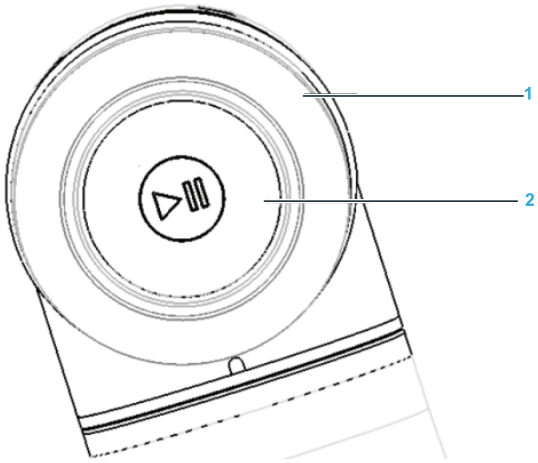
Failure to follow these instructions can result in death, serious injury, or equipment damage.

Lexium Cobot Arm Tool Flange Opposite Side

On the opposite side of the Lexium Cobot Arm tool flange an illuminated ring and a **play/pause** button are provided.

The **play/pause** button could be either used for hand guiding operation or for stopping or resuming the automatic operation. In manual mode the Lexium Cobot can be hand guided by holding down the **play/pause** button. In automatic mode the Lexium Cobot can be stopped for a pause by pressing the **play/pause** button. Press the **play/pause** button again to return to automatic operation.

The illuminated ring indicates the state of the Lexium Cobot. The following table presents the meaning of the illumination:



1 Illuminated ring

2 Play/pause button

Illumination	Lexium Cobot Arm status
Blue	Power on
Green	Enabled/operating
Red	Detected error
Yellow	Hand-guided mode
Flashing yellow	Pause

⚠WARNING

CRUSHING, SHEARING, CUTTING AND IMPACT INJURY

Ensure that using the **play/pause** button poses no subsequent risks in the zone of operation of the Lexium Cobot Arm.

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

Lexium Cobot Arm Tool Flange Buttons and Interface

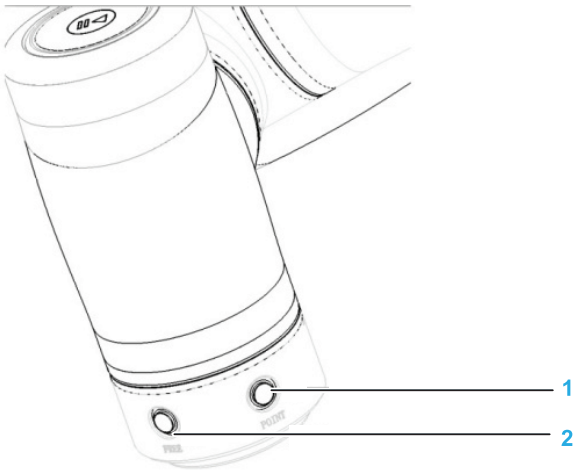
Two buttons and an M8 connector interface are located close to the tool flange on joint 6.

The button is used for hand guiding. If the button is held down, the Lexium Cobot is in the hand-guided mode. When the button is released, the Lexium Cobot returns to its previous mode of operation.

NOTE: The **FREE** button is inactive if any program is executed.

The **POINT** button can be used to record the positions of the Tool Center Point (TCP). If the button is pressed, the TCP position is stored as a new path point in the EcoStruxure Cobot Expert tab **Programming**.

The M8 connector interface can be used to access inputs and outputs on the end-effector. The inputs and outputs are directly connected to the Lexium Cobot Controllers. For further information on electrical connection, refer to the chapter Electrical Connections of the Lexium Cobot Arm, page 63.



1: **POINT** button

2: **FREE** button, engages the hand-guided mode

⚠WARNING

CRUSHING, SHEARING, CUTTING AND IMPACT INJURY

- Ensure that using the **play/pause** and **FREE** buttons pose no subsequent risks in the zone of operation of the Lexium Cobot Arm.
- Verify that determined settings are properly set (for example, end-effector and TCP settings) for storing the correct new path point.

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

Mechanical and Electrical Data of the Lexium Cobot Cabinet Controller LXMRL03C1•••

Category	Parameter	Unit	LXMRL03C1•••
General data	Communication	-	TCP/IP, Modbus TCP, Modbus RTU, EtherNet/IP, and ProfiNet
	Size (W x H x D)	mm (in)	410 x 308 x 235 (16.14 x 12.13 x 9.25)
Electrical data	I/O ports	-	Digital inputs: 16 [1)]
		-	Digital outputs: 16 [1)]
		-	Configurable analog interface: 2 [1)]
	I/O voltage	V dc	24
	Power consumption for a typical pick & place cycle with 3 kg (6.6 lb)	kW (hp)	0.15 (0.201)
	Voltage at 50/60 Hz	V ac	100 ... 240
	Pre-fuse mains current	A	10
Mechanical data	Ingress of protection	-	IP44
	Weight	kg (lb)	13 (28.7)
Material	External casing	-	Sheet steel
[1)] For detailed information on the Lexium Cobot Cabinet Controller input and output characteristics, refer to Electrical Connections of the Lexium Cobot Cabinet Controller, page 68.			

Mechanical and Electrical Data of the Lexium Cobot Cabinet Controller LXMRL07C1•••

Category	Parameter	Unit	LXMRL07C1•••
General data	Communication	-	TCP/IP, Modbus TCP, Modbus RTU, EtherNet/IP, and ProfiNet
	Size (W x H x D)	mm (in)	410 x 308 x 235 (16.14 x 12.13 x 9.25)
Electrical data	I/O ports	-	Digital inputs: 16 [1)]
		-	Digital outputs: 16 [1)]
		-	Configurable analog interface: 2 [1)]
	I/O voltage	V dc	24
	Power consumption for a typical pick & place cycle with 5 kg / 7 kg (11.0 / 15.4 lb)	kW (hp)	0.35 (0.47)
	Voltage at 50/60 Hz	V ac	100 ... 240
	Pre-fuse mains current	A	10
Mechanical data	Ingress of protection	-	IP44
	Weight	kg (lb)	15.4 (34)
Material	External casing	-	Sheet steel
[1)] For detailed information on the Lexium Cobot Cabinet Controller input and output characteristics, refer to Electrical Connections of the Lexium Cobot Cabinet Controller, page 68 .			

Mechanical and Electrical Data of the Lexium Cobot Cabinet Controller LXMRL12C1•••

Category	Parameter	Unit	LXMRL12C1•••
General data	Communication	-	TCP/IP, Modbus TCP, Modbus RTU, EtherNet/IP, and ProfiNet
	Size (W x H x D)	mm (in)	410 x 308 x 235 (16.14 x 12.13 x 9.25)
Electrical data	I/O ports	-	Digital inputs: 16 [1]
		-	Digital outputs: 16 [1]
		-	Configurable analog interface: 2 [1]
	I/O voltage	V dc	24
	Power consumption for a typical pick & place cycle with 12 kg (26.5 lb)	kW (hp)	0.6 (0.8)
	Voltage at 50/60 Hz	V ac	100 ... 240
	Pre-fuse mains current	A	10
Mechanical data	Ingress of protection	-	IP44
	Weight	kg (lb)	18 (40)
Material	External casing	-	Sheet steel
[1] For detailed information on the Lexium Cobot Cabinet Controller input and output characteristics, refer to Electrical Connections of the Lexium Cobot Cabinet Controller, page 68			

Mechanical and Electrical Data of the Lexium Cobot Compact Controller LXMRL00C2••

Category	Parameter	Unit	LXMRL00C2••
General data	Communication	-	TCP/IP, Modbus TCP, Modbus RTU, EtherNet/IP, and ProfiNet
	Size (W x H x D)	mm (in)	46.6 x 181 x 129 (1.83 x 7.1 x 5.1)
Electrical data	I/O ports	-	5[1] Individually configurable as inputs or outputs.
	I/O voltage	V dc	24
	Power consumption for a typical pick & place cycle with 3 kg (6.6 lb)	kw (hp)	0.15 (0.201)
	Power consumption for a typical pick & place cycle with 5 kg / 7 kg (11.0 / 15.4 lb)	kw (hp)	0.35 (0.47)
	Power consumption for a typical pick & place cycle with 12 kg (26.5 lb)	kW (hp)	0.6 (0.8)
	Voltage	V dc	48
Mechanical data	Ingress of protection	-	IP20
	Weight	kg (lb)	2.2 (4.85)
Material	External casing	-	Aluminum alloy
[1] For detailed information on the Lexium Cobot Compact Controller input and output characteristics, refer to Electrical Connections of the Lexium Cobot Compact Controller, page 79.			

WiFi Function Specification

Parameter	Unit	LXMRL••C••••
Standard	–	802.11 b/g/n
Operating frequency	MHz	2,400...2,483.5
Bandwidth	MHz	20 / 40
RF Output Power Limit	dBm	20 [1)]
[1)] Alternatively: 100 mW (e.i.r.p = equivalent isotropically radiated power)		

Refer to WiFi Connection Considerations, page 27, for more information concerning the use of a wireless connection.

Lexium Cobot Control Stick Details

Overview

After commissioning is completed, the Control Stick is used to control the Lexium Cobot Arm. The Control Stick can be used for various operations, described in the following table.

NOTE: The Control Stick must be connected to use the Lexium Cobot, because it provides the emergency stop button.

⚠WARNING

CRUSHING, SHEARING, CUTTING AND IMPACT INJURY

Ensure that either a hard-wired emergency stop button, or the Control Stick, is located in accordance with the appropriate local standards for emergency stops while the Lexium Cobot Arm is in operation.

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

Number	Icon	Description	Meaning
1	–	**EMERGENCY STOP**	Emergency stop button to engage the internal holding brakes of the Lexium Cobot Arm. For more information refer to Emergency Stop Safety Functions, page 139.
2		**On/Off**	• To power on the Lexium Cobot controller, press the **On/Off** button for 1 second. **Result:** The Lexium Cobot controller confirms powering on by an acoustic signal and is booting up. • To power off the Lexium Cobot controller, press the **On/Off** button for 3 seconds. **Result:** The Lexium Cobot controller confirms powering off by a pulsing acoustic signal and turns the Lexium Cobot controller off.

Number	Icon	Description	Meaning
3		**Power/Enable**	• To power on the Lexium Cobot Arm, press the **Power/Enable** button. **Result:** The indicator light of the Lexium Cobot Arm turns blue. • To power off the Lexium Cobot Arm, first disable the Lexium Cobot Arm (see below), then press the **Power/Enable** button. **Result:** The indicator light of the Lexium Cobot Arm turns off. • To enable the Lexium Cobot Arm, when the Lexium Cobot Arm is powered on, press the **Lock/Function** button and the **Power/Enable** button at the same time. **Result:** The indicator light of the Lexium Cobot Arm turns green. • To disable the Lexium Cobot Arm, when the Lexium Cobot Arm is enabled, press the **Lock/Function** button and the **Power/Enable** button at the same time. **Result:** The indicator light of the Lexium Cobot Arm turns blue.
4		**Start/Stop**	• To start the program: after the program is implemented and loaded during commissioning, press the **Start/Stop** button. **Result:** The program starts after the Lexium Cobot Arm has moved to the initial position of program. • To stop the program: When the loaded program is running, press the **Start/Stop** button. **Result:** The program is stopped according to a category 2 stop.
5		**Home**	To return the Lexium Cobot Arm to the home position: when the Lexium Cobot Arm is enabled, press the **Home** button until the Lexium Cobot Arm has fully returned to the Home position. **Result:** When the Lexium Cobot Arm has returned to the Home position, the lock indicator (**8**) illuminates blue. **NOTE:** If you release the **Home** button prior to the Lexium Cobot Arm assuming the home position, the Lexium Cobot Arm stops according to a category 2 stop, and the lock indicator (**8**) does not illuminate.
6		**Pause/Resume**	• To pause the loaded program: when the Lexium Cobot Arm is in automatic movement, press the **Pause/Resume** button. **Result**: The Lexium Cobot Arm comes to a stop according to a category 2 stop. • To resume the program: when the Lexium Cobot Arm is paused, press the **Pause/Resume** button. **Result**: The program restarts from the point where it was previously paused and takes into account the final position of the Lexium Cobot Arm resulting from the pause command.

Number	Icon	Description	Meaning
7		**Lock/Function**	• To lock the Control Stick, press the **Lock/Function** button for 3 seconds. **Result:** When the Control Stick is locked, the lock indicator (**8**) illuminates orange. In this case, the Control Stick buttons are disabled except for **Lock/Function**, **On/Off** and **EMERGENCY STOP**. The Lexium Cobot Arm can only be controlled by EcoStruxure Cobot Expert. • To unlock the Control Stick, press the **Lock/Function** button for 3 seconds. **Result:** When the Control Stick is unlocked, the lock indicator (**8**) is off. The Control Stick buttons can be used. The Lexium Cobot Arm can only be controlled by the Control Stick. The EcoStruxure Cobot Expert interface is locked by a gray Control Stick window. • Combined option: **Lock/Function** button is also intended to be used for combined options by pressing it together with the **Power/Enable** button.
8	-	Lock indicator	• Orange illumination indicates that the Control Stick is locked. • No illumination indicates that the Control Stick is unlocked. • Blue illumination indicates the arrival at the Home position.
9	-	Status indicator	• Yellow illumination lights up during starting up and shutting down the Lexium Cobot controller and when the pause mode is activated. • Blue illumination indicates that the Lexium Cobot controller has finished starting up. The illumination remains blue when you power on the Lexium Cobot Arm. • Red illumination indicates a detected error. • Green illumination indicates that the Lexium Cobot system is operational and the Lexium Cobot Arm is powered on and enabled. **NOTE:** Right after switching on the system the status indicator runs a short sequence of different colors for a few seconds as an embedded self test of the Lexium Cobot Control stick.

NOTICE

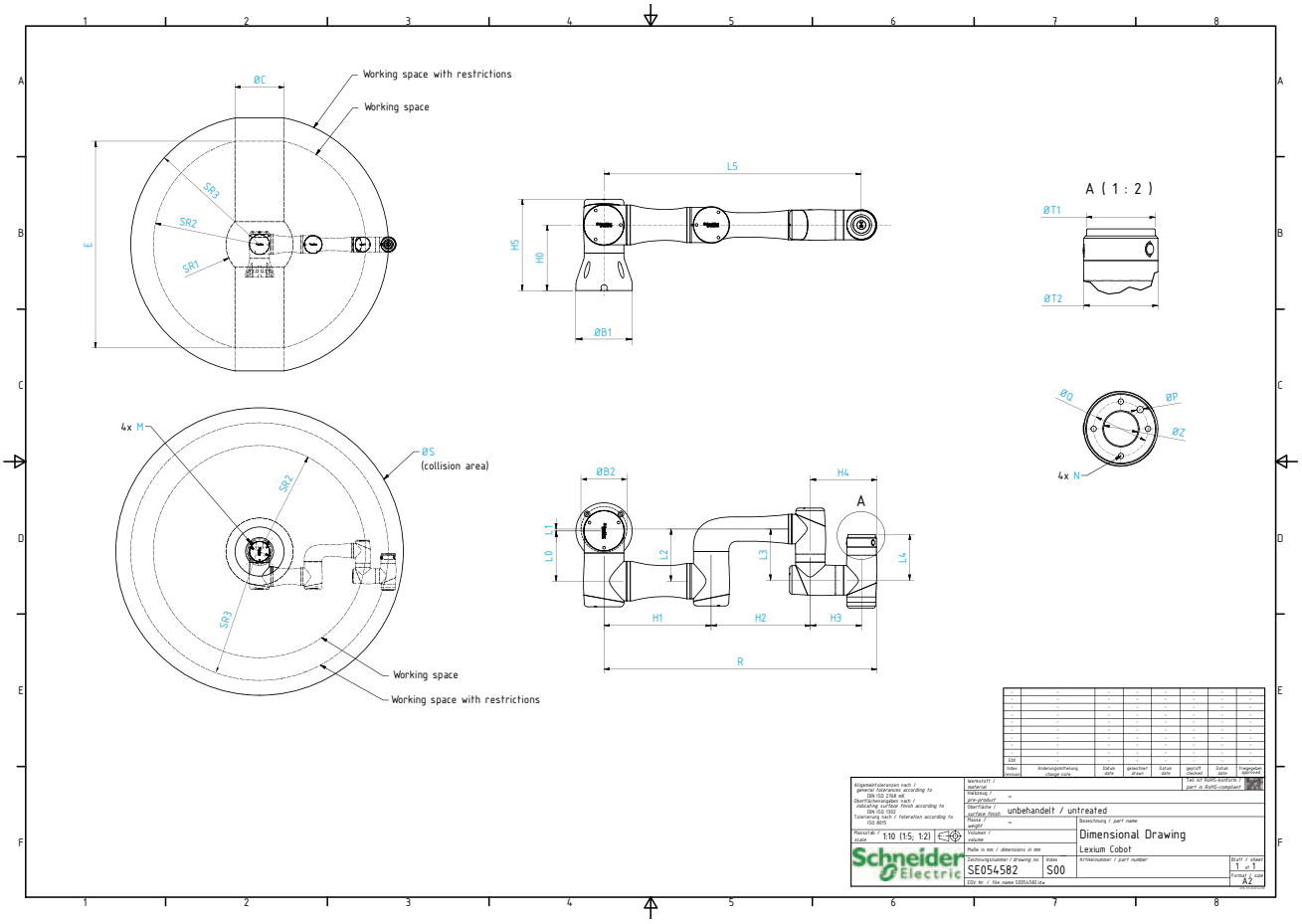
INOPERABLE EQUIPMENT

Do not use the **EMERGENCY STOP** button on the Control Stick for purposes other than stopping the Lexium Cobot Arm in hazardous situations.

Failure to follow these instructions can result in equipment damage.

Dimensional Drawings

Dimensional Drawing of Lexium Cobot Arm



The possible working space of the Lexium Cobot Arm is represented as a flattened sphere. The flattening exists above and below the Lexium Cobot Arm within a cylinder of diameter C (ØC) around the base (joint 1).

NOTE: Due to the physical combination of the Lexium Cobot Arm by joints and tubes between the joints a slow movement at the FCP (flange center point) might cause fast rotation speeds at the connected joints. Especially, when the FCP is entering or passing the inner cylindrical restricted area (represented in the graphic above), you must consider these specific conditions and respect this in your application.

NOTICE
INOPERABLE EQUIPMENT Align the working space required by the application with the mounting position in such a way that the movements within the above mentioned cylindrical restricted area are avoided. **Failure to follow these instructions can result in equipment damage.**

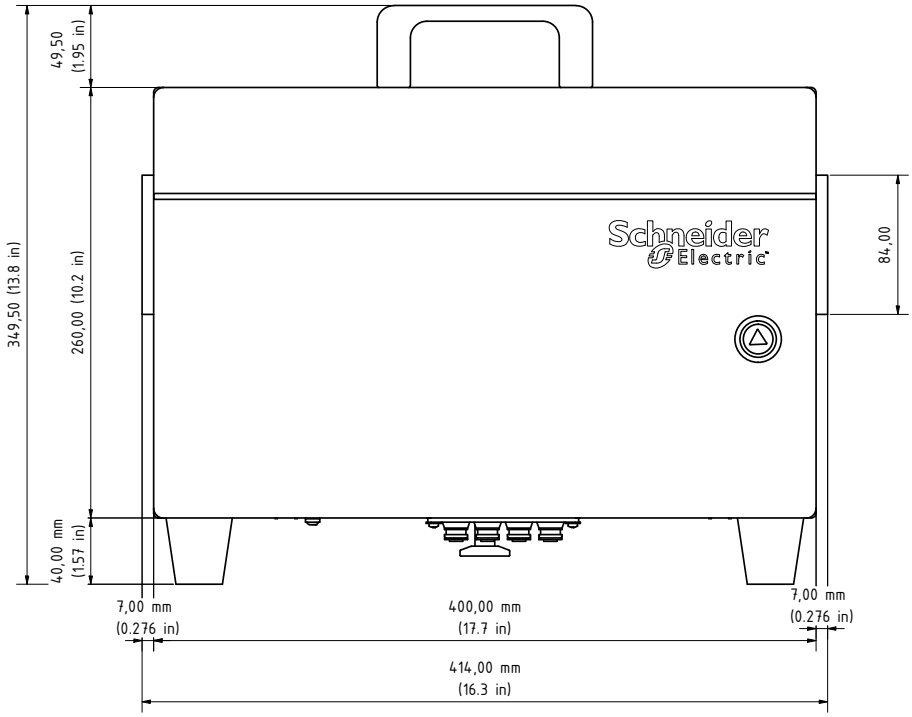
The Lexium Cobot Arm is able to position the TCP in any desired direction in the working space, without any restriction on translation and rotation of the tool flange. In the extended working space with restrictions, the Lexium Cobot Arm is able to position the TCP, with restriction on rotation of the tool flange.

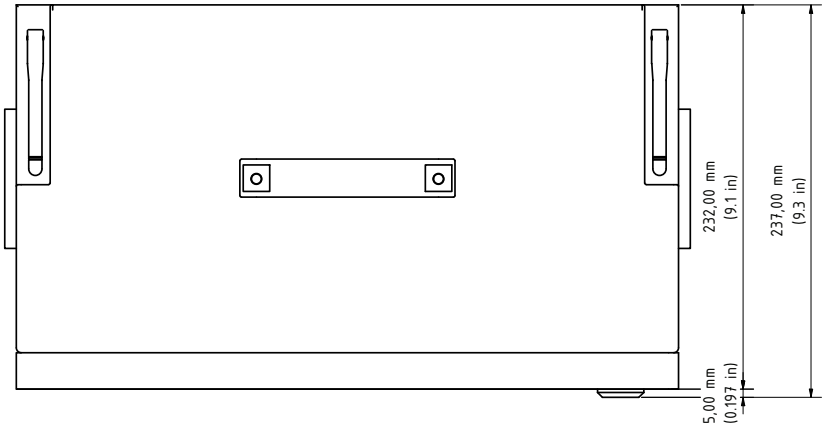
Dimension	Description	Unit	LXMRL03S0•••	LXMRL05S0•••	LXMRL07S0•••	LXMRL12S0•••	LXMRL18S0•••
R	Working space radius: joint 2 ... joint 6 outer ring	mm (in)	626.5 (24.7)	954.18 (37.56)	819.18 (32.25)	1328.68 (52.31)	1072.18 (42.21)
H0	Distance height: base ... joint 2	mm (in)	150.55 (5.93)	120.15 (4.73)	120.15 (4.73)	142.65 (5.61)	142.65 (5.61)
H1	Distance height: joint 2 ... joint 3	mm (in)	246 (9.69)	430 (16.93)	360 (14.17)	595 (23.43)	510 (20.08)
H2	Distance height: joint 3 ... joint 4/5	mm (in)	228 (8.98)	368.5 (14.51)	303.5 (11.95)	571.5 (22.50)	400 (15.75)
H3	Distance height: joint 4/5 ... joint 6	mm (in)	117.5 (4.63)	113.5 (4.47)	113.5 (4.47)	115 (4.53)	115 (4.53)
H4	Distance height: joint 4/5 ... joint 6 outer ring	mm (in)	152.5 (6.00)	155.68 (6.13)	155.68 (6.13)	162.19 (6.39)	162.19 (6.39)
H5	Height Base	mm (in)	210 (8.27)	197.65 (7.78)	197.65 (7.78)	239.15 (9.41)	239.15 (9.41)
L0	Distance length: base ... joint 2	mm (in)	115 (4.53)	144.15 (5.68)	144.15 (5.68)	181.65 (7.15)	181.65 (7.15)
L1	Distance length: base ... joint 4	mm (in)	4.5 (0.18)	0.5 (0.02)	1.51 (0.059)	16.5 (0.65)	39 (1.54)
L2	Distance length: joint 3 ... joint 4	mm (in)	119.5 (4.70)	143.65 (5.66)	142.64 (5.62)	165.15 (6.50))	142.65 (5.62)
L3	Distance length: joint 4 ... joint 5	mm (in)	117.5 (4.63)	113.5 (4.47)	113.5 (4.47)	115 (4.53)	115 (4.53)
L4	Distance length: joint 6 ... tool flange	mm (in)	105 (4.13)	107 (4.21)	107 (4.21)	103.5 (4.07)	103.5 (4.07)
L5	Distance length joint 2 ... joint 6 FCP (flange center point)	mm (in)	626 (24.6)	912 (35.91)	777 (30.59)	1281.5 (50.45)	1025 (40.35)
SR1	Working space for P point: Inner sphere radius	mm (in)	154.2 (6.07)	243.38 (9.58)	192 (7.56)	284.59 (11.20)	272.11 (10.71)
SR2	Working space for P point: Outer sphere radius	mm (in)	487.28 (18.04)	806.6 31.76	673.39 (26.51)	1173.89 (46.21)	922.94 (36.34)
SR3	Working space with restrictions	mm (in)	626 (24.6)	938.48 (36.95)	808.1 (31.82)	1302.87 (51.29)	1056.85 (41.61)
ØC	Restricted area: Inner cylinder diameter	mm (in)	226 (8.90)	228 (8.98)	230 (9.06)	263 (10.35)	308 (12.13)
E	Working space height	mm (in)	948 (37.322)	1597 (62.87)	1327 (52.24)	2333 (91.85)	1820 (71.65)
ØQ	Pitch circle diameter	mm (in)	50 (1.97)	50 (1.97)	50 (1.97)	50 (1.97)	50 (1.97)

Dimension	Description	Unit	LXMRL03S0•••	LXMRL05S0•••	LXMRL07S0•••	LXMRL12S0•••	LXMRL18S0•••
ØP	Pin hole	mm (in)	6 + 0.012 / 0 (0.24 +0.0005 / 0)	6 + 0.012 / 0 (0.24 +0.0005 / 0)	6 + 0.012 / 0 (0.24 +0.0005 / 0)	6 + 0.012 / 0 (0.24 +0.0005 / 0)	6 + 0.012 / 0 (0.24 +0.0005 / 0)
	Pin hole depth	mm (in)	10 (0.39)	10 (0.39)	10 (0.39)	10 (0.39)	10 (0.39)
ØZ	Centering hole	mm (in)	31.5 +0.025 / 0 (1.24 +0.001 / 0)	31.5 +0.030 / +0.005 (1.24 +0.001 / +0.0002)	31.5 +0.030 / +0.005 1.24 +0.001 / +0.0002	31.5 +0.030 / +0.005 1.24 +0.001 / +0.0002	31.5 +0.030 / +0.005 1.24 +0.001 / +0.0002
	Centering hole depth	mm (in)	6.5 (0.26)	6.5 (0.26)	6.5 (0.26)	6.5 (0.26)	6.5 (0.26)
N	Threaded hole	-	M6	M6	M6	M6	M6
	Threaded hole depth	mm (in)	7 (0.28)	7 (0.28)	7 (0.28)	7 (0.28)	7 (0.28)
	Tightening torque	Nm (lbf*in)	15 (132.67)	15 (132.76)	15 (132.76)	15 (132.76)	15 (132.76)
ØT1	Centering outside	mm (in)	63 0 / -0.030 (2.48 0 / -0.001)	63 -0.010 / -0.040 (2.48 -0.0004 / -0.0016)	63 -0.010 / -0.040 (2.48 -0.0004 / -0.0016)	63 -0.010 / -0.040 (2.48 -0.0004 / -0.0016)	63 -0.010 / -0.040 (2.48 -0.0004 / -0.0016)
	Centering outside depth	mm (in)	5.5 (0.22)	6.5 (0.26)	6.5 (0.26)	6.5 (0.26)	6.5 (0.26)
ØT2	Tool flange shaft	mm (in)	68 (2.68)	81 (3.19)	81 (3.19)	91 (3.58)	91 (3.58)
	Tool flange depth	mm (in)	29 (1.14)	39 (1.54)	39 (1.54)	41 (1.61)	41 (1.61)
ØS	Collision area diameter	mm (in)	1320 (51.97)	980 (38.58)	850 (33.46)	1350 (53.15)	1110 (43.70)
ØB1	Base outside diameter	mm (in)	129 (5.08)	140 (5.51)	140 (5.51)	170 (6.69)	170 (6.69)
ØB2	Base bolt circle diameter	mm (in)	110 (4.33)	158 (6.22)	158 (6.22)	188 (7.40)	188 (7.40)
M	Counterbore hole inner	mm (in)	6.6 (0.26)	9 (0.35)	9 (0.35)	9 (0.35)	9 (0.35)
	Counterbore hole outside	mm (in)	13 (0.51)	–	–	–	–
	Tightening torque	Nm (lbf*in)	15 (132.67)	40 (354.03)	40 (354.03)	40 (354.03)	40 (354.03)

Dimensional Drawing of the Lexium Cobot Cabinet Controller

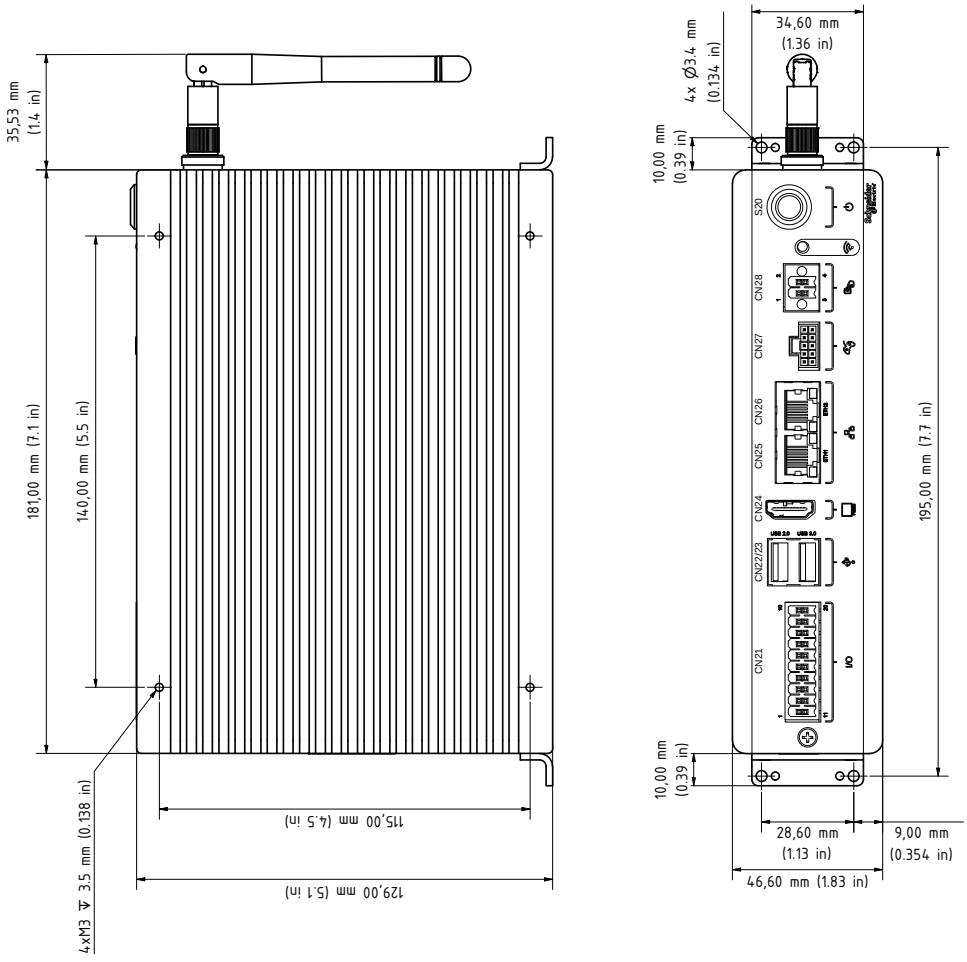
Dimension	Description	Unit	LXMRL••C1•••
L	Length	mm (in)	410 (16)
H	Height	mm (in)	310 (12.2)
W	Width	mm (in)	295 (11.6)





Dimensional Drawing of the Lexium Cobot Compact Controller

Dimension	Description	Unit	LXMRL00C2•••
H	Height	mm (in)	181 (7.1)
W	Width	mm (in)	46.6 (1.83)
D	Depth	mm (in)	129 (5.1)



Electrical Connections

Electrical Connections of the Lexium Cobot Arm

Supply Connection

For the Lexium Cobot Arm LXMRL03S0•••:

The power supply cable is included in the scope of delivery and one terminal side is pre-mounted on the Lexium Cobot Arm, in a length of 6 m (19.7 ft). On the other terminal side, the power supply cable is equipped with a connector to interface with the Lexium Cobot Controllers.

For the Lexium Cobot Arm LXMRL05S0••• / LXMRL07S0••• / LXMRL12S0••• / LXMRL18S0•••:

The power supply cable is included in the scope of delivery of the Lexium Cobot Arm, in a length of 6 m (19.7 ft). On both terminal sides, the power supply cable is equipped with connectors to interface with the Lexium Cobot Controllers. Use the angled connector of the power supply cable with the Lexium Cobot Controllers.

1 Connector CN1

End-Effector M8 Connector Interface

The M8 connector interface located at the side of the tool flange is used to control outputs and inputs on the end effector. Besides a DC power supply the following signals are provided by default by the interface:

- Digital inputs: 2
- Digital outputs: 2
- Analog inputs: 2

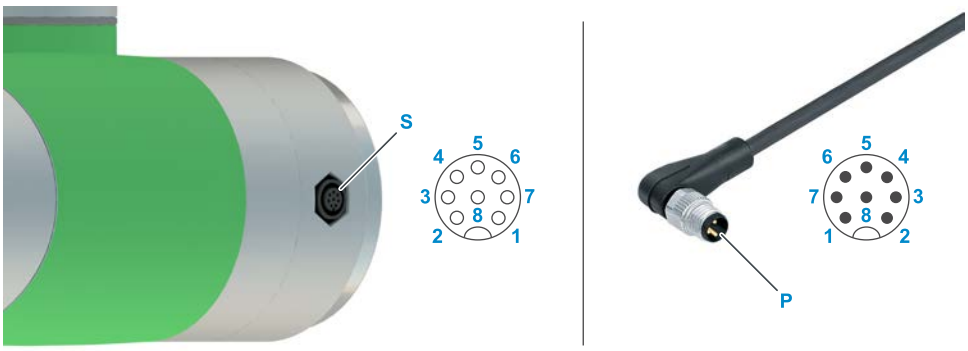
In addition, the analog inputs and the digital outputs can be configured in EcoStruxure Cobot Expert to operate as RS485 network. For details on the configuration of the end-effector interface, refer to the chapter *Terminal IO* in the *EcoStruxure Cobot Expert Software Guide*.

Characteristic	**End-Effector interface**
Digital Inputs	
Number of digital inputs	2 inputs (TDI1, TDI2)
Pins on interface	2, 3
Input type	Type 1
Logic type	Source or sink (configurable by application)
Rated input voltage	24 V dc

Characteristic	End-Effector interface
High signal	7...24 V dc
Low signal	0...4 V dc
Digital Outputs	
Number of digital outputs	2 outputs (TDO1, TDO2)
Pins on interface	4, 5
Output type	Type 1
Logic type	Source or sink (configurable by application), TDO1 and TDO2 can be used together as RS485 channel 1
Rated output voltage	24 V dc
Maximum output current	1.0 A per output **NOTE:** Verify that the total current of the end-effector interface is not exceeded.
Analog Inputs	
Number of analog inputs	2 inputs (TAI1, TAI2)
Pins on interface	6, 7
Input type	Voltage
Input range	0...10 V dc
Logic type	Source, TAI1 and TAI2 can be used together as RS485 channel 2
Power Supply	
Number of power supplies	1 common supply for the interface connector
Pins on interface	1, 8
Rated output voltage available for end-effector	Disabled, 12 or 24 V dc (configurable by application)
Maximum output current	1.0 A

For connecting external sensors and actuators at the end-effector, you can use pre-wired cables equipped with an 8-pole M8 plug-type connector. For questions regarding applicable extension cables, contact your local Schneider Electric representative.

The following figure presents the socket-type M8 connector (**S**) at the Lexium Cobot Arm flange and the delivered extension cable equipped with an 8-pole M8 plug-type connector (**P**) with a length of 400 mm (15.7 in) and open ended (reference LXMRL00YY011).



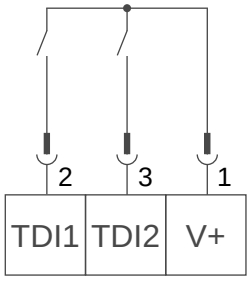
S Socket-type connector

P Plug-type connector

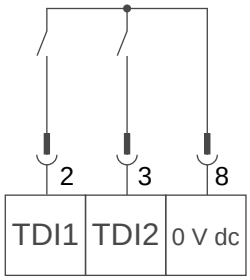
Pin	Label	Wire color	Dedica-tion	Description
1	V+	red	Power supply	Positive supply potential, 12 or 24 V dc or disabled, configurable by application
2	TDI1	blue	Digital input	Digital input 1, sink or source configurable by application
3	TDI2	green	Digital input	Digital input 2, sink or source configurable by application
4	TDO1	yellow	Digital output RS485 channel	Digital output 1, sink or source configurable by application, also configurable as RS485 channel 1
5	TDO2	pink	Digital output RS485 channel	Digital output 2, sink or source configurable by application, also configurable as RS485 channel 1
6	TAI1	brown	Analog input RS485 channel	Analog input 1, also configurable as RS485 channel 2 by application
7	TAI2	white	Analog input RS485 channel	Analog input 2, also configurable as RS485 channel 2 by application
8	0V	grey	Power supply	Negative reference potential for V+ supply

Digital Inputs

The following figure presents the sink wiring of the controller digital inputs. Sink or source can be configured on the digital input settings by the application.

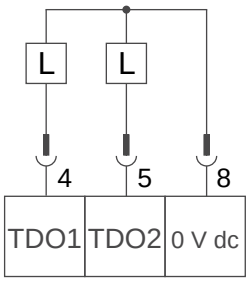


The following figure presents the source wiring of the controller digital inputs. Sink or source can be configured on the digital input settings by the application.

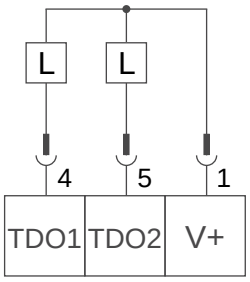


Digital Outputs

The following figure presents the source wiring of the outputs. Sink or source can be configured on the digital output settings by the application.

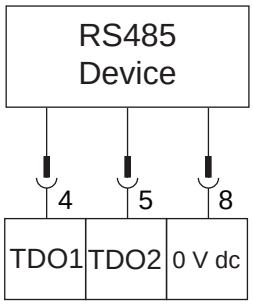


The following figure presents the sink wiring of the outputs. Sink or source can be configured on the digital output settings by the application.

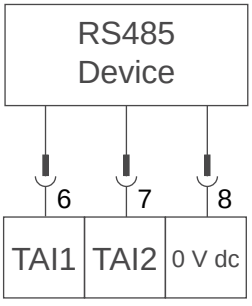


RS485 Communication

The following figure presents the wiring of the RS485 channel 1. RS485 communication can be configured on the digital output settings by the application.

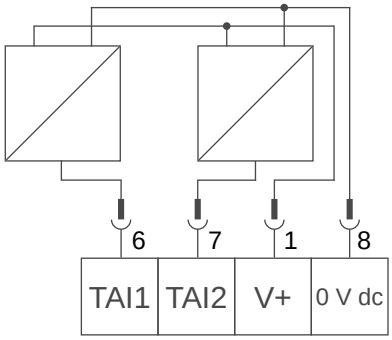


The following figure presents the wiring of the RS485 channel 2. RS485 communication can be configured on the analog input settings by the application.



Analog Inputs

The following figure presents an example of an analog input wiring.



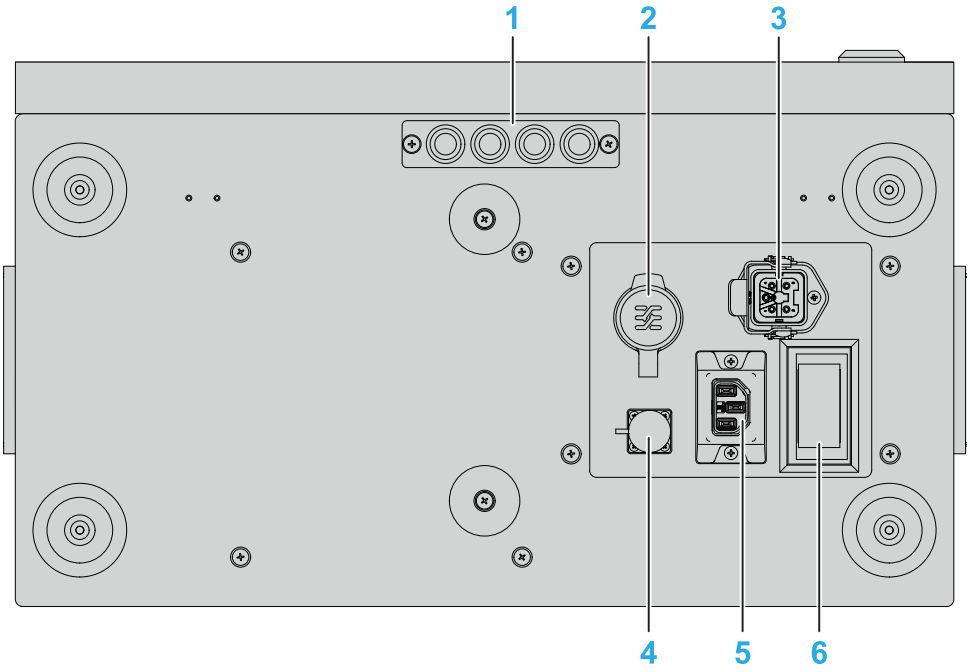
Electrical Connections of the Lexium Cobot Cabinet Controller

If your controller is a Lexium Cobot Compact Controller, refer to Electrical Connections of the Lexium Cobot Compact Controller, page 79.

Bottom Panel of the Lexium Cobot Cabinet Controller

The bottom panel of the Lexium Cobot Cabinet Controller provides the following interfaces:

- Cable entry cutout for feeding the input and output connections to the front panel of the Lexium Cobot Cabinet Controller
- Connection for operator terminal via Ethernet cable or connection to local network
- Connection to the Control Stick
- Power supply connection to the Lexium Cobot Arm
- Power supply connection for the Lexium Cobot Cabinet Controller with corresponding power switch



Number	Index	Description
1	-	Cable inlet
2	CN13	Ethernet port
3	CN14	Lexium Cobot Arm interface connector
4	CN12	Control Stick interface connector
5	CN11	Power supply connector
6	S11	Power switch

The Control Stick power supply cable is pre-mounted on one terminal side to the Control Stick, with a length of 6 m (19.7 ft). On the other terminal side, the power supply cable is equipped with a connector to interface on CN12 with the Lexium Cobot Cabinet Controller.

The power supply interface CN11 is equipped with a power switch S11 and an integrated fuse. The power switch is intended to be used for disconnecting the power supply of the Lexium Cobot Cabinet Controller. The fuse definition is done by 10 A slow-blow at 250 V ac at factory delivery.

NOTE: Ensure that the power switch is only used when the Lexium Cobot Arm is powered off. See the Control Stick description for **Power/Enable**, page 55.

The power cord (length of 2 m (6.6 ft)) delivered with the Lexium Cobot Cabinet Controller can be used with each power outlet socket which fulfills the following requirement:

- Mains circuit breaker (maximum 16 A)
- Connection to protective earth (ground)
- Outlet protected by properly sized residual current circuit breaker

Supply the devices in the environment of the Lexium Cobot Arm from the same power supply with a mains disconnector.

Front Panel of the Lexium Cobot Cabinet Controller

The Lexium Cobot Cabinet Controller provides various possibilities to integrate the Lexium Cobot into a complete machine environment and to interact with equipment and other periphery placed outside the Lexium Cobot Cabinet Controller.

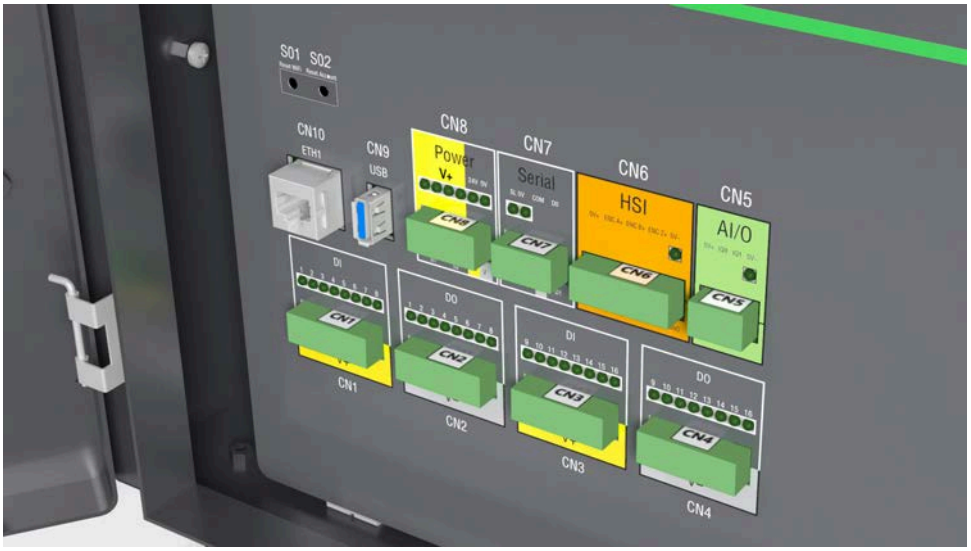
- 16 digital inputs (CN1 and CN3)
- 16 digital outputs (CN2 and CN4)
- 2 configurable analog interfaces (CN5)
- 1 encoder interface (CN6)
- 1 RS485 serial line interface (CN7)
- Lexium Cobot Cabinet Controller remote on/off (CN7)
- Control power supply (CN8)
- Safety function interface (CN8)

Characteristics	Controller interface
Digital Inputs	
Number of digital inputs	16 inputs (CN1: DI1…DI8, CN3: DI9…DI15)
Pins on interface	1…8 (for details, refer to Digital Inputs, page 73)
Input type	Type 1
Logic type	Source
Rated input voltage	24 V dc
High signal	15…30 V dc
Low signal	-3…5 V dc
Digital Outputs	
Number of digital outputs	16 outputs (CN2: DO1…DO8, CN4: DO9…DO15)
Pins on interface	1…8 (for details, refer to Digital Outputs, page 73)
Output type	Type 1
Logic type	Source
Rated output voltage	24 V dc
Maximum output current	1 A per output **NOTE:** Verify that the total current of the Lexium Cobot Cabinet Controller is not exceeded.
Analog Inputs / Outputs	
Number of analog inputs / outputs	2 inputs / outputs (CN5: IQ01, IQ12)
Pins on interface	2, 3 (for details, refer to Analog Inputs and Outputs, page 73)

Characteristics	Controller interface
Input type (while configured as input)	Voltage or current
Input range (while configured as input)	0…10 V dc (configured as voltage input) 4…20 mA (configured as current input)
Output type (while configured as output)	Voltage or current
Output range (while configured as output)	0…10 V dc (configured as voltage output) 0…20 mA (configured as current output)
Power Supply for Analog Inputs / Outputs	
Number of power supplies	1 supply with 2 terminals (CN5: 5VA)
Pins on interface	1, 4 (for details refer to Analog Inputs and Outputs, page 73)
Rated output voltage	5 V dc
Maximum output current (if configured as an output)	100 mA
Digital Encoder Interface	
Number of digital Encoder interfaces	1 encoder interface (CN6: ENC A+, ENC A-, ENC A+, ENC B+, ENC B-, ENC Z+, ENC Z-) 2 terminals for each track
Pins on interface	For details, refer to Digital Encoder Interface, page 74
Interface type	TTL
Power Supply for Digital Encoder Interface	
Number of power supplies	1 supply with 2 terminals (CN6: 5V+)
Pins on interface	1, 8 (for details, refer to Digital Encoder Interface, page 74)
Rated output voltage	5 V dc
Maximum output current	100 mA
Remote On / Off Control	
Number of Remote On inputs	1 input (CN7: R-ON)
Pins on interface	6 (for details, refer to Remote On and Off, page 75)
Number of Remote Off inputs	1 input (CN7: R-OFF)
Pins on interface	7 (for details, refer to Remote On and Off, page 75)
High signal	3…24 V dc
Low signal	0…1 V dc
RS485 Communication	
Number of RS485 serial lines	1 serial line (CN7: D0, D1, COM)
Pins on interface	3, 4, 5, 9, 10 (for details, refer to RS485 Communication, page 75)
Power Supply for Remote On / Off or RS485 Communication	
Number of power supplies	1 supply with 2 terminals (CN7: VSB)
Pins on interface	1, 2
Rated output voltage	5 V dc
Maximum output current	100 mA
Emergency Stop Input	
Number of emergency stop inputs	2 emergency stop inputs (CN8: S11, S12)

Characteristics	Controller interface
Pins on interface	7, 8 (for details, refer to External Emergency Stop, page 76)
High signal	4.5…24 V dc
Low signal	0…4 V dc
Protective Stop Input	
Number of protective stop inputs	2 protective stop inputs (CN8: S21, S22)
Pins on interface	9, 10 (for details, refer to External Protective Stop, page 77)
High signal	4.5…24 V dc
Low signal	0…4 V dc
24 V dc Internal Power Supply	
Number of power supplies	1 power supply (CN8: 24V, 0V)
Pins on interface	5, 6 (for details, refer to 24 V dc Power Supply, page 76)
Rated output voltage	24 V dc
Maximum output current	1.5 A

The following figure presents the front panel of the Lexium Cobot Cabinet Controller.



NOTE: Respective backgrounds of the terminals are marked by yellow (V+) and grey (V-) color. Terminals marked by V+ are connected to the internal 24 V dc power supply of the Lexium Cobot Cabinet Controller, terminals V- are connected to the internal 0 V dc potential.

Index	Name	Pin	Label	Description
CN1	DI Digital Input	1...8	DI1...DI8	First group of digital inputs, inputs 1..8, positive logic (sink), input is active high.
		9...16	V+	24 V dc supply for the digital inputs 1...8.
CN2	DO Digital Output	1...8	DO1...DO8	First group of digital outputs, outputs 1...8, positive logic (source).
		9...16	V-	0 V dc for the digital outputs 1...8.
CN3	DI Digital Input	1...8	DI9...DI16	Second group of digital inputs, inputs 9...16, positive logic (sink), input is active high.
		9...16	V+	24 V dc supply for digital inputs 9...16.
CN4	DO Digital Output	1...8	DO9...DO16	Second group of digital outputs, outputs 9...16, positive logic (source).
		9...16	V-	0 V dc for the digital outputs 9...16.

Index	Name	Pin	Label	Description
CN5	AI/AO Analog Input/Output	1, 4	5VA	Analog power supply 5 V dc output, 100 mA maximum.
		2	IQ0	First analog input and output. Usage as input or output depends on the configuration in the application program. For details, refer to *I/O Panel* in the *EcoStruxure Cobot Expert Software Guide*.
		3	IQ1	Second analog input and output. Usage as input or output depends on the configuration in the application program. For details, refer to *I/O Panel* in the *EcoStruxure Cobot Expert Software Guide*.
		5...8	GND	Grounding potential dedicated to analog interface.
CN6	ENC 5V Encoder	1, 8	5V+	5 V dc power supply dedicated to incremental encoder usage.
		2, 3	ENC A+	Incremental signal A+ of the encoder, positive potential.
		4, 5	ENC B+	Incremental signal B+ of the encoder, positive potential.
		6, 7	ENC Z+	Incremental signal Z+ of the encoder, positive potential.
		9, 16	GND	Grounding potential dedicated to encoder.
		10, 11	ENC A-	Incremental signal A- of the encoder, negative potential.
		12, 13	ENC B-	Incremental signal B- of the encoder, negative potential.
		14, 15	ENC Z-	Incremental signal Z- of the encoder, negative potential.
CN7	Serial RS485 Serial line, Remote On/Off	1, 2	VSB	5 V dc power supply with 100 mA maximum, can be used for remote power on / power off or to supply low current devices via RS485 serial line.
		3	COM	Common grounding for RS485 communication.
		4, 5	D1	D1 channel for RS485 communication.
		6	R-ON	Remote power-on signal input, high level (5...24 V dc) is valid
		7	R-OFF	Remote shutdown signal input, high level (5...24 V dc) is valid
		8	V-	0 V dc potential for power supply.
		9, 10	D0	D0 channel for RS485 communication.
CN8	Power Control power supply, Safety functions	1...4, 11	V+	24 V dc supply used for various connectors on the Lexium Cobot Cabinet Controller front panel. At factory delivery, pins 5 and 11 are connected by an external jumper and V+ provides the internal 24 V+ potential.
		5	24V	Internal 24 V dc power supply provided by the Lexium Cobot Cabinet Controller.
		6	0V	Internal 0 V dc reference potential for 24 V dc power supply provided by the Lexium Cobot Cabinet Controller.
		7	S11	Emergency stop function input 1, the factory default is V+.
		8	S12	Emergency stop function input 2, the factory default is V+.
		9	S21	The protective stop function input 1, the factory default is V+.
		10	S22	The protective stop function input 2, the factory default is V+.
		12	V-	0 V dc supply used for various connectors on the Lexium Cobot Cabinet Controller front panel. By factory delivery pins 6 and 12 are connected by an external jumper and V- provides the internal 0 V dc potential.
CN9	–	–	USB	USB 3.0 connector, reserved for manufacturer use.
CN10	–	–	Ethernet	Ethernet interface, reserved for manufacturer use.
S01	Reset WiFi	–	–	–
S02	Reset Account	–	–	–

NOTE: The CN8 connector pins dedicated to safety functions are provided by factory delivery with at V+ potential. Hence, the safety functions are active but not controlled by periphery of the application (for example, E-Stop push buttons or others). For a proper integration of safety functions, refer to the chapter Functional Safety, page 136

⚠WARNING

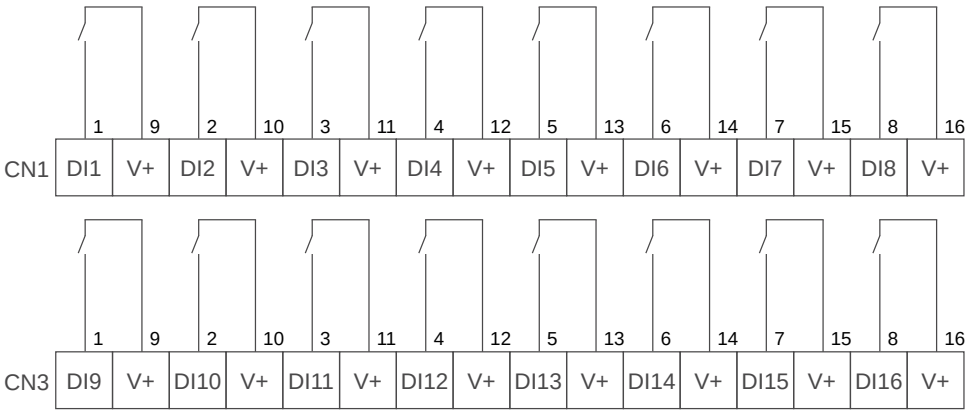
UNINTENDED EQUIPMENT OPERATION

- Ensure that the hazard and risk analysis is conducted and respected according to EN/ISO 12100 during the design of your machine.
- Apply all measures from the hazard and risk analysis before putting the system in service.

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

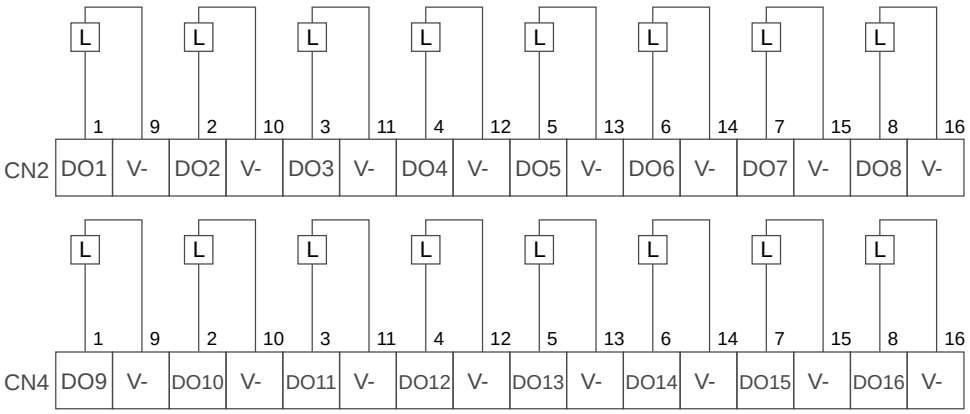
Digital Inputs

The following figure presents the sink wiring of the digital inputs at the Lexium Cobot Cabinet Controller (CN1 and CN3).



Digital Outputs

The following figure presents the source wiring of the digital outputs at the Lexium Cobot Cabinet Controller (CN2 and CN4).



Analog Inputs and Outputs

The Lexium Cobot Cabinet Controller provides the connection of two analog signals.

Depending on the configuration of the application, the analog interface can be configured as analog input or analog output. The analog inputs or outputs are not isolated from the Lexium Cobot Cabinet Controller.

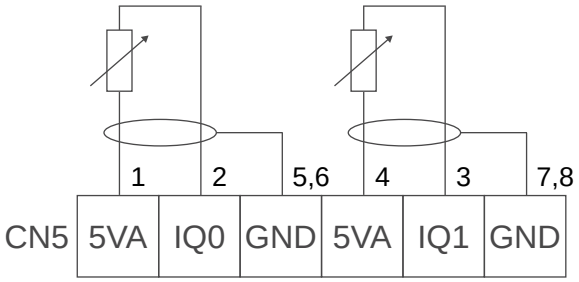
In case the signal is configured as input, use the following configuration: 4...20 mA, 0...10 V dc

In case the signal is configured as output, use the following configuration: 0...20 mA, 0...10 V dc

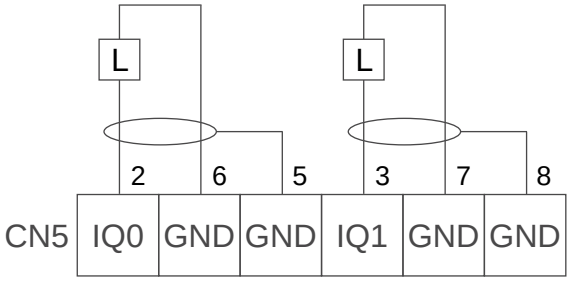
NOTE: For reducing and avoiding disturbances on analog signals, consider the following measures:

- Use shielded cables and ground to potential on CN5
- Use twisted pair cables
- Use the same ground for the Lexium Cobot Cabinet Controller and the connected equipment

The following figure presents the wiring of the analog inputs at the Lexium Cobot Cabinet Controller (CN5) for a variable resistor, based on the internal 5 V dc power supply for analog signals.



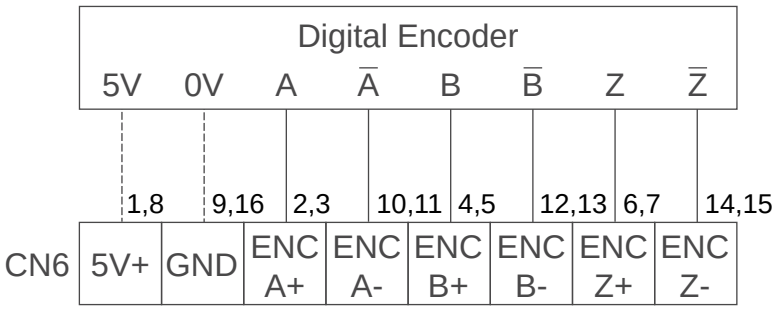
The following figure presents the wiring of the analog outputs at the Lexium Cobot Cabinet Controller (CN5).



Digital Encoder Interface

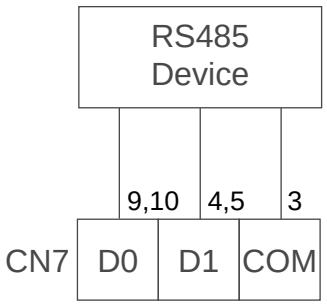
The Lexium Cobot Cabinet Controller provides the connection of a digital encoder. If the digital encoder does not require more than 100 mA, the encoder can also be supplied with a 5 V dc power supply using the same connector.

The following figure presents the wiring of a digital encoder at the Lexium Cobot Cabinet Controller (CN6).



RS485 Communication

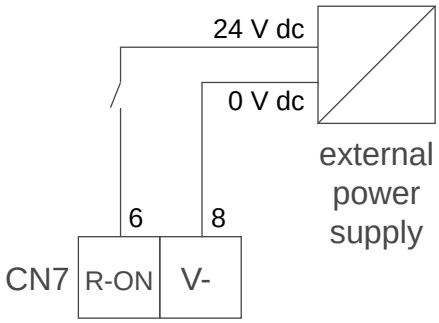
The following figure presents the wiring of the RS485 communication to an external device at the Lexium Cobot Cabinet Controller (CN7).



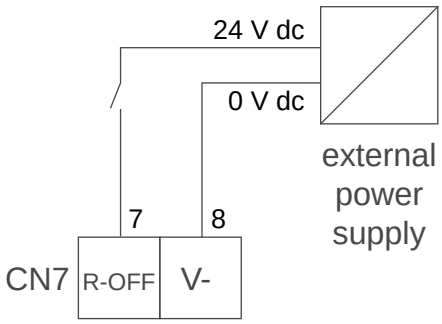
Remote On and Off

The Lexium Cobot Cabinet Controller can be powered on and off remotely. Remote on and off requires an external power supply (5...24 V dc), where V- (terminal 8 on CN7) and 0 V dc of the external power supply are connected.

The following figure presents the wiring of the remote powering-on function at the Lexium Cobot Cabinet Controller (CN7).



The following figure presents the wiring of the remote powering-off function at the Lexium Cobot Cabinet Controller (CN7).



⚠WARNING

UNINTENDED EQUIPMENT OPERATION

Ensure that the R-ON and the R-OFF pins are not powered simultaneously.

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

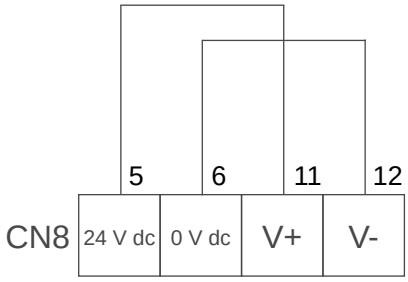
In order to avoid that both pins are simultaneously at 24 V dc, use an SPDT switch to alternate the closed circuit between the two pins R-ON and R-OFF.

24 V dc Power Supply

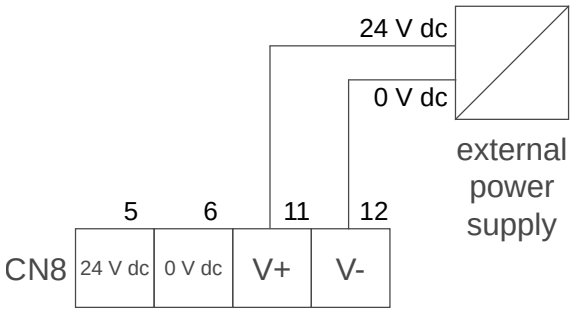
The Lexium Cobot Cabinet Controller provides the connection of the central power supply for the digital inputs and outputs on pins 11 and 12 (CN8).

The Lexium Cobot Cabinet Controller provides an internal 24 V dc power supply which can be used to supply the digital inputs and outputs of the front panel. In addition, it is also possible to connect an external 24 V dc power supply. In delivery condition, the internal power supply is active with the jumpers in place.

The following figure presents the wiring of the internal power supply.



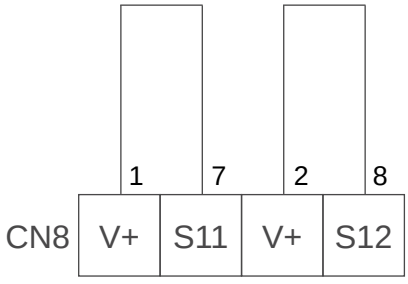
The following figure presents the wiring of the external power supply.



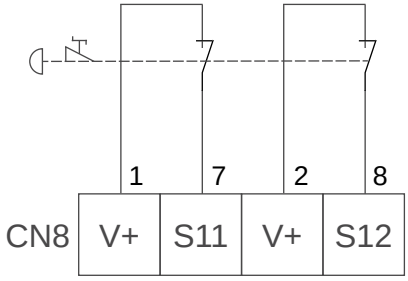
External Emergency Stop

The Lexium Cobot Control Stick is equipped with a built-in emergency stop push button. To also connect an external emergency stop signal, the Lexium Cobot Cabinet Controller provides the connection of dedicated terminals (CN8).

The following figure presents the default wiring of the external emergency stop inputs in delivery condition.



The following figure presents the wiring of an external emergency stop.



⚠WARNING

UNINTENDED EQUIPMENT OPERATION

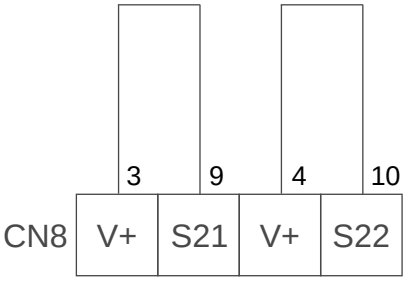
- Ensure that the cable for the external emergency stop switch is carried out by a separate and protected cable routing.
- Ensure that safety-related equipment is connected to dedicated safety-related terminals (CN8) only.

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

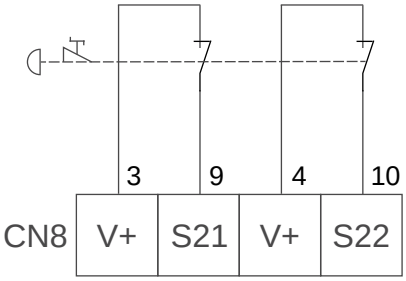
External Protective Stop

The Lexium Cobot Cabinet Controller provides the connection of dedicated terminals to additionally connect an external protective stop signal (CN8).

The following figure presents the default wiring of the external protective stop inputs in delivery condition.



The following figure presents the default wiring of an external protective stop device.



⚠WARNING

UNINTENDED EQUIPMENT OPERATION

- Ensure that the cable for the external protective stop switch is carried out by a separate and protected cable routing.
- Ensure that safety-related equipment is connected to dedicated safety-related terminals (CN8) only.

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

Emergency Stop and Protective Stop

Additionally to the Lexium Cobot Control Stick, the safety functions emergency stop and protective stop can be realized by connecting external emergency stop and protective stop switches on connector CN8 of the Lexium Cobot Cabinet Controller. With factory delivery, jumpers are installed to operate the device without external switches.

Physical installation of external stop switches (for example, safety-related door switches, safety-related light curtains or others) extends the dedicated function for emergency stop / protective stop without replacing or disabling the same functionality of the Lexium Cobot Control Stick. No configuration in the software needs to be applied, the enhancement is active by correct installation according to the explaining figures above.

The table below outlines the mode of action for emergency stop and the protective stop and its consequence on the equipment.

	Emergency stop switch(1)	**Protective stop switch(2)**
Lexium Cobot stops moving	Yes	Yes
Joint motor status	Stop	Enable
Lexium Cobot power supply	OFF	ON
Program execution status	Terminated	Pause
Brake	Closed	Open

1) Represents stop category 1. For further information, refer to Emergency Stop Safety Functions, page 139.

2) Represents stop category 2. For further information, refer to Protective Stop Safety Functions, page 142.

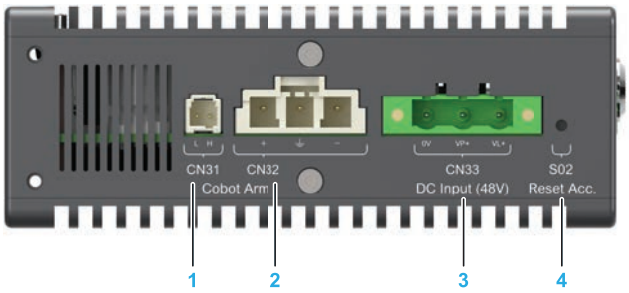
Electrical Connections of the Lexium Cobot Compact Controller

If your controller is a Lexium Cobot Cabinet Controller, refer to Electrical Connections of the Lexium Cobot Cabinet Controller, page 68.

Bottom Panel of the Lexium Cobot Compact Controller

The bottom panel of the Lexium Cobot Compact Controller provides the following interfaces:

- CAN connection to the Lexium Cobot Arm
- Power supply connection to the Lexium Cobot Arm
- Power supply connection for the Lexium Cobot Compact Controller



Number	Index	Description
1	CN31	Lexium Cobot Arm CAN interface connector
2	CN32	Lexium Cobot Arm power supply connector
3	CN33	Input power supply connector 48 V dc
4	S02	Account reset pinhole button

Connect the Lexium Cobot Arm to the Lexium Cobot Compact Controller CN31 and CN32.

Connect the 48 V dc power supply to the CN33 connector.

The adapter cable for CN31/CN32 and the power supply connector for CN33 are included with the Lexium Cobot Compact Controller.

The following table presents the quantity of required 48 V dc power supplies for the different Lexium Cobot Arm references:

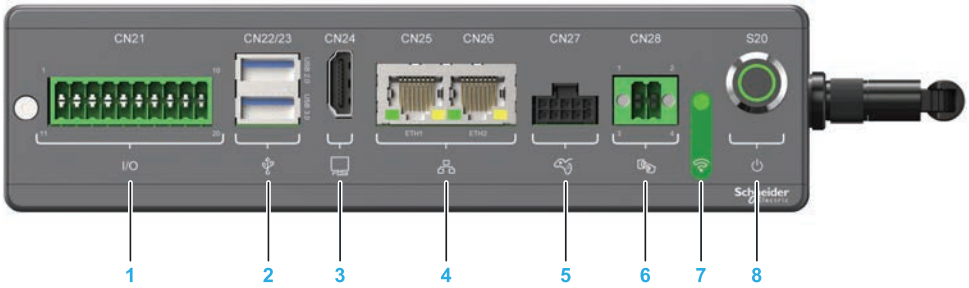
		Lexium Cobot Arm				
		LXMRL03	LXMRL05	LXMRL07	LXMRL12	LXMRL18
Power supply unit ABLU3-A48200	Quantity	1	2*			
	Output current	20 A	2 x 20 A			
	Output voltage	48 V dc				
* Two ABLU3A48200 in parallel operation. For further information, refer to the instruction sheet of the power supply.						

Front Panel of the Lexium Cobot Compact Controller

The Lexium Cobot Compact Controller provides various possibilities to integrate the Lexium Cobot into a complete machine environment and to interact with equipment and other periphery placed outside the Lexium Cobot Compact Controller.

- Digital interfaces configurable as inputs or outputs
- RS485 serial line interface

- Lexium Cobot Compact Controller remote on/off
- Ethernet port
- Control Stick interface
- Safety function interface



Number	Icon	Index	Description
1	I/O	CN21	Combined input and output interface for digital inputs and outputs, 24 V dc supply, remote power on and off, and RS485 connection [1]
2		CN22/23	USB port, reserved for manufacturer use
3		CN24	HDMI port, reserved for manufacturer use
4	ETH1	CN25	Ethernet port, reserved for manufacturer use
	ETH2	CN26	Ethernet port, supporting transmission speeds of 10/100 Mbit/s or 1 Gbit/s
5		CN27	Control Stick interface connector [2]
6		CN28	Emergency stop interface connector
7		–	WiFi status indicator
8		S20	Power button

[1] Each of the digital interfaces can be individually configured as input or output. Also, some of them can be assigned to safety functions. For details, refer to Digital Inputs, page 82, Digital Outputs, page 82, and External Protective Stop, page 84.

[2] The Control Stick can be replaced by the Control Stick Short Circuit Connector. When using the Control Stick Short Circuit Connector, ensure that an external emergency stop is connected and operational. For more information on connecting an external emergency stop, refer to Emergency Stop Safety Functions, page 139. The Control Stick Short Circuit Connector is included with the Lexium Cobot Compact Controller.

The I/O connector and the E-Stop interface connector are included with the Lexium Cobot Compact Controller.

The I/O interface provides functionality for various purposes. The table below provides an overview of individual pin usage for the Lexium Cobot Compact Controller.

Pin	Label	Description
1, 2	24V int	24 V dc power supply input required to use the digital inputs or outputs
3	R-OFF	Remote power-off signal input
4	DIQ1	Digital channel 1, can be configured as digital input or digital output
5	DIQ2	Digital channel 2, can be configured as digital input or digital output
6	DIQ3	Digital channel 3, can be configured as digital input or digital output
7	DIQ4	Digital channel 4, can be configured as digital input or digital output
8	CAN-H	CAN-H signal, reserved for manufacturer use
9	D0S	D0 channel for RS485 communication, Lexium Cobot Compact Controller acting as server.

Pin	Label	Description
10	D0C	D0 channel for RS485 communication, Lexium Cobot Compact Controller acting as client
11	24V	24 V dc power supply provided by the Lexium Cobot, used to supply pins 1 and 2 (**24V**) of the I/O interface
12, 13	0V	**0V** reference potential to **24V**, supply for protective stop and protective earth ground for RS485 communication
14	R-ON	Remote power-on signal input
15	S21	First input channel for protective stop (negative logic)
16	S22	Second input channel for protective stop (negative logic)
17	DIQ5	Digital channel 5, can be configured as digital input or digital output
18	CAN-L	CAN-L signal, reserved for manufacturer use
19	D1S	D1 channel for RS485 communication, Lexium Cobot Compact Controller acting as server
20	D1C	D1 channel for RS485 communication, Lexium Cobot Compact Controller acting as client

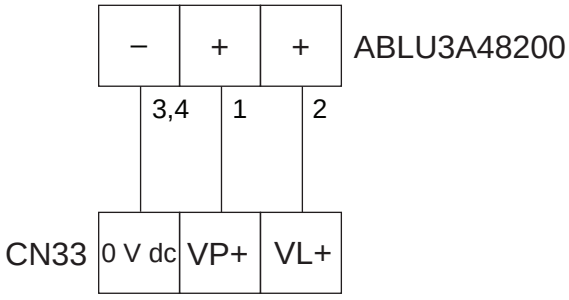
Top Panel of the Lexium Cobot Compact Controller

The following figure presents the top panel of the Lexium Cobot Compact Controller.

Number	Index	Description
1	S01	WiFi reset pinhole button
2	–	WiFi antenna

Power Supply

The following figure presents the connection of a 48 V dc Modicon power supply to provide DC power to the Lexium Cobot Compact Controller.



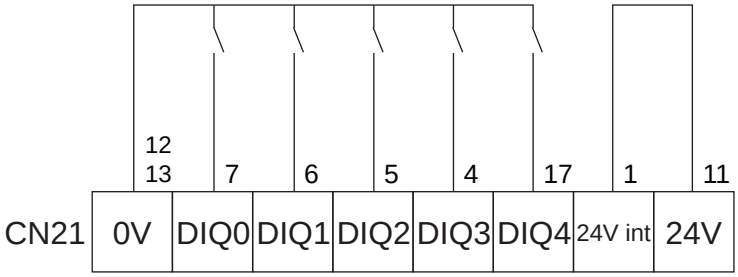
Use wires with the following minimum cross-sections:

Connector	Pin	Wire cross-section
CN33	0 V dc	2.5 mm² (14 AWG)

Connector	Pin	Wire cross-section
	VP+	2.5 mm² (14 AWG)
	VL+	1.5 mm² (16 AWG)

Digital Inputs

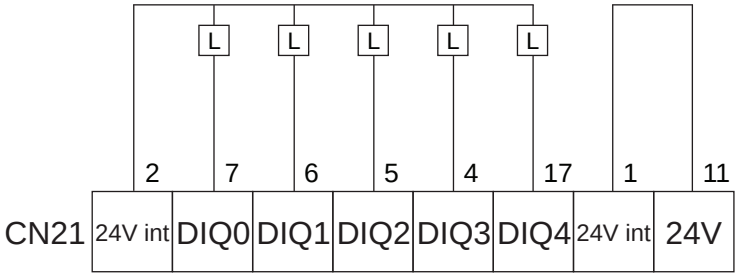
The following figure presents the source wiring of the digital inputs at the Lexium Cobot Compact Controller (I/O connector CN21) when configured as inputs.



NOTE: Each of the digital interfaces can be individually configured as input or output.

Digital Outputs

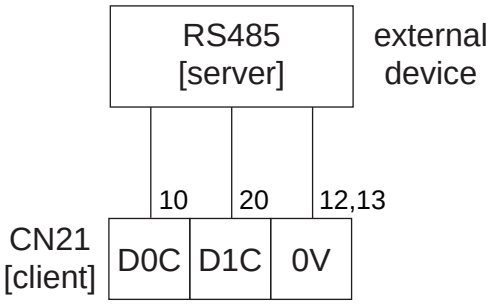
The following figure presents the sink wiring of the digital outputs at the Lexium Cobot Compact Controller (I/O connector CN21) when configured as outputs.



NOTE: Each of the digital interfaces can be individually configured as input or output.

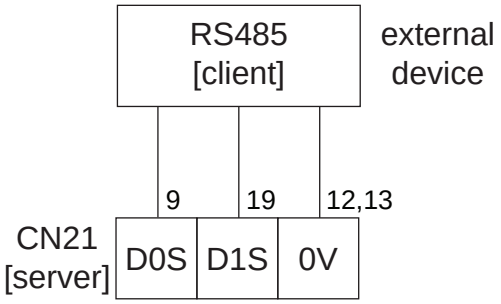
RS485 Communication with Lexium Cobot Compact Controller Acting as Client

The following figure shows the wiring of the RS485 communication to an external RS485 server, where the Lexium Cobot Compact Controller operates as a client.



RS485 Communication with Lexium Cobot Compact Controller Acting as Server

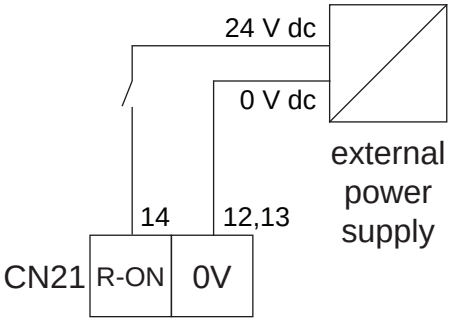
The following figure shows the wiring of the RS485 communication to an external RS485 client, where the Lexium Cobot Compact Controller operates as a server.



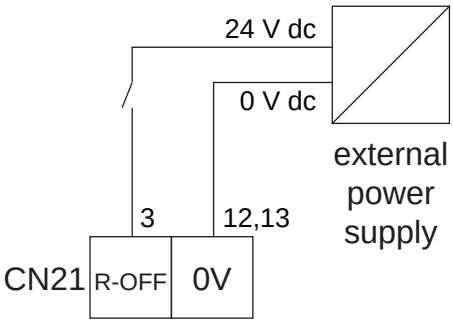
Remote On and Off

The Lexium Cobot Compact Controller can be powered on and off remotely. Remote on and off requires an external power supply (5...24 V dc), where V- (I/O connector CN21) and 0 V dc of the external power supply are connected.

The following figure presents the wiring of the remote powering-on function at the Lexium Cobot Compact Controller (I/O connector CN21).



The following figure presents the wiring of the remote powering-off function at the Lexium Cobot Compact Controller (I/O connector CN21).



⚠WARNING

UNINTENDED EQUIPMENT OPERATION

Ensure that the R-ON and the R-OFF pins are not powered simultaneously.

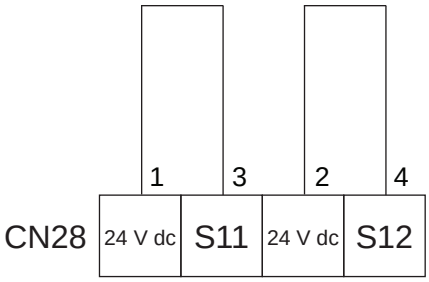
Failure to follow these instructions can result in death, serious injury, or equipment damage.

In order to avoid that both pins are simultaneously at 24 V dc, use an SPDT switch to alternate the closed circuit between the two pins R-ON and R-OFF.

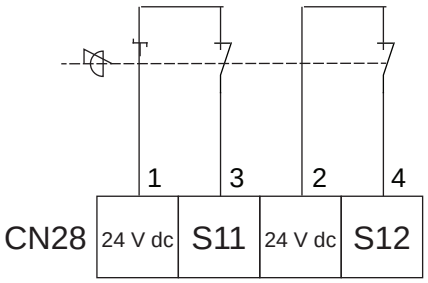
External Emergency Stop

The Lexium Cobot Control Stick is equipped with a built-in emergency stop push button. To connect an additional external emergency stop signal, the Lexium Cobot Compact Controller provides the connection of dedicated terminals (E-Stop connector CN28).

The following figure presents the default wiring of the external emergency stop inputs in delivery condition.



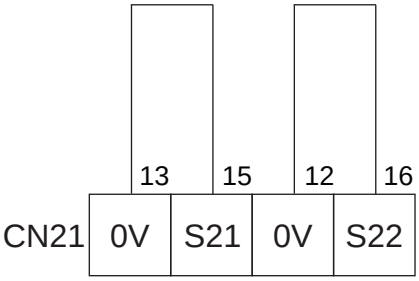
The following figure presents the wiring of an external emergency stop.



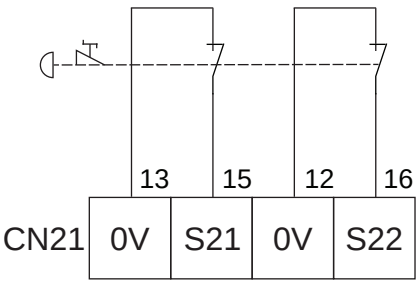
External Protective Stop

The Lexium Cobot Compact Controller provides the connection of dedicated terminals to additionally connect an external protective stop signal (I/O connector CN21).

The following figure presents the default wiring of the external protective stop inputs in delivery condition.



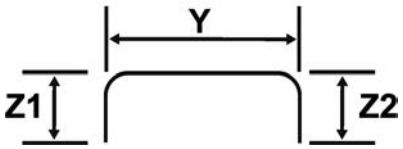
The following figure presents the default wiring of the external protective stop device.



Performance Data

Typical Cycle Time

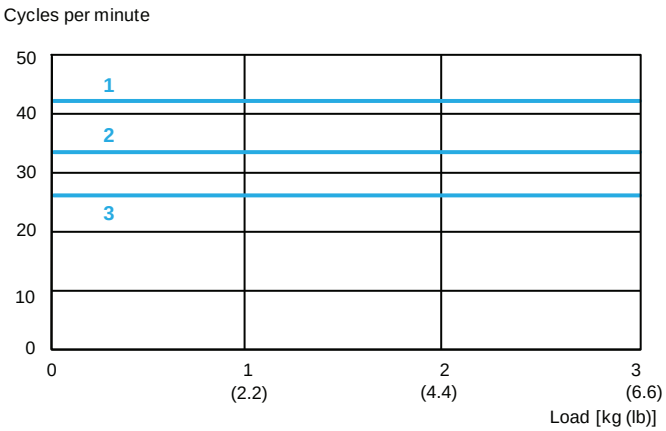
Lexium Cobot Arm Path (pick-place-pick):



Cycle Times of Lexium Cobot Arm LXMRL03S0•••

The following measurements are performed at an ambient temperature of 20 °C (68 °F) with the Lexium Cobot Controllers and EcoStruxure Cobot Expert.

Path Z1 x Y x Z2 in mm (in)	Load [kg (lb)]	Cycle times [s](1)	Cycles per minute
15 x 200 x 15 (0.59 x 7.9 x 0.59)	Any permitted load	1.43	42
25 x 305 x 25 (0.98 x 12 x 0.98)		1.76	34
70 x 400 x 70 (2.76 x 15.75 x 2.76)		2.30	26
1) Cycle times include the back and forth motion.			



1 path: 15 x 200 x 15 mm (0.59 x 7.9 x 0.59 in)

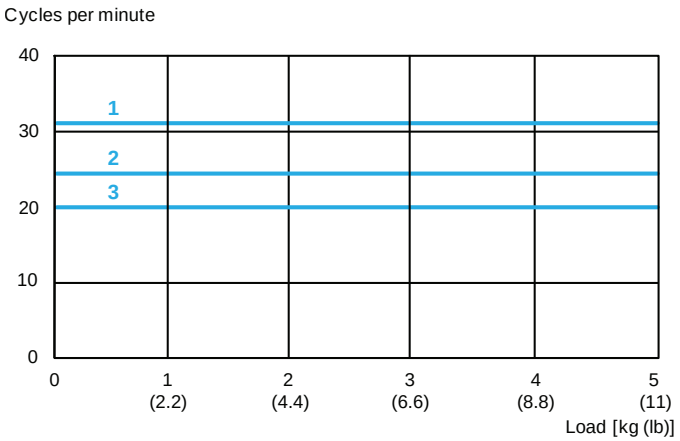
2 path: 25 x 305 x 25 mm (0.98 x 12 x 0.98 in)

3 path: 70 x 400 x 70 mm (2.76 x 15.75 x 2.76 in)

Cycle Times of Lexium Cobot Arm LXMRL05S0•••

The following measurements are performed at an ambient temperature of 20 °C (68 °F) with the Lexium Cobot Controllers and EcoStruxure Cobot Expert.

Path Z1 x Y x Z2 in mm (in)	Load [kg (lb)]	Cycle times [s](1)	Cycles per minute
25 x 305 x 25 (0.98 x 12 x 0.98)	Any permitted load	1.89	31
70 x 400 x 70 (2.76 x 15.75 x 2.76)		2.45	24
90 x 700 x 90 (3.54 x 27.56 x 3.54)		3.02	20
1) Cycle times include the back and forth motion.			



1 path: 25 x 305 x 25 (0.98 x 12 x 0.98)

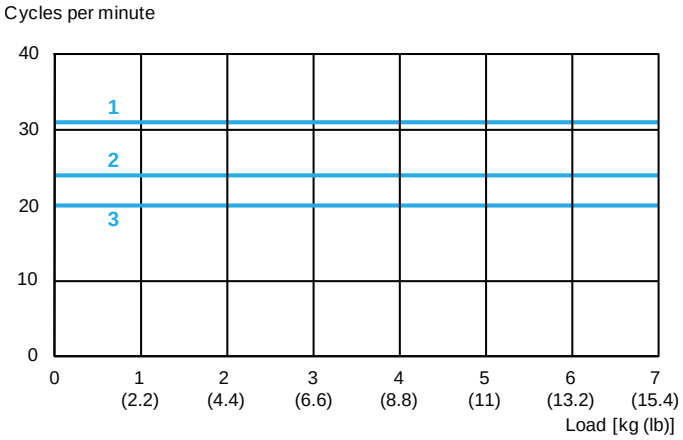
2 path: 70 x 400 x 70 (2.76 x 15.75 x 2.76)

3 path: 90 x 700 x 90 (3.54 x 27.56 x 3.54)

Cycle Times of Lexium Cobot Arm LXMRL07S0•••

The following measurements are performed at an ambient temperature of 20 °C (68 °F) with the Lexium Cobot Controllers and EcoStruxure Cobot Expert.

Path Z1 x Y x Z2 in mm (in)	Load [kg (lb)]	Cycle times [s](1)	Cycles per minute
25 x 305 x 25 (0.98 x 12 x 0.98)	Any permitted load	1.89	31
70 x 400 x 70 (2.76 x 15.75 x 2.76)		2.45	24
90 x 700 x 90 (3.54 x 27.56 x 3.54)		3.03	20
1) Cycle times include the back and forth motion.			



1 path: 25 x 305 x 25 (0.98 x 12 x 0.98)

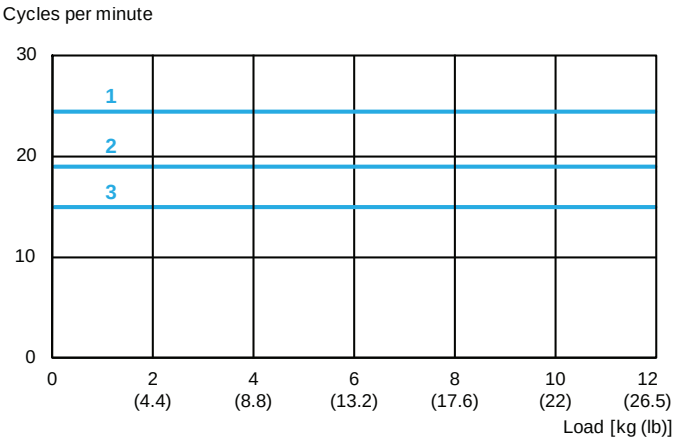
2 path: 70 x 400 x 70 (2.76 x 15.75 x 2.76)

3 path: 90 x 700 x 90 (3.54 x 27.56 x 3.54)

Cycle Times of Lexium Cobot Arm LXMRL12S0••• with Lexium Cobot Cabinet Controller

The following measurements are performed at an ambient temperature of 20 °C (68 °F) with the Lexium Cobot Cabinet Controller and EcoStruxure Cobot Expert.

Path Z1 x Y x Z2 in mm (in)	Load [kg (lb)]	Cycle times [s][1]	Cycles per minute
25 x 305 x 25 (0.98 x 12 x 0.98)	Any permitted load	2.46	24
70 x 400 x 70 (2.76 x 15.75 x 2.76)		3.19	19
90 x 700 x 90 (3.54 x 27.56 x 3.54)		3.97	15
1) Cycle times include the back and forth motion.			



1 path: 25 x 305 x 25 (0.98 x 12 x 0.98)

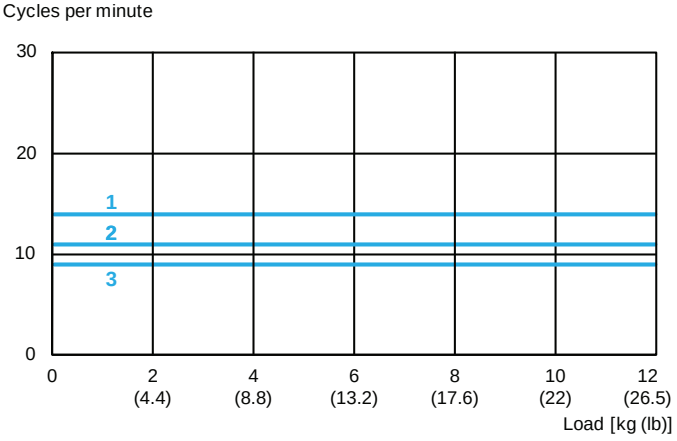
2 path: 70 x 400 x 70 (2.76 x 15.75 x 2.76)

3 path: 90 x 700 x 90 (3.54 x 27.56 x 3.54)

Cycle Times of Lexium Cobot Arm LXMRL12S0••• with Lexium Cobot Compact Controller

The following measurements are performed at an ambient temperature of 20 °C (68 °F) with the Lexium Cobot Compact Controller and EcoStruxure Cobot Expert.

Path Z1 x Y x Z2 in mm (in)	Load [kg (lb)]	Cycle times [s][1]	Cycles per minute
25 x 305 x 25 (0.98 x 12 x 0.98)	Any permitted load	4.12	14
70 x 400 x 70 (2.76 x 15.75 x 2.76)		5.29	11
90 x 700 x 90 (3.54 x 27.56 x 3.54)		6.65	9
1) Cycle times include the back and forth motion.			



1 path: 25 x 305 x 25 (0.98 x 12 x 0.98)

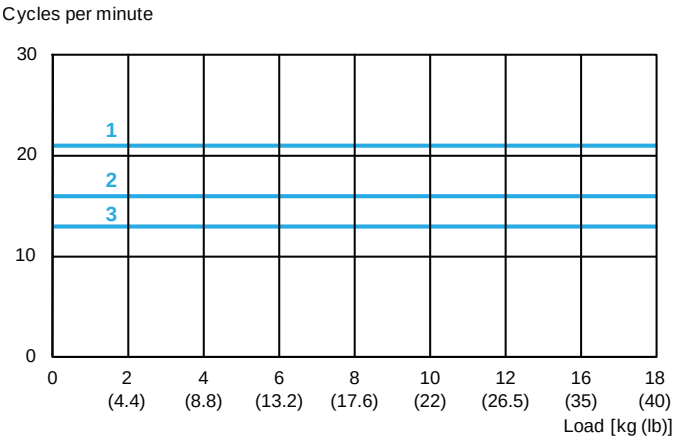
2 path: 70 x 400 x 70 (2.76 x 15.75 x 2.76)

3 path: 90 x 700 x 90 (3.54 x 27.56 x 3.54)

Cycle Times of Lexium Cobot Arm LXMRL18S0••• with Lexium Cobot Cabinet Controller

The following measurements are performed at an ambient temperature of 20 °C (68 °F) with the Lexium Cobot Cabinet Controller and EcoStruxure Cobot Expert.

Path Z1 x Y x Z2 in mm (in)	Load [kg (lb)]	Cycle times [s](1)	Cycles per minute
25 x 305 x 25 (0.98 x 12 x 0.98)	Any permitted load	2.82	21
70 x 400 x 70 (2.76 x 15.75 x 2.76)		3.73	16
90 x 700 x 90 (3.54 x 27.56 x 3.54)		4.62	13
1) Cycle times include the back and forth motion.			



1 path: 25 x 305 x 25 (0.98 x 12 x 0.98)

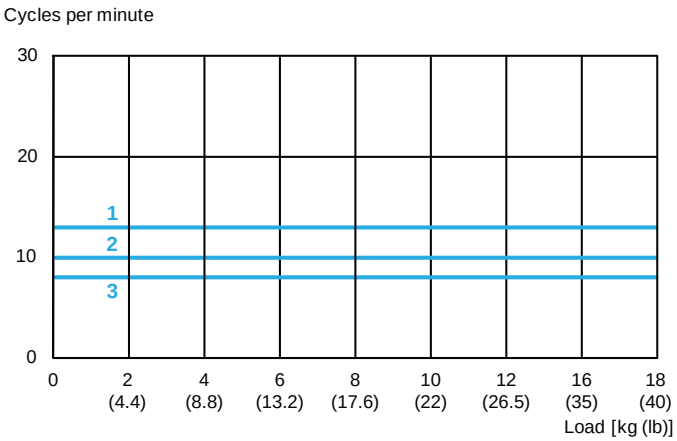
2 path: 70 x 400 x 70 (2.76 x 15.75 x 2.76)

3 path: 90 x 700 x 90 (3.54 x 27.56 x 3.54)

Cycle Times of Lexium Cobot Arm LXMRL18S0••• with Lexium Cobot Compact Controller

The following measurements are performed at an ambient temperature of 20 °C (68 °F) with the Lexium Cobot Compact Controller and EcoStruxure Cobot Expert.

Path Z1 x Y x Z2 in mm (in)	Load [kg (lb)]	Cycle times [s](1)	Cycles per minute
25 x 305 x 25 (0.98 x 12 x 0.98)	Any permitted load	2.46	24
70 x 400 x 70 (2.76 x 15.75 x 2.76)		3.19	19
90 x 700 x 90 (3.54 x 27.56 x 3.54)		3.97	15
1) Cycle times include the back and forth motion.			



1 path: 25 x 305 x 25 (0.98 x 12 x 0.98)

2 path: 70 x 400 x 70 (2.76 x 15.75 x 2.76)

3 path: 90 x 700 x 90 (3.54 x 27.56 x 3.54)

Load Capacity of Lexium Cobot Arm

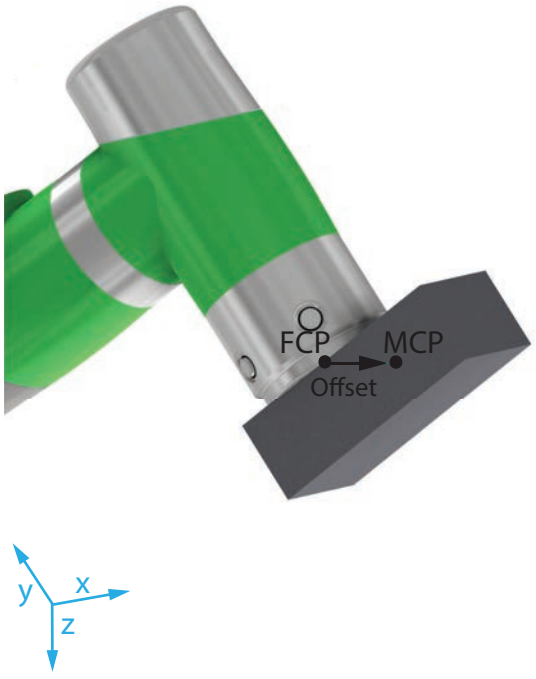
Overview

The loading capacity of the Lexium Cobot Arm depends on the offset between Lexium Cobot Arm FCP (flange center point) and the MCP (mass center point) of the additional end-customer payload. Limit values must comply with the maximum permissible payload shown in the following diagrams.

Calculate the offset with the following formula:

$$\text{Offset} = \sqrt{(\Delta X^2 + \Delta Y^2 + \Delta Z^2)}$$

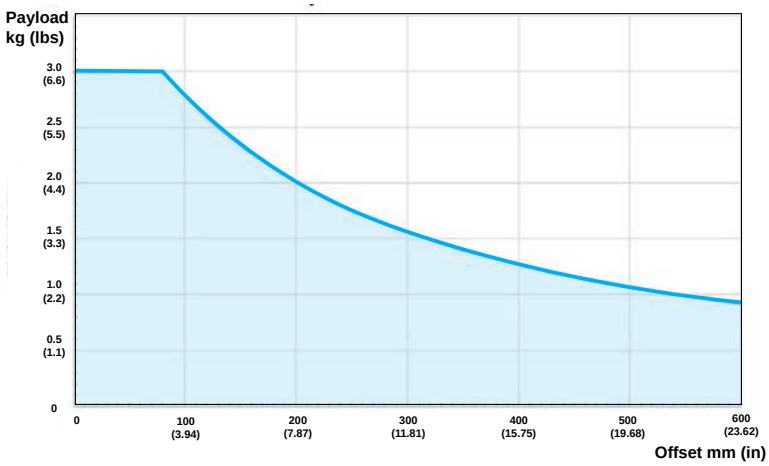
The following image illustrates the offset:



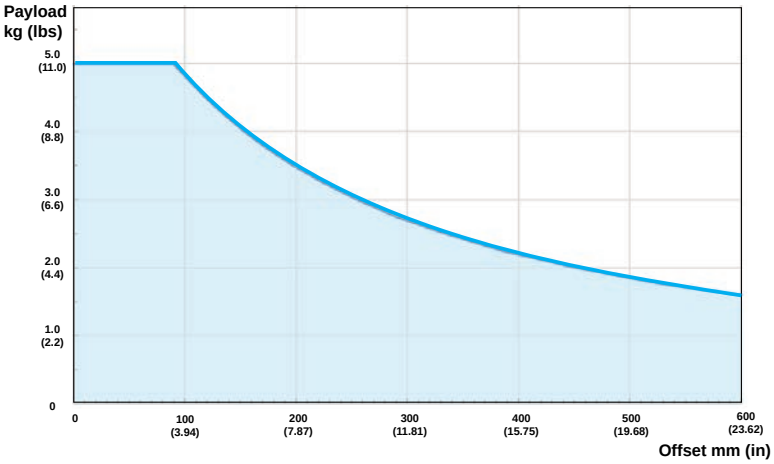
FCP flange center point

MCP mass center point

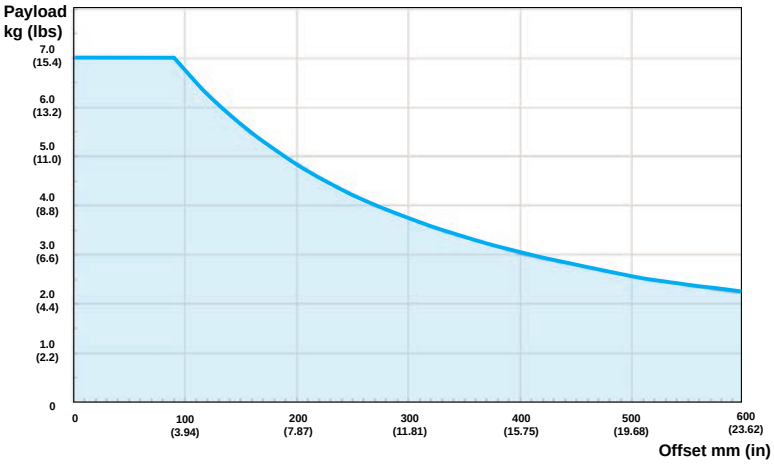
Load Capacity of Lexium Cobot Arm LXMRL03S0•••



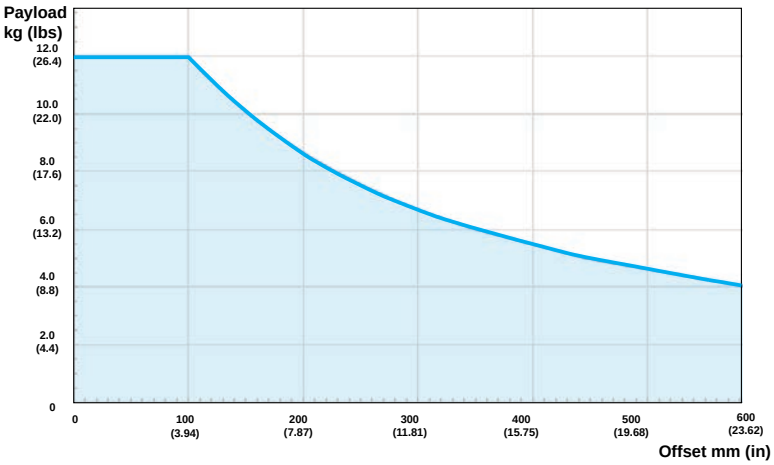
Load Capacity of Lexium Cobot Arm LXMRL05S0•••



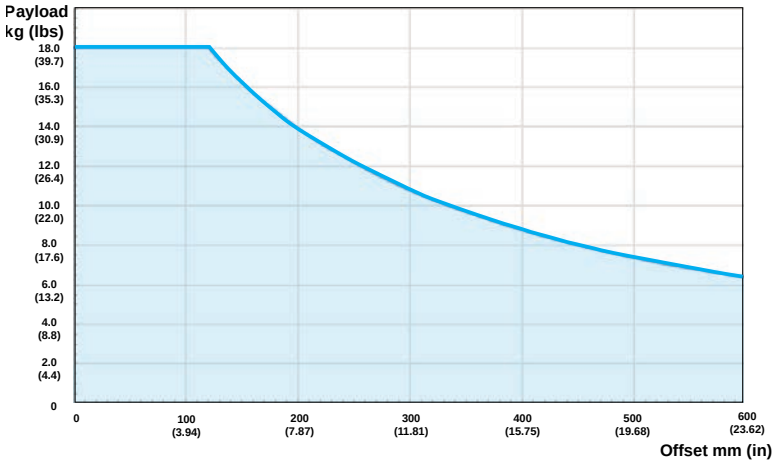
Load Capacity of Lexium Cobot Arm LXMRL07S0•••



Load Capacity of Lexium Cobot Arm LXMRL12S0•••



Load Capacity of Lexium Cobot Arm LXMRL18S0•••



Design of the Mounting Surface

System Requirements

Lexium Cobot Arm

Lexium Cobot Arm is intended to be mounted on a sturdy mounting surface. The surface must not only withstand the constant force and torque stated below, but also have sufficient stiffness so that the deformations and vibrations which occur do not lead to any major deviations on the TCP.

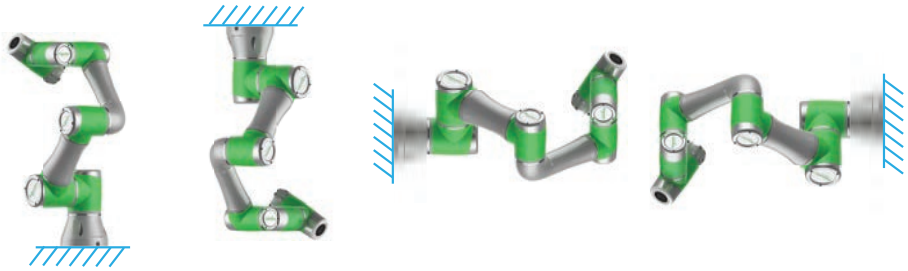
Note the weight and torque to be taken up by the mounting surface during normal operation:

Commercial reference	Static load[1)]	Dynamic torque[2)]
LXMRL03S0•••	65.5 kg (146.6 lb)	900 Nm (7965.7 lbf*in)
LXMRL05S0•••	113.0 kg (249.1 lb)	3000 Nm (26552.3 lbf*in)
LXMRL07S0•••	113.5 kg (250.2 lb)	3000 Nm (26552.3 lbf*in)
LXMRL12S0•••	212.5 kg (468.5 lb)	3800 Nm (33632.9 lbf*in)
LXMRL18S0•••	179 kg (394.6 lb)	3800 Nm (33632.9 lbf*in)
[1)] 5 * weight of Lexium Cobot Arm [2)] 10 * maximum torque of base joint		

NOTE: Make sure bolt lengths (minimum screwing depth) and material of the installation surface meet the requirement of the minimum torque noted above.

The Lexium Cobot Arm is intended to be mounted in various installation positions as ground, ceiling or wall mounting. Adapt the location and position respectively to the installation position during initial start up.

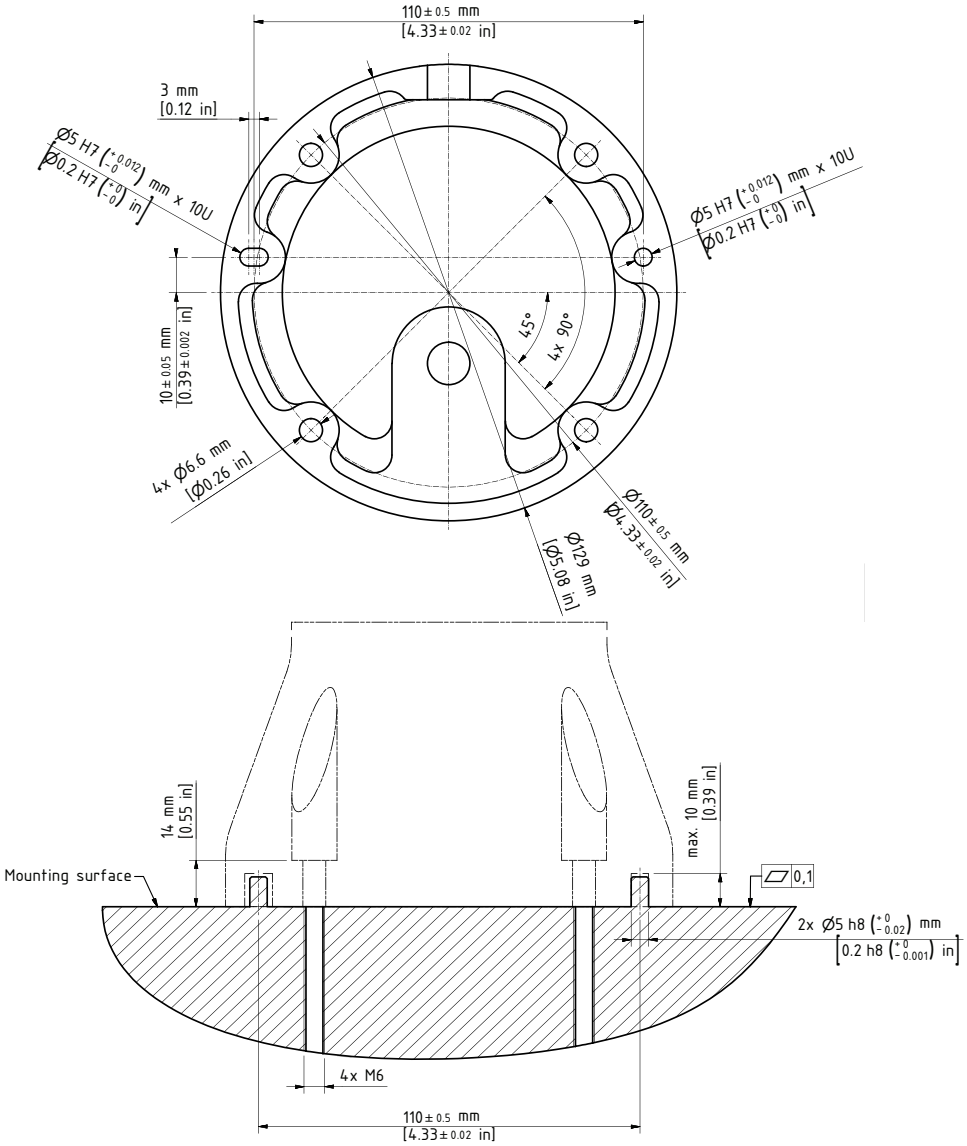
Examples of mounting positions:



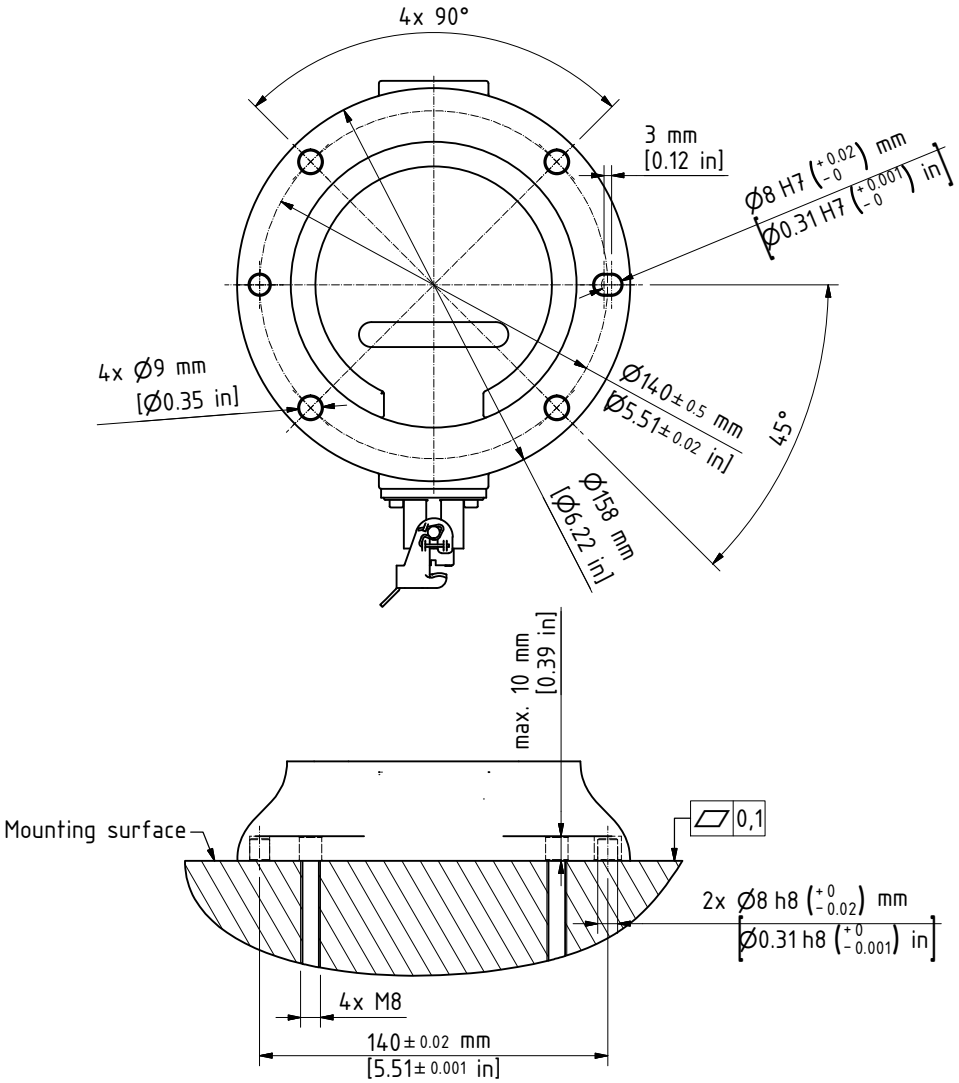
In case the Lexium Cobot Arm is mounted on a moving platform (for example, linear axis or moving platform), high acceleration of the moving ground base might be interpreted by the Lexium Cobot Arm as a collision.

NOTE: Verify that the acceleration of the moving system causes no unintended stopping of Lexium Cobot Arm.

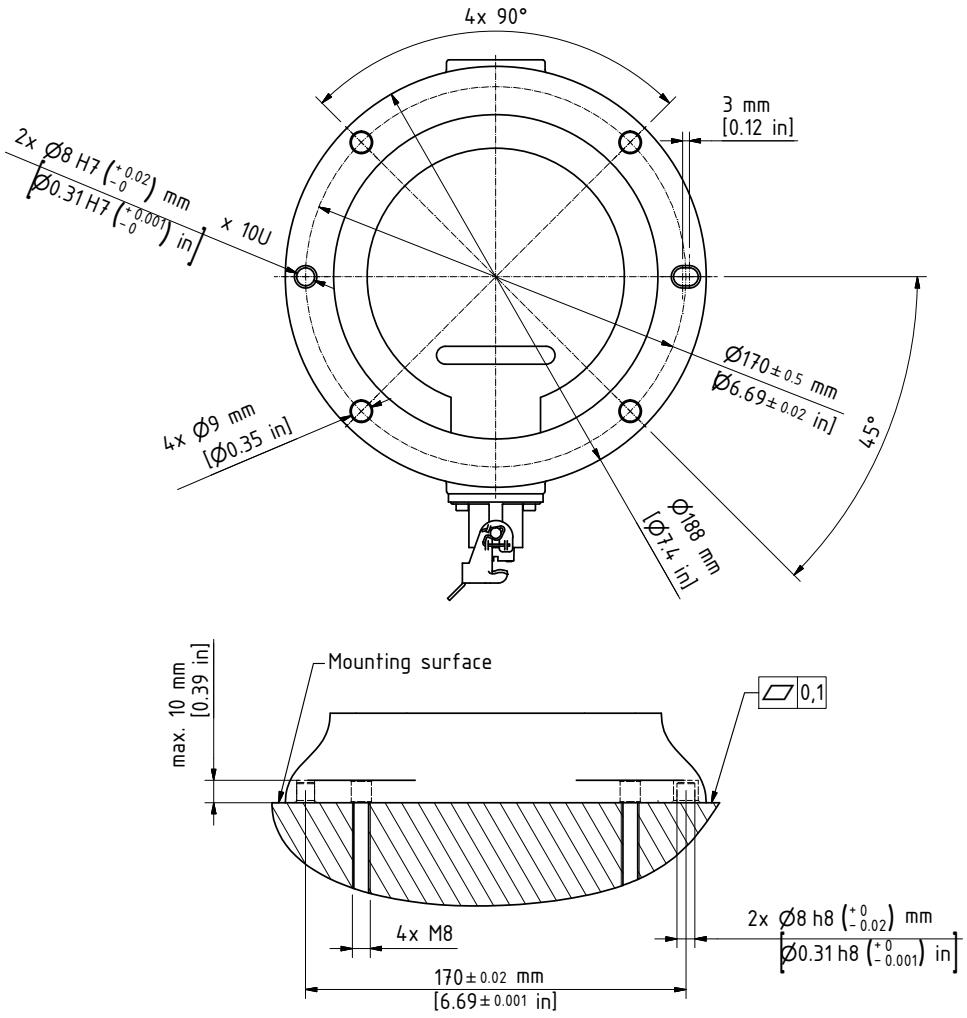
Dimension of Base LXMRL03S0•••



Dimension of Base LXMRL05S0••• / LXMRL07S0•••



Dimension of Base LXMRL12S0••• / LXMRL18S0•••



Lexium Cobot Cabinet Controller

The Lexium Cobot Cabinet Controller is intended to be placed on a plane surface. Ensure that a clearance of 100 mm (3.9 in) is respected on each side of the Lexium Cobot Cabinet Controller for sufficient airflow.

NOTICE
INOPERABLE EQUIPMENT / REDUCTION OF LIFETIME Ensure sufficient airflow for the Lexium Cobot Cabinet Controller, especially if the device is installed in an enclosure. **Failure to follow these instructions can result in equipment damage.**

Lexium Cobot Compact Controller

The Lexium Cobot Compact Controller is intended to be placed on a mounting plate inside an electrical cabinet. There are two installation options:

- Using two angled plates
- Using a hat rail adapter on a DIN rail

Both accessories are included in the scope of delivery.

For further information on mounting and the clearance distance, refer to .

Control Stick

The Control Stick is equipped with a magnet on the back side and can be placed on a wall or on the Lexium Cobot Cabinet Controller.

Interference Contours

When designing the system, ensure that the Lexium Cobot Arm has sufficient freedom of movement. Take into account the required space for the movement of the respective Lexium Cobot Arm type and associated equipment.

For further information, refer to the respective dimensional drawing in Mechanical and Electrical Data, page 40.

Run-On Motions of the Lexium Cobot Arm for Risk Assessment

Overview

The time from the application of a stop signal to the standstill of the Lexium Cobot Arm is measured. This measurement is carried out for various different loads and velocities (measurement according to ISO 10218-1).

⚠WARNING

BREAKDOWN OF THE INTERNAL JOINT HOLDING BRAKE

- Take into account a possible breakdown of the internal joint holding brake during your risk assessment.
- Take into account that the internal joint holding brake of the Lexium Cobot Arm only withstands a limited number of brake operations.

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

If there is a power interruption of the control system, the brakes are applied and the robot mechanics may leave the planned trajectory.

⚠WARNING

LEAVING THE PLANNED TRAJECTORY OF THE ROBOT MECHANICS

- Use the buffering of the 24 V supply (UPS) in order to enable a controlled stop of the mechanics, in accordance with stop category 1, by making use of the stored residual mechanical and electrical energy.
- Use a synchronous stop on the path to avoid collisions with obstacles.
- Observe the extension of the run-on path while performing your risk assessment.

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

Stop Function Categories

The following table presents the stop function categories according to IEC 60204-1 that are related to the product:

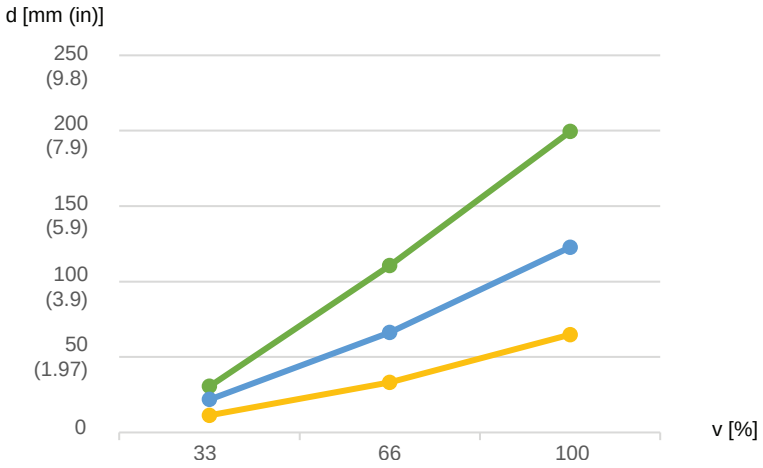
Stop function category	Definition	Corresponds to
0	Stopping by immediate removal of power to the actuators (for example, an uncontrolled stop).	An uncontrolled stop (stopping of motion by removing electrical power to the actuators).
1	A controlled stop with power available to the actuators to achieve the stop and then removal of power when the stop is achieved.	A controlled stop (stopping of motion with power to the actuators maintained during the stopping process).
2	A controlled stop with power available to the actuators.	A controlled stop (stopping of motion with power to the actuators maintained during and after the stopping process).

Run-On Path of LXMRL03S0••• Joint 1

The following graphs present the run-on path and stopping time for joint 1 for three different joint speeds and Lexium Cobot Arm poses.

Graph color	**Green**	**Blue**	**Yellow**
Arm extension	100 %	66 %	33 %
Representation			

Run-on path for stop category 1:

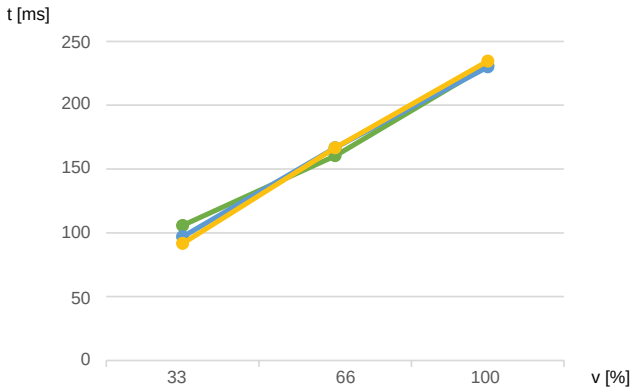


d Run-on path distance

v Joint speed

For further information, refer to IEC 60204-1.

Stopping time for stop category 1:



t Stopping time

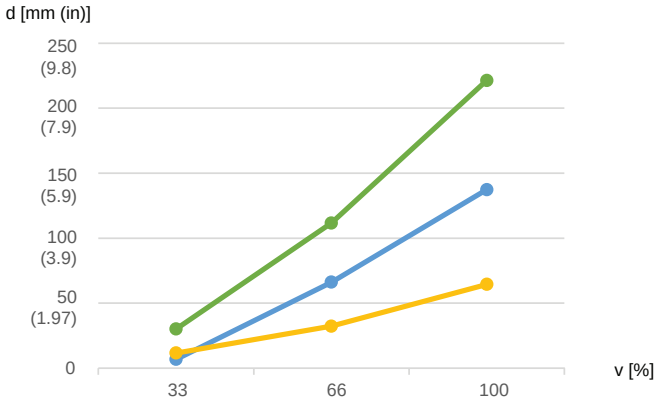
v Joint speed

Run-On Path of LXMRL03S0••• Joint 2

The following graphs present the run-on path and stopping time for joint 2 for three different joint speeds and Lexium Cobot Arm poses.

Graph color	Green	Blue	Yellow
Arm extension	100 %	66 %	33 %
Representation			

Run-on path for stop category 1:

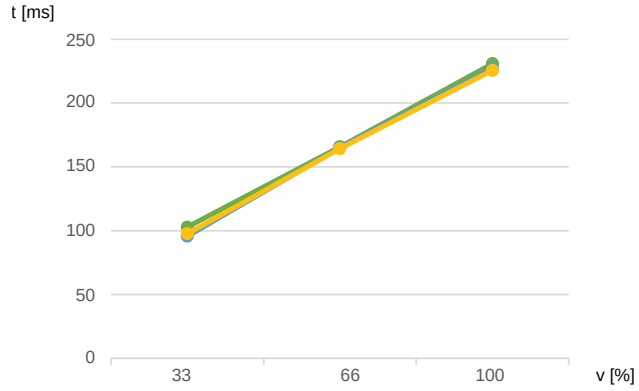


d Run-on path distance

v Joint speed

For further information, refer to IEC 60204-1.

Stopping time for stop category 1:

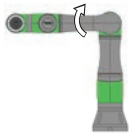


t Stopping time

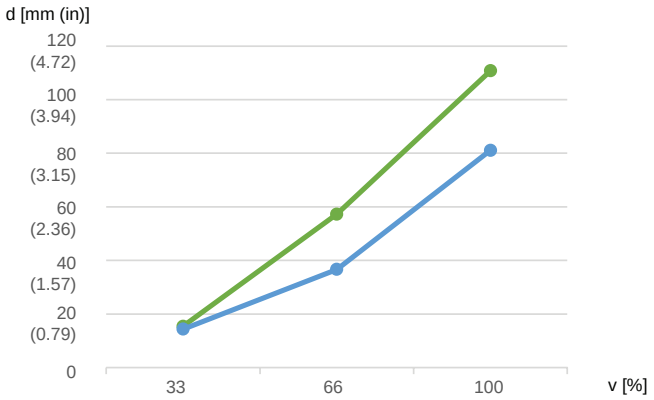
v Joint speed

Run-On Path of LXMRL03S0••• Joint 3

The following graphs present the run-on path and stopping time for joint 3 for two different joint speeds and Lexium Cobot Arm poses.

Graph color	**Green**	**Blue**
Arm extension	100 %	66 %
Representation		

Run-on path for stop category 1:

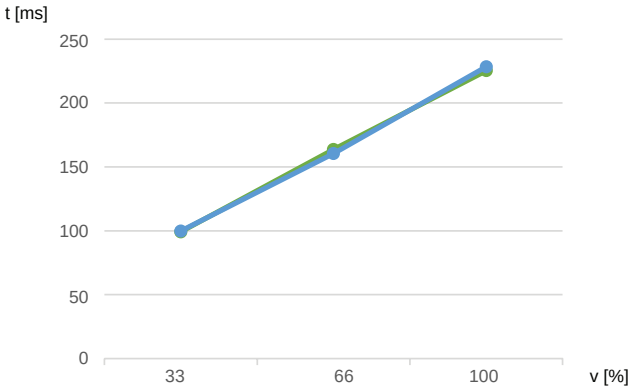


d Run-on path distance

v Joint speed

For further information, refer to IEC 60204-1.

Stopping time for stop category 1:



t Stopping time

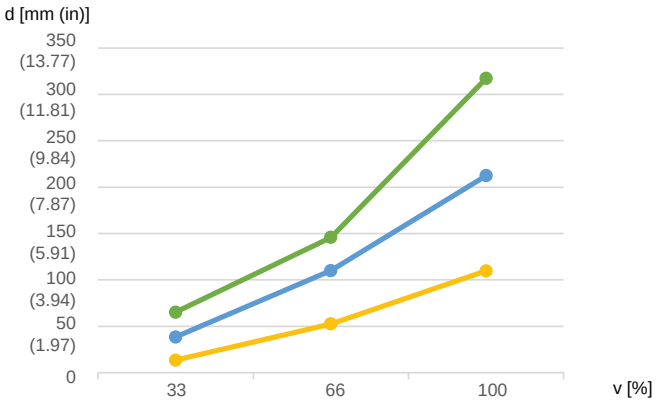
v Joint speed

Run-On Path of LXMRL05S0••• Joint 1

The following graphs present the run-on path and stopping time for joint 1 for three different joint speeds and Lexium Cobot Arm poses.

Graph color	Green	Blue	Yellow
Arm extension	100 %	66 %	33 %
Representation			

Run-on path for stop category 1:

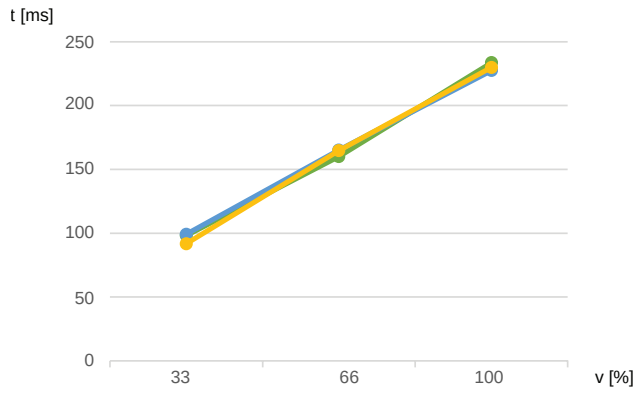


d Run-on path distance

v Joint speed

For further information, refer to IEC 60204-1.

Stopping time for stop category 1:



t Stopping time

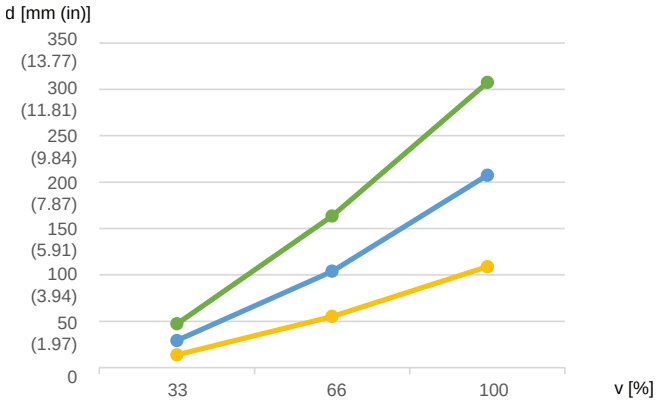
v Joint speed

Run-On Path of LXMRL05S0••• Joint 2

The following graphs present the run-on path and stopping time for joint 2 for three different joint speeds and Lexium Cobot Arm poses.

Graph color	Green	Blue	Yellow
Arm extension	100 %	66 %	33 %
Representation			

Run-on path for stop category 1:

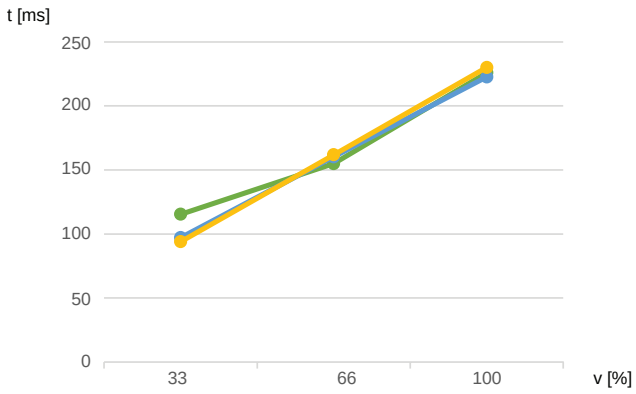


d Run-on path distance

v Joint speed

For further information, refer to IEC 60204-1.

Stopping time for stop category 1:

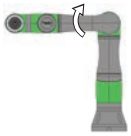


t Stopping time

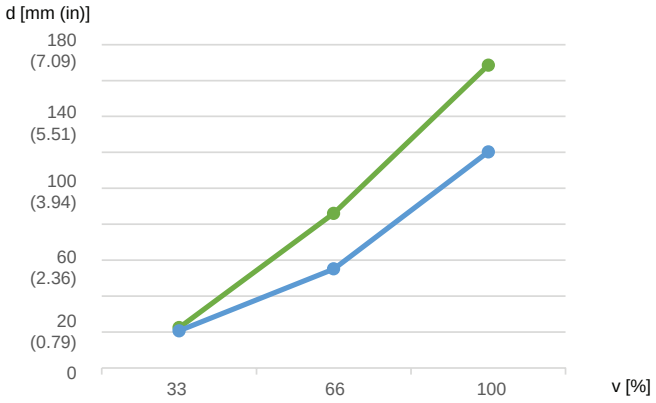
v Joint speed

Run-On Path of LXMRL05S0••• Joint 3

The following graphs present the run-on path and stopping time for joint 3 for two different joint speeds and Lexium Cobot Arm poses.

Graph color	Green	Blue
Arm extension	100 %	66 %
Representation		

Run-on path for stop category 1:

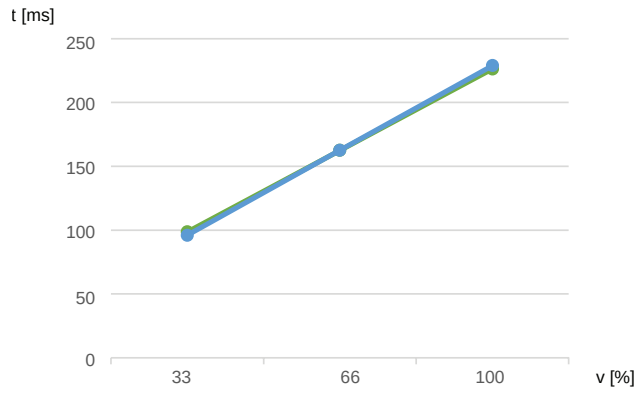


d Run-on path distance

v Joint speed

For further information, refer to IEC 60204-1.

Stopping time for stop category 1:



t Stopping time

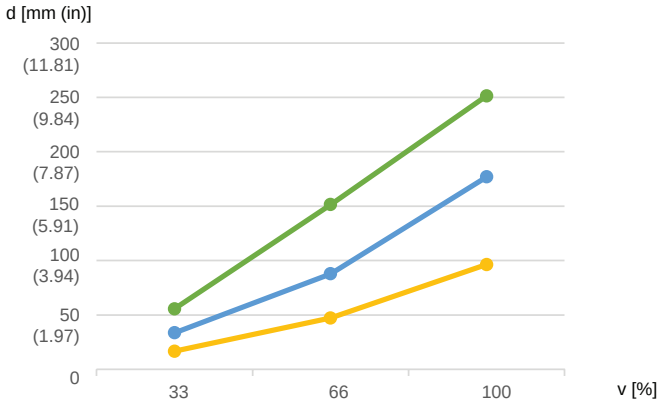
v Joint speed

Run-On Path of LXMRL07S0••• Joint 1

The following graphs present the run-on path and stopping time for joint 1 for three different joint speeds and Lexium Cobot Arm poses.

Graph color	**Green**	**Blue**	**Yellow**
Arm extension	100 %	66 %	33 %
Representation			

Run-on path for stop category 1:

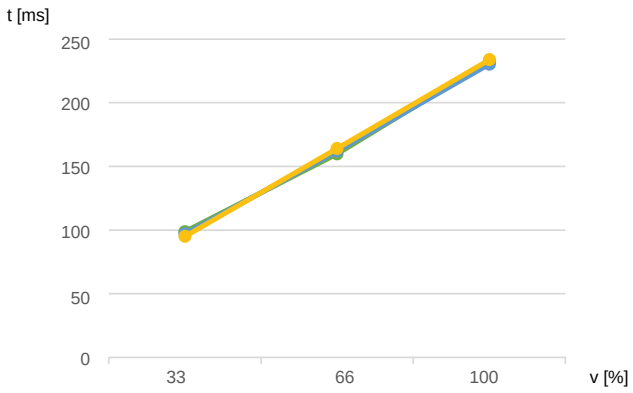


d Run-on path distance

v Joint speed

For further information, refer to IEC 60204-1.

Stopping time for stop category 1:

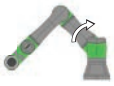


t Stopping time

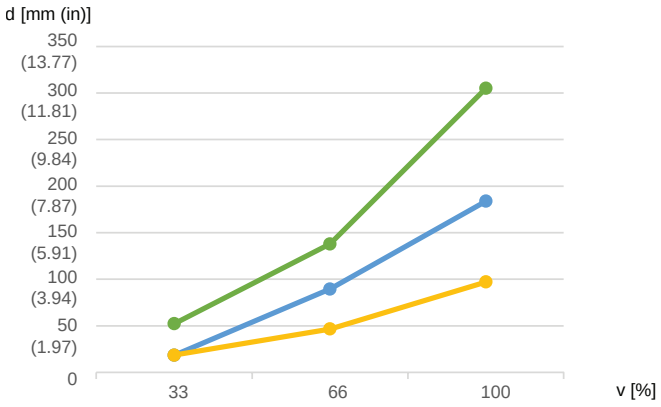
v Joint speed

Run-On Path of LXMRL07S0••• Joint 2

The following graphs present the run-on path and stopping time for joint 2 for three different joint speeds and Lexium Cobot Arm poses.

Graph color	Green	Blue	Yellow
Arm extension	100 %	66 %	33 %
Representation			

Run-on path for stop category 1:

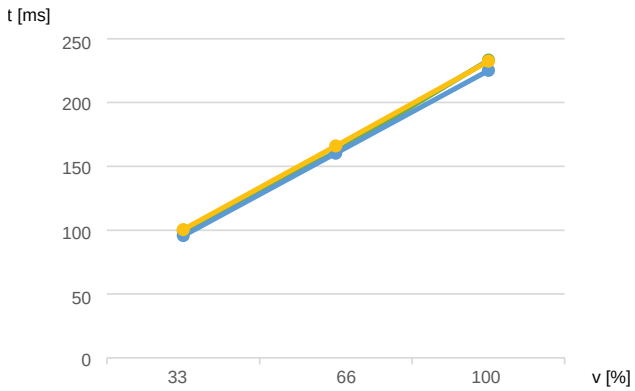


d Run-on path distance

v Joint speed

For further information, refer to IEC 60204-1.

Stopping time for stop category 1:

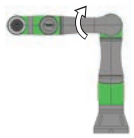


t Stopping time

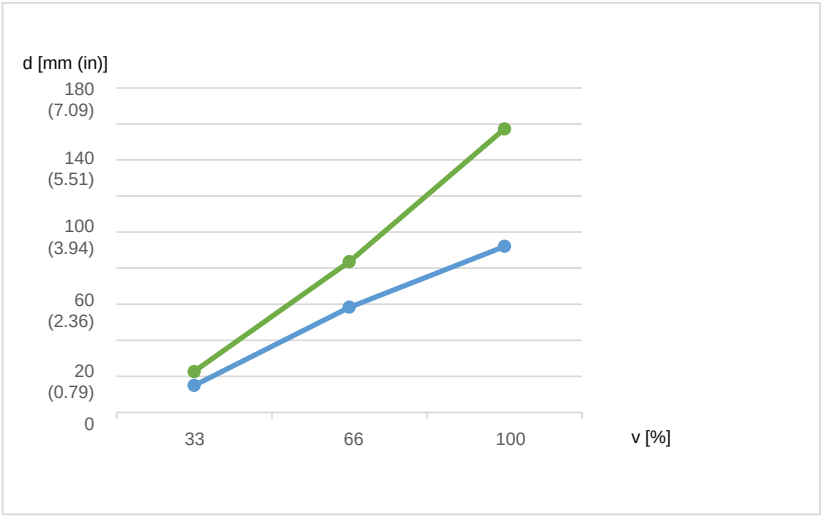
v Joint speed

Run-On Path of LXMRL07S0••• Joint 3

The following graphs present the run-on path and stopping time for joint 3 for two different joint speeds and Lexium Cobot Arm poses.

Graph color	**Green**	**Blue**
Arm extension	100 %	66 %
Representation		

Run-on path for stop category 1:

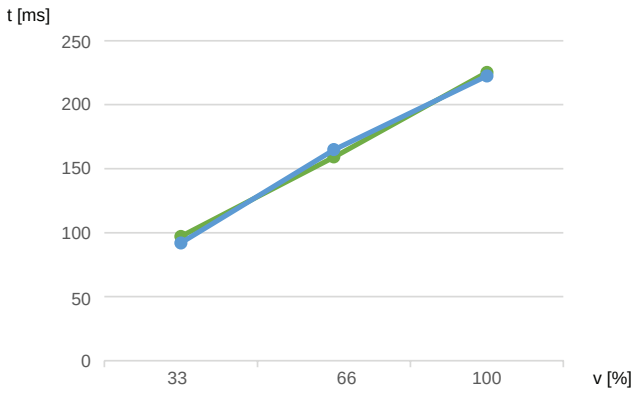


d Run-on path distance

v Joint speed

For further information, refer to IEC 60204-1.

Stopping time for stop category 1:



t Stopping time

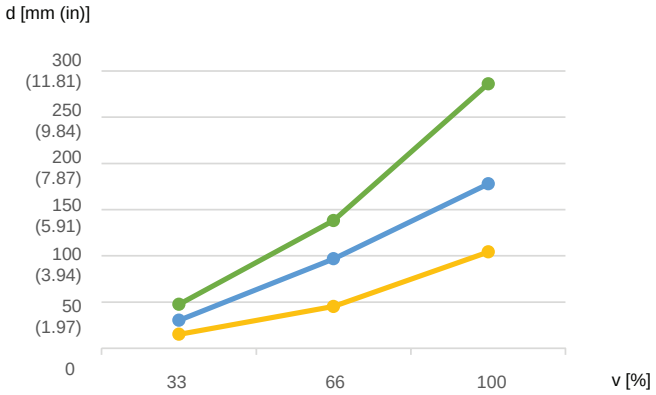
v Joint speed

Run-On Path of LXMRL12S0••• Joint 1

The following graphs present the run-on path and stopping time for joint 1 for three different joint speeds and Lexium Cobot Arm poses.

Graph color	Green	Blue	Yellow
Arm extension	100 %	66 %	33 %
Representation			

Run-on path for stop category 1:

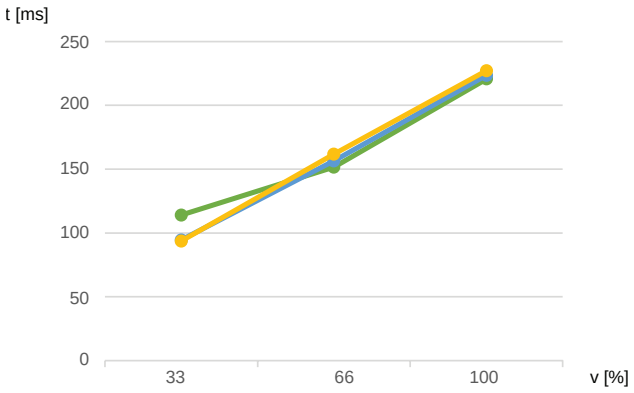


d Run-on path distance

v Joint speed

For further information, refer to IEC 60204-1.

Stopping time for stop category 1:



t Stopping time

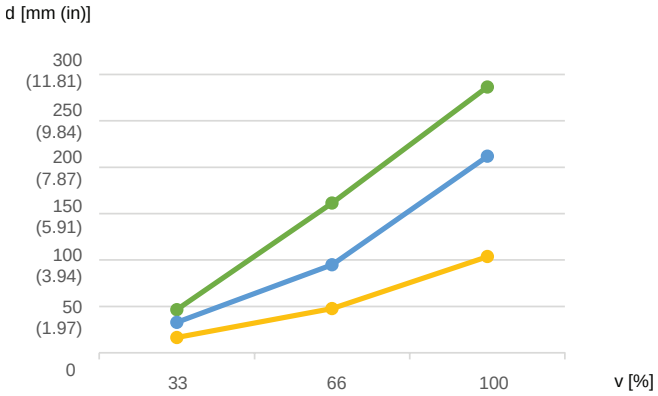
v Joint speed

Run-On Path of LXMRL12S0••• Joint 2

The following graphs present the run-on path and stopping time for joint 2 for three different joint speeds and Lexium Cobot Arm poses.

Graph color	**Green**	**Blue**	**Yellow**
Arm extension	100 %	66 %	33 %
Representation			

Run-on path for stop category 1:

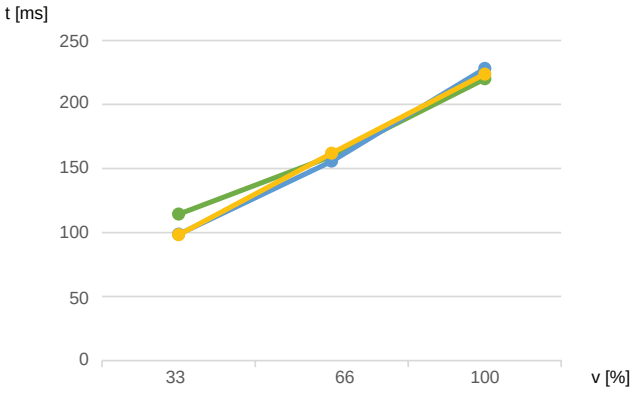


d Run-on path distance

v Joint speed

For further information, refer to IEC 60204-1.

Stopping time for stop category 1:

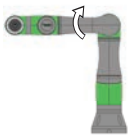


t Stopping time

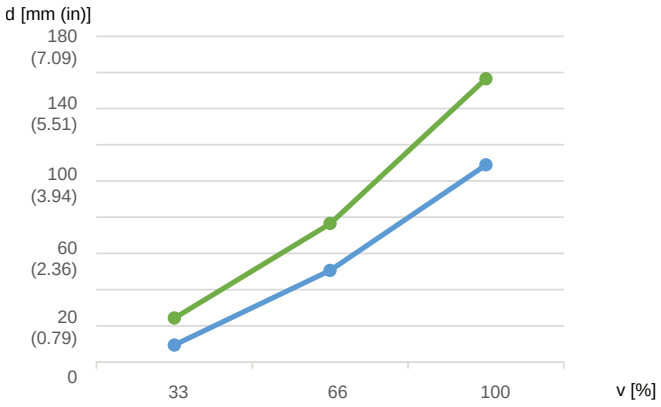
v Joint speed

Run-On Path of LXMRL12S0••• Joint 3

The following graphs present the run-on path and stopping time for joint 3 for two different joint speeds and Lexium Cobot Arm poses.

Graph color	**Green**	**Blue**
Arm extension	100 %	66 %
Representation		

Run-on path for stop category 1:

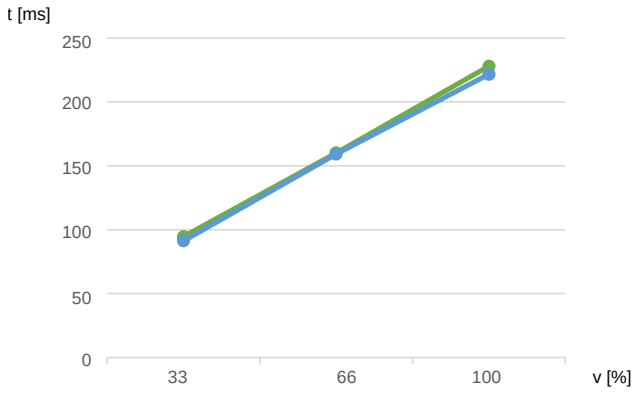


d Run-on path distance

v Joint speed

For further information, refer to IEC 60204-1.

Stopping time for stop category 1:



t Stopping time

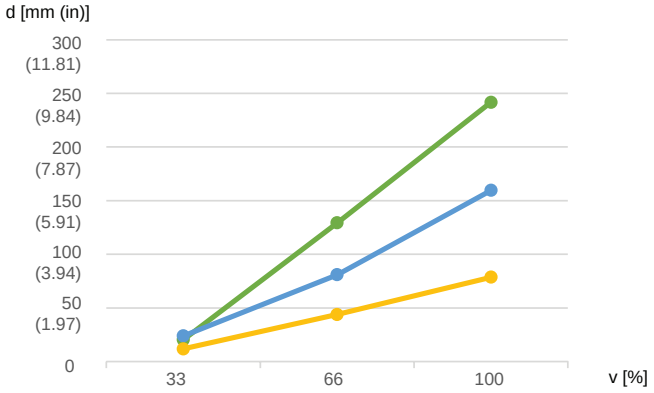
v Joint speed

Run-On Path of LXMRL18S0••• Joint 1

The following graphs present the run-on path and stopping time for joint 1 for three different joint speeds and Lexium Cobot Arm poses.

Graph color	Green	Blue	Yellow
Arm extension	100 %	66 %	33 %
Representation			

Run-on path for stop category 1:

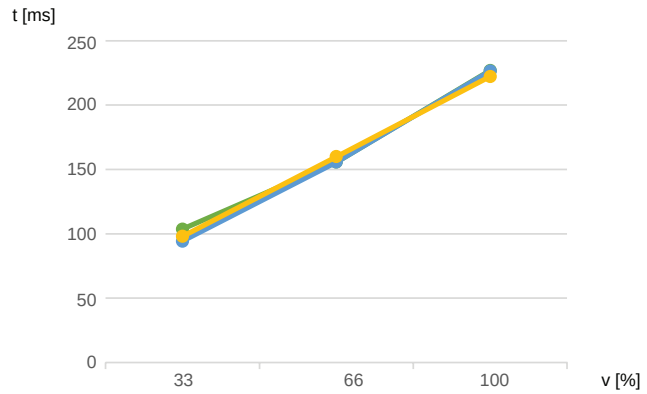


d Run-on path distance

v Joint speed

For further information, refer to IEC 60204-1.

Stopping time for stop category 1:

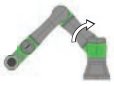


t Stopping time

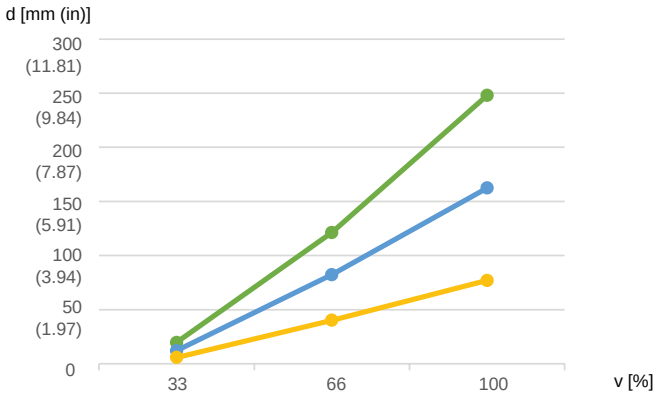
v Joint speed

Run-On Path of LXMRL18S0••• Joint 2

The following graphs present the run-on path and stopping time for joint 2 for three different joint speeds and Lexium Cobot Arm poses.

Graph color	Green	Blue	Yellow
Arm extension	100 %	66 %	33 %
Representation			

Run-on path for stop category 1:

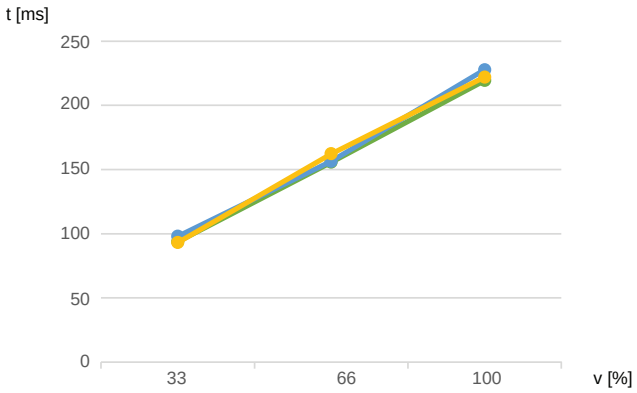


d Run-on path distance

v Joint speed

For further information, refer to IEC 60204-1.

Stopping time for stop category 1:

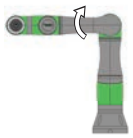


t Stopping time

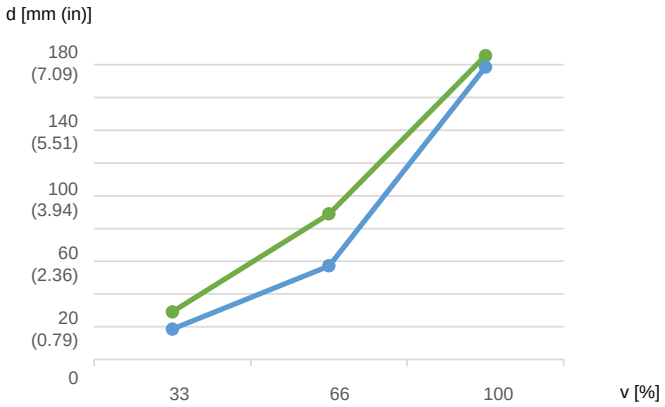
v Joint speed

Run-On Path of LXMRL18S0••• Joint 3

The following graphs present the run-on path and stopping time for joint 3 for two different joint speeds and Lexium Cobot Arm poses.

Graph color	**Green**	**Blue**
Arm extension	100 %	66 %
Representation		

Run-on path for stop category 1:

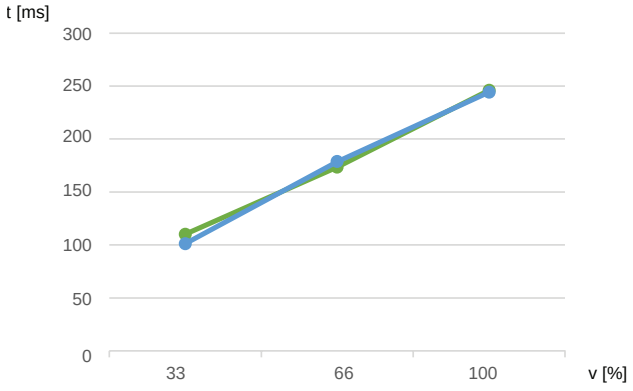


d Run-on path distance

v Joint speed

For further information, refer to IEC 60204-1.

Stopping time for stop category 1:



t Stopping time

v Joint speed

Transport and Commissioning

What's in This Chapter

Transport and Unpacking 115
Mechanical Installation 117
Electrical Installation 128
Functional Safety 136
Initial Start-Up 162
Mounting the Payload 166

Transport and Unpacking

Transport and Storage

Transport Conditions

The Lexium Cobot Arm and the Lexium Cobot Controllers must be handled with care. Shocks and impacts may damage the product. Damage may lead to reduced running accuracy, reduced service life, or to inoperable equipment.

NOTICE
INOPERABLE EQUIPMENT Handle the Lexium Cobot Arm and the Lexium Cobot Controllers with care. **Failure to follow these instructions can result in equipment damage.**

The Lexium Cobot Arm is preassembled before transport.

> **NOTE:** Before unpacking and installing the Lexium Cobot Arm, ensure that the lifting capacity of the lifting devices is sufficient to lift the Lexium Cobot Arm. You can find the total weight of your equipment on the packaging or in the transport documents.

For detailed information about transport conditions, refer to Ambient Conditions, page 39.

Storage

The Lexium Cobot Arm and the Lexium Cobot Controllers 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 Lexium Cobot Arm and the Lexium Cobot Controllers.

NOTICE
INOPERABLE EQUIPMENT Store the Lexium Cobot Arm and the Lexium Cobot Controllers in a sheltered and dry place. **Failure to follow these instructions can result in equipment damage.**

For detailed information about storage conditions, refer to Ambient Conditions, page 39.

Unpacking

Overview

The following figure presents the packaging of the Lexium Cobot Arm and the Lexium Cobot Controllers.

1 Outer carton box of the Lexium Cobot Arm and the Lexium Cobot Controllers

Preparing the Lexium Cobot Arm and the Lexium Cobot Controllers for Installation

Step	Action
1	Open the outer carton on the top side.
2	Lift up and remove the upper inner packaging part.
3	Inspect the Lexium Cobot Arm and the Lexium Cobot controller for transport damage. **NOTE:** You will find the power supply cable inside the Lexium Cobot Cabinet Controller.

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

For information on the disposal of the packaging, refer to Disposal, page 185.

Mechanical Installation

Information About Installation

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

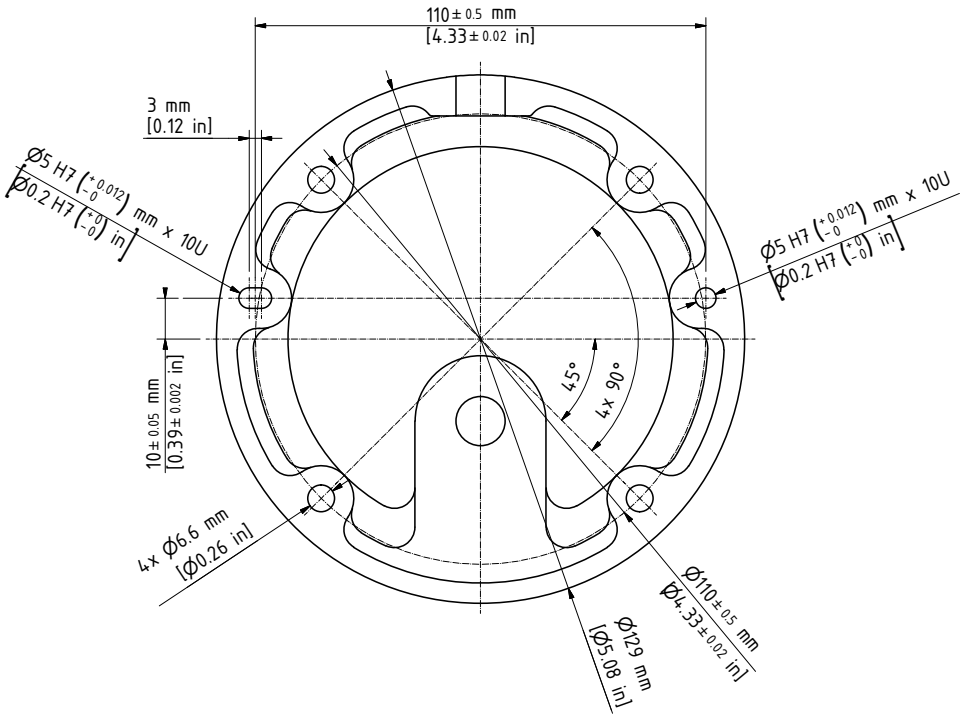
- Injuries and material damage
- Incorrect installation and programming of components
- Incorrect operation of components
- Use of non-authorized cables or modified components

For further Information, refer to *Hazard Information*, page 12.

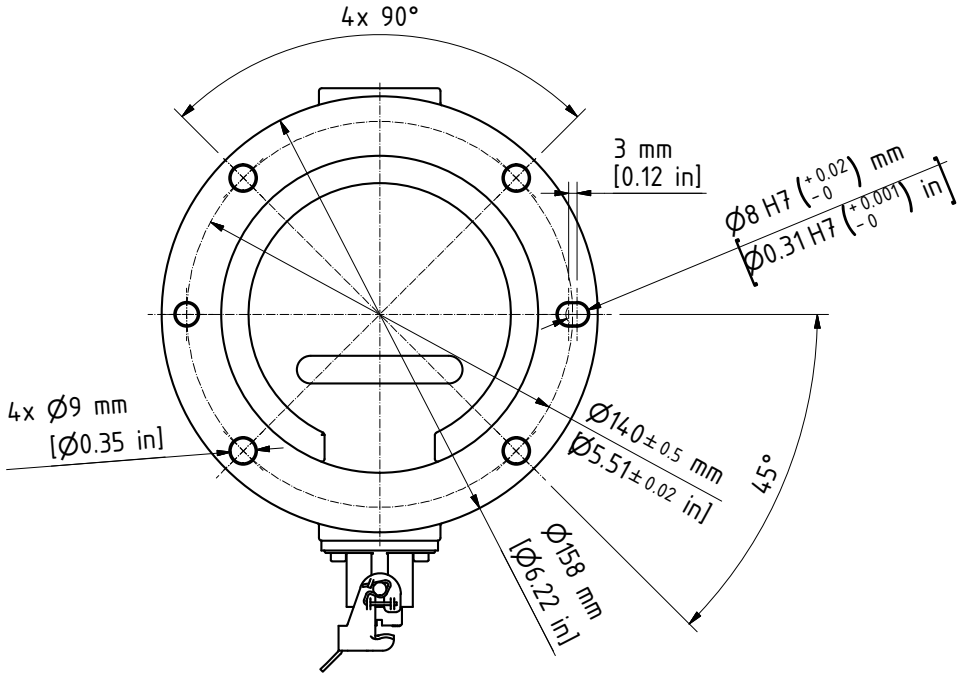
Mounting the Lexium Cobot Arm

Overview

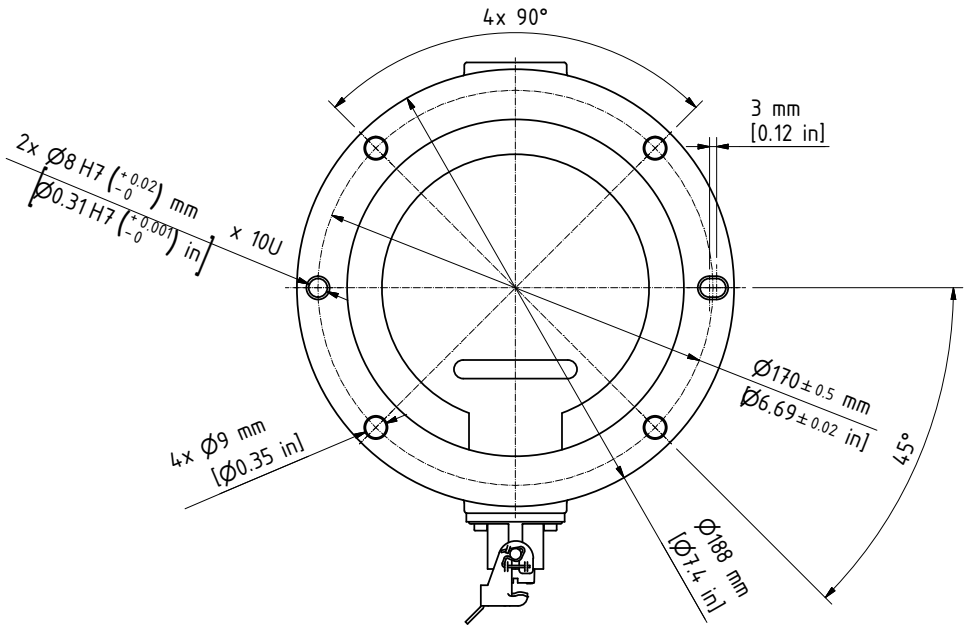
The following figure presents the installation dimensions of LXMRL03S0••• Lexium Cobot Arm base.



The following figure presents the installation dimensions of LXMRL05S0••• / LXMRL07S0••• Lexium Cobot Arm base.



The following figure presents the installation dimensions of LXMRL12S0••• / LXMRL18S0••• Lexium Cobot Arm base.



Mount the Lexium Cobot Arm in such a way that enough space is allowed from any obstacle to provide sufficient working space. Working space should be defined as the maximum path until the hardware safety system limits, as well as the additional run-on paths are reached.

⚠WARNING

CRUSHING, SHEARING, CUTTING AND IMPACT INJURY

- Define the working space required by the application to account for the maximum possible travel path of Lexium Cobot Arm in such a way that collisions can be avoided.
- Define the clearance distance to the zone of operation of the Lexium Cobot Arm so the operational staff cannot be enclosed in the robot mechanics zone of operation.

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

Mounting the Lexium Cobot Arm

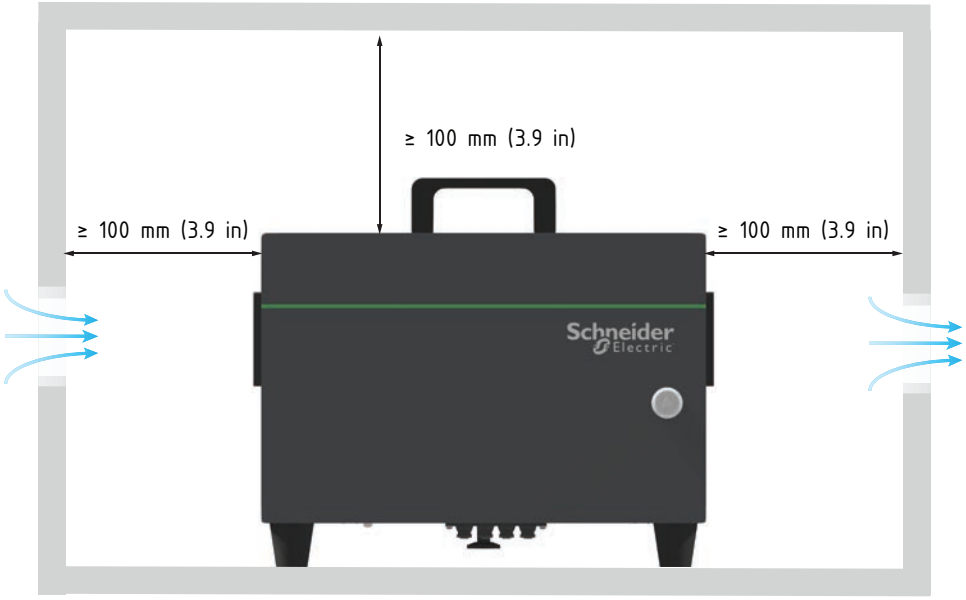
Step	Action
1	Use a lifting device when necessary for lifting up the Lexium Cobot Arm out of the transport packaging. **NOTE:** Lift both tubes of the Lexium Cobot Arm at the same time when moving it from the packaging to the installation position.
2	Place the Lexium Cobot Arm on the mounting surface and hold it in place while completing step 3.
3	Fasten the Lexium Cobot Arm base to the mounting surface by using the four through holes. For additional fixing, centering pins can be added. Tightening torque and size for LXMRL03S0•••: • Four through holes: Ø 6.6 mm (0.26 in) • Bolt size: M6 • Tightening torque: 15 Nm (132.8 lbf-in) **NOTE:** • Property class of the screws: 12.9 or greater. • Two centering pins: Ø 5.0 mm (0.20 in) Tightening torque and size for LXMRL05S0••• / LXMRL07S0••• / LXMRL12S0••• / LXMRL18S0•••: • Four through holes: Ø 9.0 mm (0.35 in) • Bolt size: M8 • Tightening torque: 40.0 Nm (354.0 lbf-in) **NOTE:** • Property class of the screws: 12.9 or greater. • Two centering pins: Ø 8.0 mm (0.32 in)

Mounting the Lexium Cobot Cabinet Controller

Overview

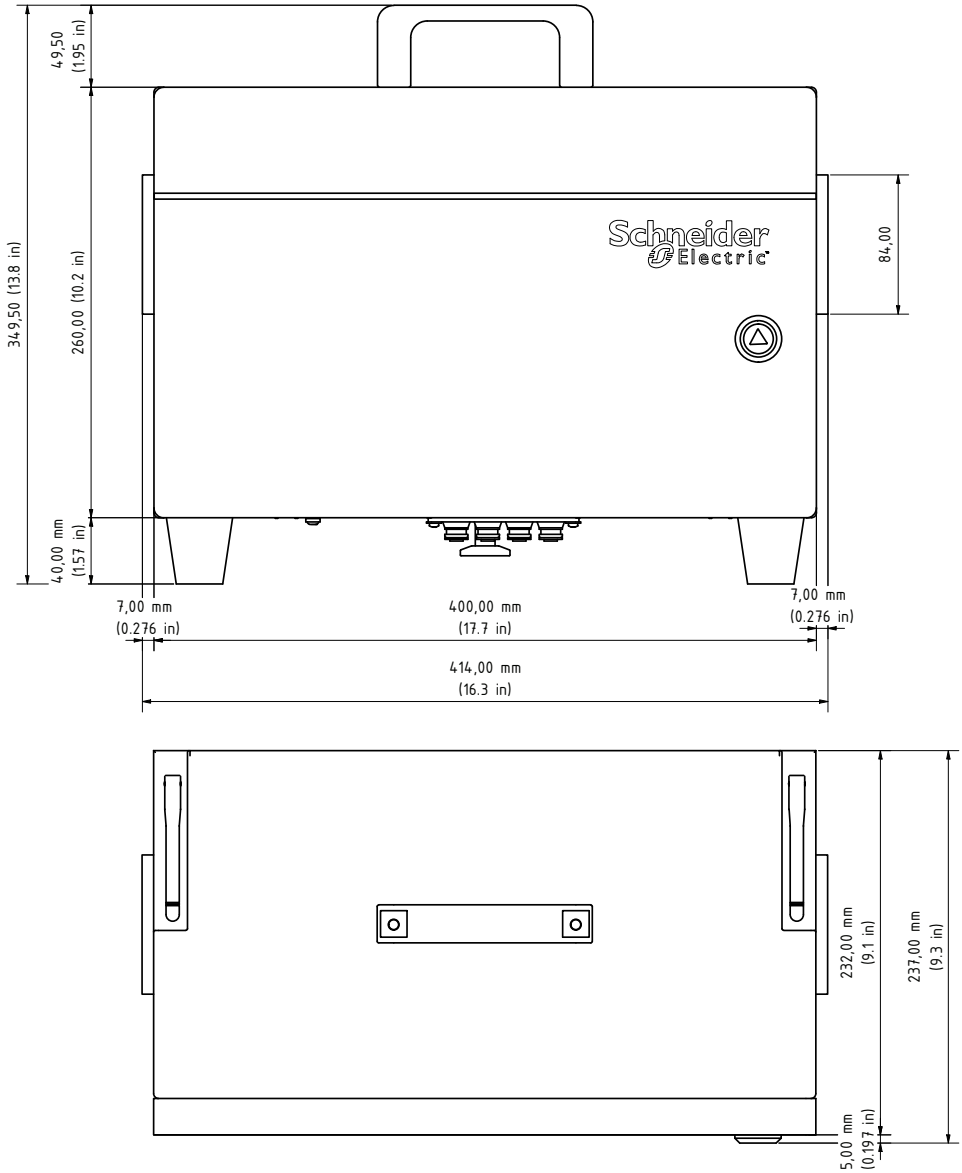
The Lexium Cobot Cabinet Controller is intended to be placed on a plane surface.

The following figure presents the minimum distances and minimum clearances of Lexium Cobot Cabinet Controller installation.



NOTICE
INOPERABLE EQUIPMENT / REDUCTION OF LIFETIME Ensure sufficient airflow for the Lexium Cobot Cabinet Controller, especially if the device is installed in an enclosure. **Failure to follow these instructions can result in equipment damage.**

Installation Dimensions



Mounting the Lexium Cobot Compact Controller

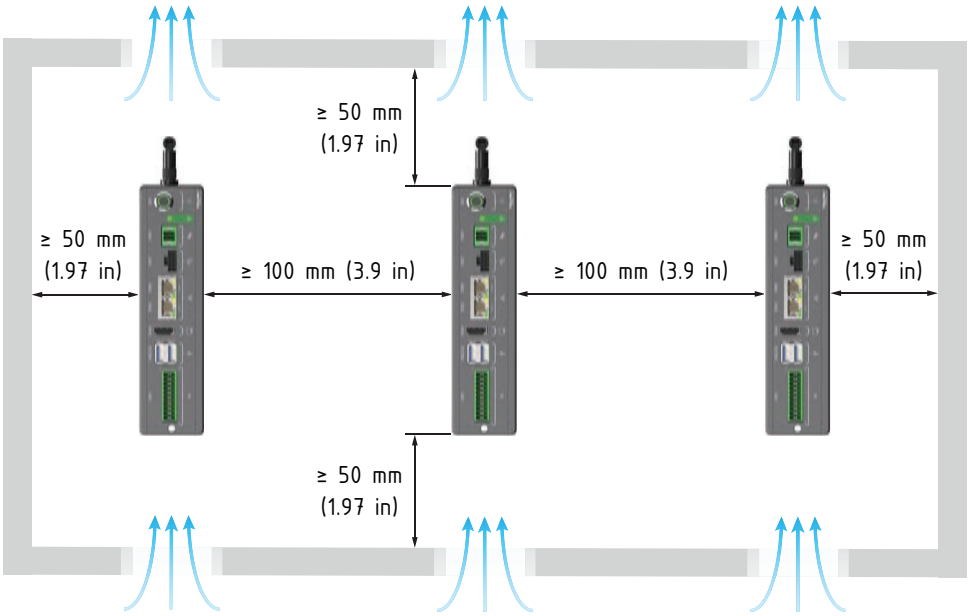
Overview

The Lexium Cobot Compact Controller is intended to be placed on a mounting plate inside an electrical cabinet. There are two installation options:

- Using two angled plates
- Using a hat rail adapter on a DIN rail

Both accessories are included in the scope of delivery.

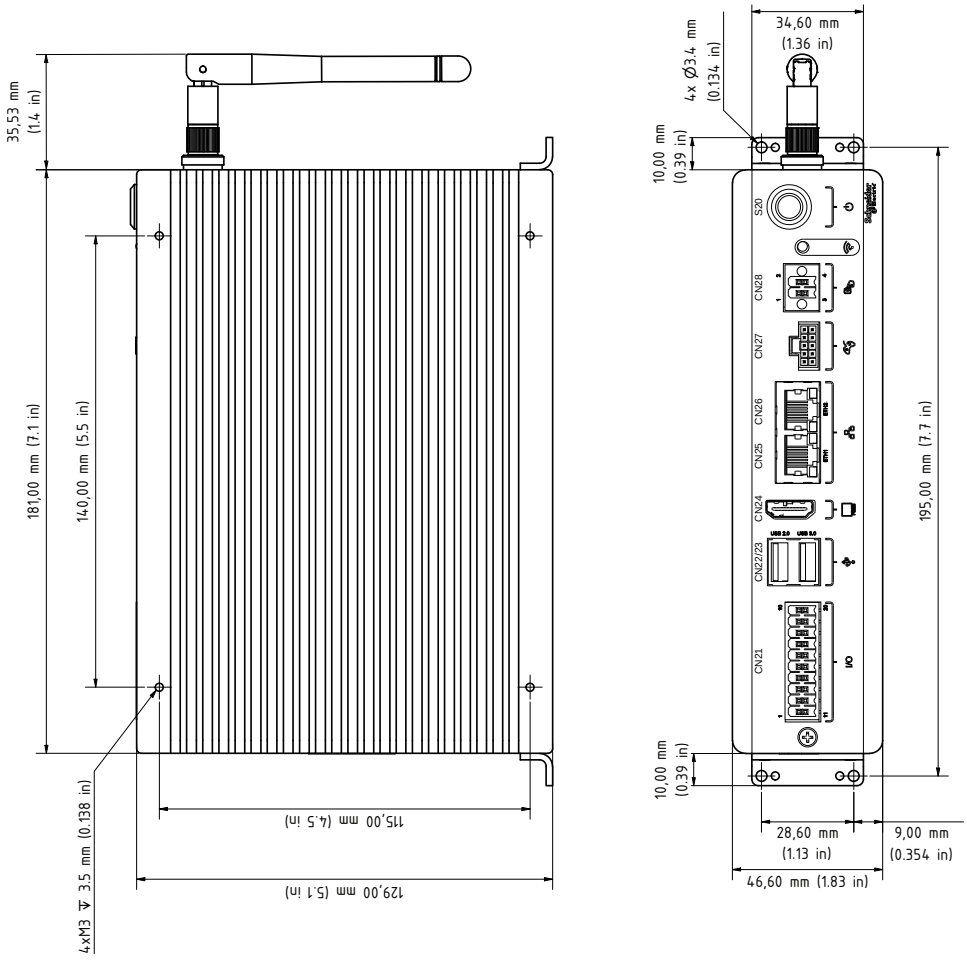
The following figure presents the minimum distances and minimum clearances of Lexium Cobot Compact Controller installation. The blue arrows in the figure represent the airflow in the electrical cabinet.



NOTICE
INOPERABLE EQUIPMENT Ensure sufficient airflow for the Lexium Cobot Compact Controller. **Failure to follow these instructions can result in equipment damage.**

Installation Dimensions

The following figure presents the installation dimensions with mounted angled plates:



Installation Using Two Angled Plates

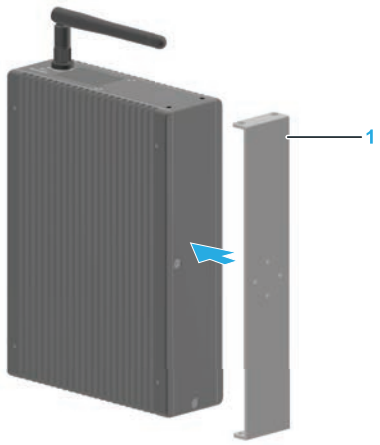
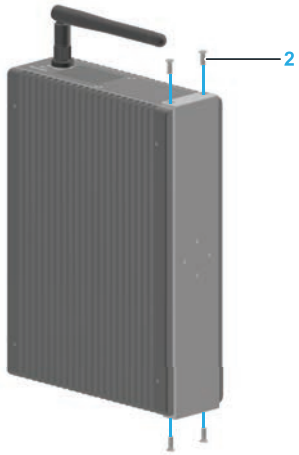
The mount the Lexium Cobot Compact Controller on the rear using the two angled plates, perform the following steps.

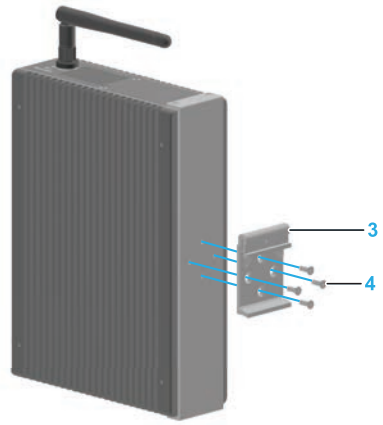
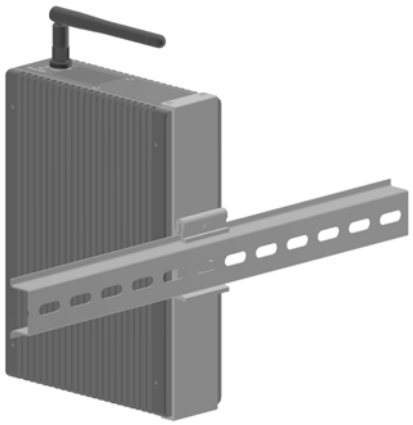
Step	Action
1	Fasten the two angled plates (2) to the Lexium Cobot Compact Controller with the M3 7 mm (0.276 in) screws (1). Tightening torque: 1.4 Nm (12.4 lbf-in)  **NOTE:** The two angled plates and the appropriate M3 screws are included in the scope of delivery of the Lexium Cobot Compact Controller.
2	Fasten the Lexium Cobot Compact Controller to the mounting surface by using the through holes of the two angled plates. Tightening torque and size: • Four through holes: Ø 3.4 mm (0.134 in) • Bolt size: M3 • Tightening torque: 1.4 Nm (12.4 lbf-in) **NOTE:** Property class of the screws: 8.8 or greater. 

Installation Using the Hat Rail Adapter

The mount the Lexium Cobot Compact Controller on a DIN rail using the hat rail adapter, perform the following steps.

NOTE: Use a 35 mm x 15 mm (1.38 in x 0.59 in) DIN rail according to EN 50022 or similar.

Step	Action
1	Position the adapter plate (1) at the Lexium Cobot Compact Controller.  **NOTE:** The adapter plate, the hat rail adapter, and the appropriate M3 screws are included in the scope of delivery of the Lexium Cobot Compact Controller.
2	Fasten the adapter plate with the M3 7 mm (0.276 in) screws (2). Tightening torque: 1.4 Nm (12.4 lbf-in) 

Step	Action
3	Fasten the hat rail adapter (3) to the adapter plate with the four M3 3 mm (0.118 in) screws (4). Use the medium strength threadlocking adhesive Loctite 243 for this purpose. 
4	Mount the Lexium Cobot Compact Controller to the DIN rail. 

Electrical Installation

Cabling the Lexium Cobot

Overview

Verify the correct routing and fastening of the cables to help prevent any collision of cables and moving parts.

⚠⚠DANGER

ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

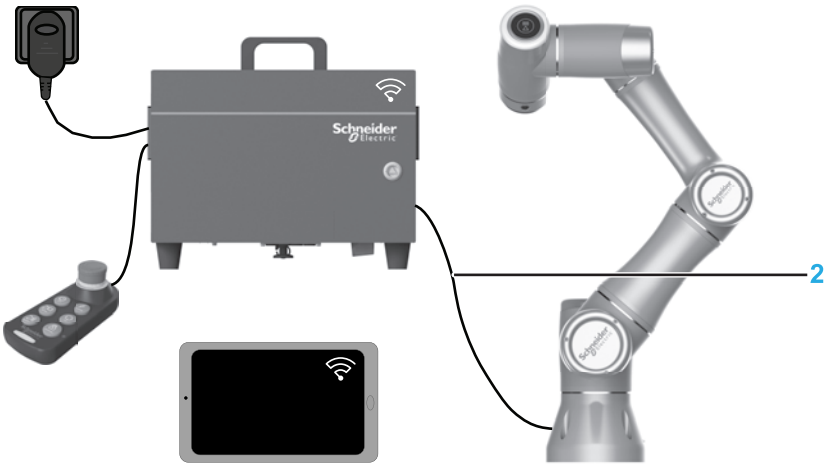
- Disconnect all power from all equipment including connected devices prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires except under the specific conditions specified in the appropriate hardware guide for this equipment.
- Always use properly 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.
- Insulate any unused conductors on both ends of the cable.
- Ensure that all power cables are correctly connected in and connectors are locked in place during the entire operation time of the system.

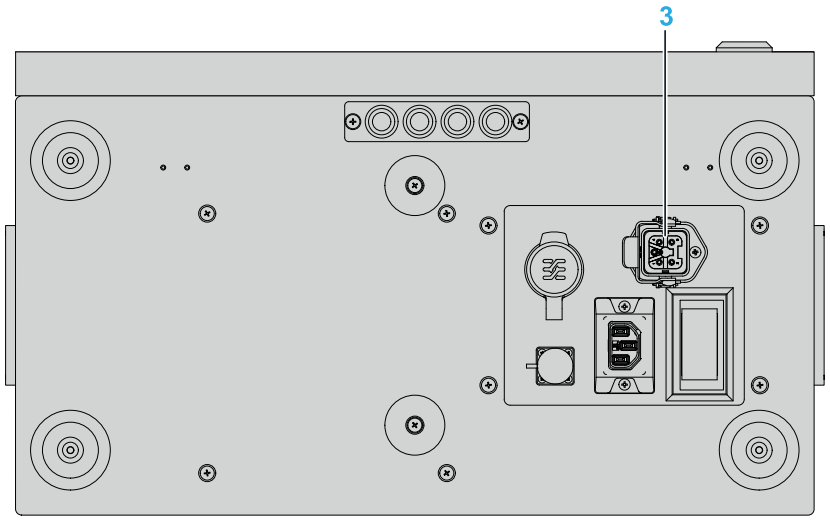
Failure to follow these instructions will result in death or serious injury.

Cabling the Lexium Cobot Arm to the Lexium Cobot Cabinet Controller

If your controller is a Lexium Cobot Compact Controller, refer to Cabling the Lexium Cobot Arm to the Lexium Cobot Compact Controller, page 131.

Cabling the Lexium Cobot Arm according to the system architecture with a Lexium Cobot Cabinet Controller.

Step	Action
1	For the Lexium Cobot Arm LXMRL05S0••• / LXMRL07S0••• / LXMRL12S0••• / LXMRL18S0•••: Connect the power supply cable to the connector CN1 (1) on the base of the Lexium Cobot Arm. Use the straight connector of the power supply cable with the Lexium Cobot Arm. Close the locking mechanism of the connector to help secure the cable in place.  **NOTE:** For the Lexium Cobot Arm LXMRL03S0•••, the cable is integrated into the Lexium Cobot Arm.
2	Feed the power supply cable (2) to the bottom panel of the Lexium Cobot Cabinet Controller. Use the angled connector of the power supply cable with the Lexium Cobot Cabinet Controller. 

Step	Action
3	Connect the CN14 connector (3) and lock the bracket. 
4	Verify the correct routing and fastening of the cables to help prevent any collision of cables and moving parts.

⚠⚠DANGER

ELECTRIC SHOCK

Verify that the input power of the Lexium Cobot Cabinet Controller is protected with an RCD (Residual Current Device).

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

⚠WARNING

UNINTENDED EQUIPMENT OPERATION

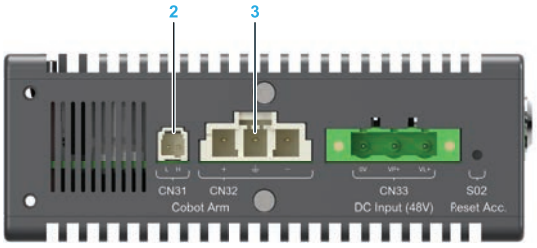
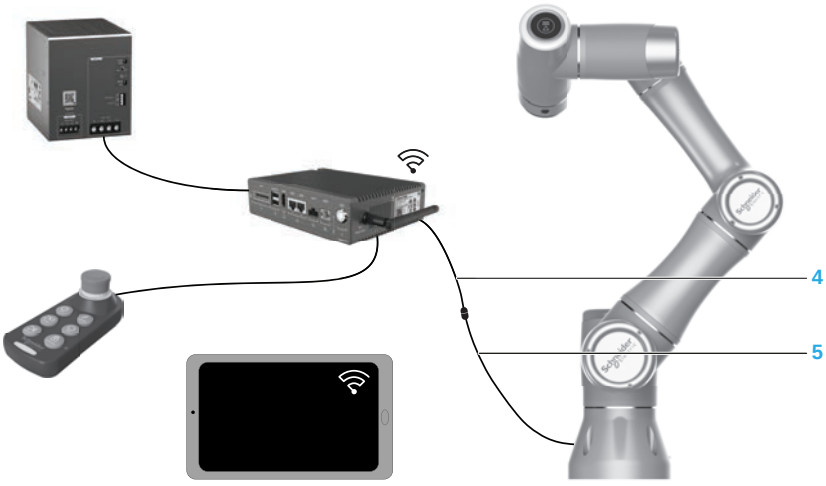
- Only use hardware components approved by Schneider Electric for use with this equipment.
- Do not extend or modify the cable set.
- Verify that all cables are connected correctly before the Lexium Cobot controller is powered.
- Verify the connections for tight fit.

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

Cabling the Lexium Cobot Arm to the Lexium Cobot Compact Controller

If your controller is a Lexium Cobot Cabinet Controller, refer to Cabling the Lexium Cobot Arm to the Lexium Cobot Cabinet Controller, page 129.

Cabling the Lexium Cobot Arm according to the system architecture with a Lexium Cobot Compact Controller.

Step	Action
1	For the Lexium Cobot Arm LXMRL05S0••• / LXMRL07S0••• / LXMRL12S0••• / LXMRL18S0•••: Connect the power supply cable to the connector CN1 (1) on the base of the Lexium Cobot Arm. Use the straight connector of the power supply cable with the Lexium Cobot Arm. Close the locking mechanism of the connector to help secure the cable in place.  **NOTE:** For the Lexium Cobot Arm LXMRL03S0•••, the cable is integrated into the Lexium Cobot Arm.
2	Connect the adapter cable to the connectors CN31 (2) and CN32 (3) at the Lexium Cobot Compact Controller. 
3	Connect the angled connector of the connection cable (5) of the Lexium Cobot Arm to the adapter cable (4) and close the locking clip. 
4	Verify the correct routing and fastening of the cables to help prevent any collision of cables and moving parts.

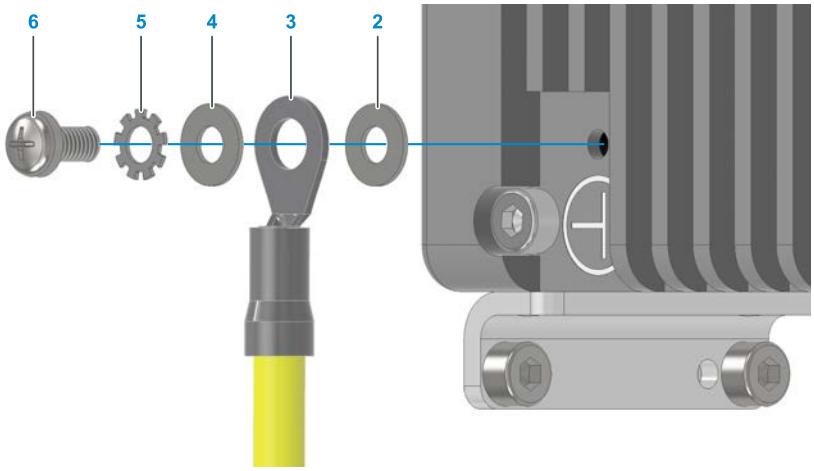
⚠WARNING

UNINTENDED EQUIPMENT OPERATION

- Only use hardware components approved by Schneider Electric for use with this equipment.
- Do not extend or modify the cable set.
- Verify that all cables are connected correctly before the Lexium Cobot controller is powered.
- Verify the connections for tight fit.

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

Grounding the Lexium Cobot Compact Controller

Step	Action
1	Feed and fasten the ground cable (protective earth ground) to the ground connection (1) of the Lexium Cobot Compact Controller housing. The ground connection is marked with the following symbol:  
2	Mount the ground cable (protective earth ground) in the following order: • Washer M3 (2) • Ring cable lug M3 (3) • Washer M3 (4) • Lock washer M3 (5) • Screw M3 (6)  Tightening torque: 1.4 Nm (12.4 lbf-in), property class of the screw: 8.8 or greater **NOTE:** Ground cable cross-section 2.5 mm² (AWG 13.2) or greater.
3	Verify the correct routing and fastening of the cables to help prevent any collision of cables and moving parts.

⚠⚠DANGER

ELECTRIC SHOCK DUE TO IMPROPER GROUNDING

Ground robot components in accordance with local, regional and/or national standards and regulations at a single, central point.

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

Multipoint grounding is permissible if connections are made to an equipotential ground plane dimensioned to help avoid cable shield damage in the event of power system short-circuit currents.

Reducing Risks Around the Lexium Cobot Arm

Risks

A direct or indirect physical contact relationship exists when an interaction between the operator and the Lexium Cobot exists. Operators must have sufficient self-protection awareness when contacting, and integrators need to carefully consider the use conditions when using the Lexium Cobot. The following are possible hazardous situations:

- The Lexium Cobot dropping during handling
- The loosening of the Lexium Cobot fixing screw
- Finger pinching and collision injury during the operation
- Operation with an unrepaired, or otherwise unmaintained Lexium Cobot
- The use of a sharp end-effector or tool connection
- Operation in a toxic or corrosive environment

Emergency Stop

When an emergency occurs, press the emergency stop button to stop all movement of the Lexium Cobot immediately. Note that an emergency stop button does not constitute a risk reduction measure. It is considered as a secondary protective device.

⚠WARNING

UNINTENDED EQUIPMENT OPERATION

- Use appropriate protective devices (functional safety devices) in compliance with local and national standards.
- 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.
- Apply all measures from the hazard and risk analysis before putting the system in service.
- Install and operate the device only in the intended environment considering the residual risks.
- Do not disassemble, repair, or modify this equipment.

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

External Functional Safety Devices

Install external safety-related devices in accordance to local regulations and standards.

⚠WARNING

UNINTENDED EQUIPMENT OPERATION

- Use appropriate protective devices (functional safety devices) in compliance with local and national standards.
- 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.
- Apply all measures from the hazard and risk analysis before putting the system in service.
- Install and operate the device only in the intended environment considering the residual risks.
- Do not disassemble, repair, or modify this equipment.

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

Functional Safety

General Information

The Lexium Cobot provides 27 safety functions (SF) that have been designed and tested for functional safety in accordance with the following standards:

- IEC 60204-1
- ISO 13849-1

NOTE: Due to the limited number of digital I/O connections available for the Lexium Cobot Compact Controller, the number of safety functions used simultaneously is restricted.

These safety functions are gathered in 8 groups:

- Emergency Stop Safety Functions, page 139
- Protective Stop Safety Functions, page 142
- Hand Guiding / Manual Mode Safety Functions, page 145
- Speed Monitoring (Reduced Mode) Safety Functions, page 147
- Torque and Power Limitations Safety Functions, page 150
- Collision Protection Safety Functions, page 152
- Position Monitoring Safety Functions, page 155
- Motion Status Safety Functions, page 157

The following table provides an overview of the safety functions per group. For detailed information on the specific reaction sequence, the defined safe state, and the stopping time, refer to the description of the respective group of safety functions.

NOTE: The following sections of this chapter describe the logical behavior of the safety functions. High and Low correspond to logical states 1 and 0. For details on the electrical wiring, refer to Electrical Connections, page 63.

Group of safety function	Safety Function	Description
Emergency stop	SF1 – Emergency Stop Button on the Control Stick	Pressing the emergency stop pushbutton on the Control Stick results in an emergency stop.
	SF2 – External Emergency Stop Button	Pressing the external emergency stop pushbutton connected to CN8 results in an emergency stop.
	SF15 – Additional Emergency Stop Input	Pressing the external emergency stop pusbutton connected to the digital inputs (configurable by software) results in an emergency stop.
	SF19 – Emergency Stop Button State (Digital Output)	Digital output (configurable by software) with a low state when the emergency stop button on the Control Stick is pressed.
	SF20 – Emergency Stop State (Digital Output)	Digital output (configurable by software) with a low state when the emergency stop state is active.
Protective stop	SF3 – External Protective Stop	Pressing the external protective stop pushbutton connected to CN8 results in a protective stop.
	SF16 – Additional Protective Stop Input	Pressing the external protective stop pushbutton connected to the digital inputs (configurable by software) results in a protective stop.
	SF17 – Protective Stop Reset Input	If configured, this function enables manual resetting of the protective stop by the rising edge on the digital inputs (configurable by software).
	SF21 – Protective Stop State (Digital Output)	Digital output (configurable by software) with a low state if the protective stop is active.

Group of safety function	Safety Function	Description
Hand guiding / manual mode	SF13 – TCP Speed Limit in Hand Guiding	The dragging speed limit of the TCP in hand-guided mode can be adjusted. Exceeding the limit results in a defined safe state.
	SF27 – 3-Position Enable Switch Input	Optional 3-position enable switch inputs for manual mode. The Lexium Cobot Arm can only be moved when the signal is high and is stopped as soon as the signal is low.
Speed monitoring (Reduced Mode)	SF5 – Joint Speed Limit	Exceeding a Joint Speed Limit results in a defined safe state. Each joint can have its own limit.
	SF9 – TCP Speed Limit	Exceeding TCP speed limit results in a defined safe state.
	SF18 – Reduced Mode Input	Reduced mode with pre-defined motion values can be activated via digital inputs (configurable by software).
	SF24 – In Reduced Mode (Digital Output)	Configurable digital output with a low state if the reduced mode is active.
	SF25 – Not in Reduced Mode (Digital Output)	Configurable digital output with a low state if the reduced mode is not active.
Torque and power limitations	SF6 – Joint Torque Limit	Exceeding a joint torque limit results in a defined safe state.[1]
	SF7 – Joint Power Limit	Exceeding the joint power limit results in a defined safe state.[1]
	SF8 – Robot Power Limit	Exceeding the power limit of the Lexium Cobot Arm results in a defined safe state.
Collision protection	SF12 – TCP Position Mismatch Limit	Exceeding the position mismatch limit is handled as collision detection and results in a defined safe state.[1]
	SF14 – Collision Protection	Collision is monitored by various feedback parameters. Collision detection results in a defined safe state.
	SF26 – TCP Force Limit	Exceeding the TCP force limit is handled as collision detection and results in a defined safe state.
Position monitoring	SF4 – Joint Position Limit	Exceeding the joint position limit results in a defined safe state. Each joint can have its own limit.
	SF10 – Tool Orientation Limit	Optionally, the tool orientation limit can be configured. Exceeding the limit results in a defined safe state.
	SF11 – Safety Planes	Optionally, safety planes (TCP Position Limit) can be configured. Exceeding the limit results in a defined safe state.
Motion status	SF22 – Robot in Motion (Digital Output)	Digital output (configurable by software) with a low state if the Lexium Cobot Arm is moving.
	SF23 – Robot Not Stopping (Digital Output)	Digital output (configurable by software) with a low state if the Lexium Cobot Arm is not in a defined safe state. The output signal is high if the Lexium Cobot Arm is decelerated to stop and stays high while the Lexium Cobot Arm is at standstill due to a protective stop or emergency stop.
1) This limit is a factory setting that cannot be modified. It considers the internal parameters of the joints.		

Process for Minimizing Risks Associated with the Lexium Cobot

General

The goal of designing machines safely is to protect people. The risk associated with electrically controlled robots comes chiefly from moving machine parts and 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 robot. Therefore, only you can determine the collaborative robotic 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 system, 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 local 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 robot.
- Use appropriate safety interlocks where personnel and/or equipment hazards exist.
- 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 system to a reasonable degree: To perform risk assessment and risk minimization according to ISO 12100, proceed as follows:

1. Defining the boundary of the system.
2. Identifying risks associated with the system.
3. Assessing risks.
4. Evaluating risks.
5. Minimizing risks by:
    - Intrinsically safe design
    - Protective devices
    - User information (see ISO 12100)

Additional information is available on www.se.com.

Emergency Stop Safety Functions

Functional Description

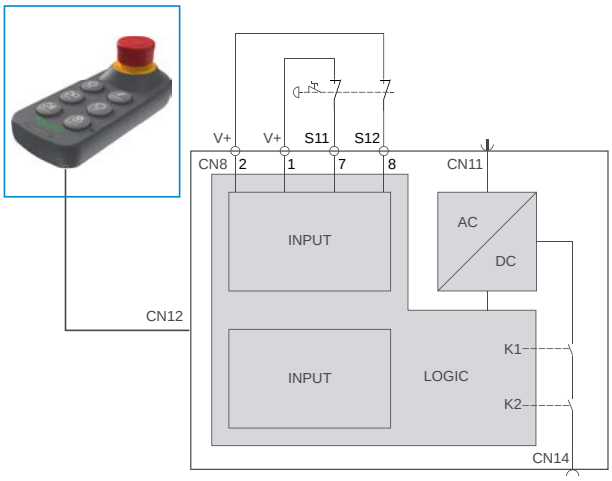
The Lexium Cobot system provides the following options to implement an emergency stop:

- Emergency stop pushbutton on the Lexium Cobot Control Stick (SF1).
- External emergency stop safety-related device (for example, pushbuttons, light curtains, safety-related mats or other such device) connected to CN8 at the Lexium Cobot Cabinet Controller or to the emergency stop interface connector at the Lexium Cobot Compact Controller (SF2).
- Additional emergency stop safety-related device connected to a two-channel safety-related digital input at the Lexium Cobot Controllers, if configured in EcoStruxure Cobot Expert (SF15).

Connected emergency stops can be used together. When one of the emergency stops is requested, the Lexium Cobot system stops the Lexium Cobot Arm motion, engages the internal brake, and powers off the Lexium Cobot Arm after a maximum stopping time of 250 ms (stop category 1 in accordance with IEC 60204-1). The executed program of the Lexium Cobot system is stopped and terminated.

NOTE: The emergency stop functions take priority over other safety-related functions.

The following figure shows an example of the wiring of the Lexium Cobot Cabinet Controller.

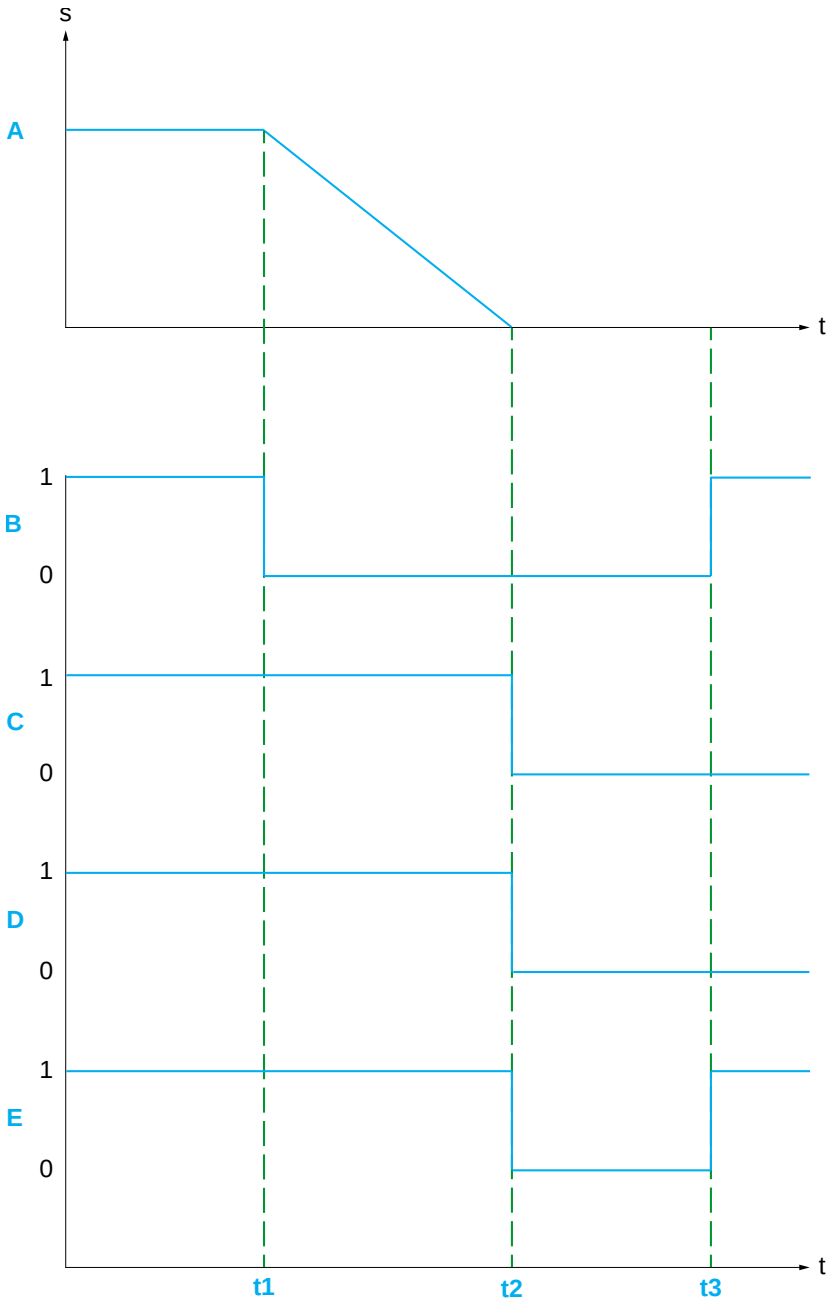


The Lexium Cobot Controllers can also control other systems with the following safety-related outputs:

- Lexium Cobot Control Stick emergency stop pushbutton state two-channel safety-related digital output, if configured in EcoStruxure Cobot Expert (SF19).
- Emergency stop state of the Lexium Cobot system two-channel safety-related digital output, if configured in EcoStruxure Cobot Expert (SF20).

For example, the status of one Lexium Cobot system can be connected to another Lexium Cobot system to synchronize the emergency stop status.

The following graphic presents the emergency stop sequence.



s Motion speed

t Time

A Lexium Cobot Arm motion speed

B Emergency stop input signal

C Lexium Cobot Arm is disabled (0) or enabled (1)

D Lexium Cobot Arm is powered off (0) or powered on (1)

E SF19 and SF20 (SF19 only if the emergency stop is triggered by SF1)

t1 Emergency stop pushbutton is pressed

t2 Maximum stopping time of 250 ms

t3 Emergency stop pushbutton is released

Diagnostic

The Lexium Cobot Controllers monitor the status of the safety-related inputs. If inconsistent signals are detected, the Lexium Cobot system performs a category 1 stop with a maximum stopping time of 250 ms. After this time, the Lexium Cobot Arm is powered off. The corresponding diagnostic messages are displayed in EcoStruxure Cobot Expert.

Protective Stop Safety Functions

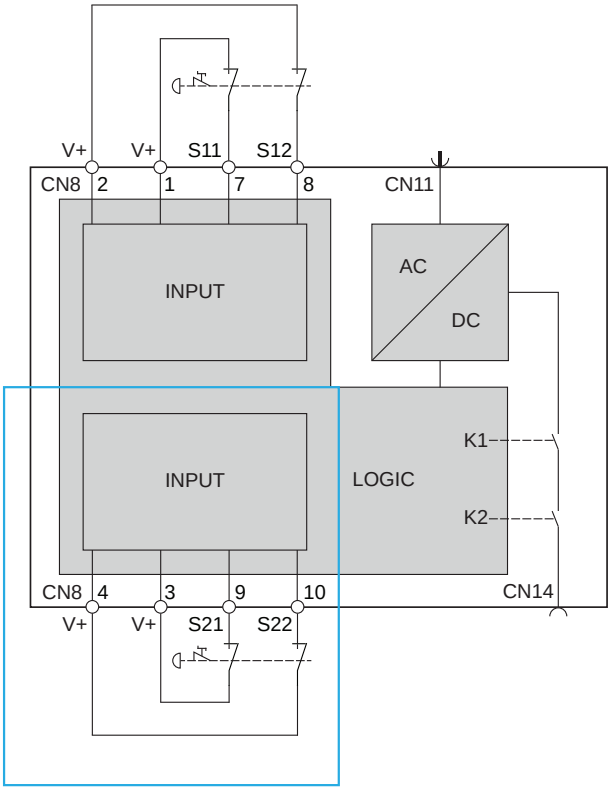
Functional Description

The Lexium Cobot system provides the following options to implement a protective stop:

- Connecting a suitable safety-related external device to CN8 (pin S21 and S22) at the Lexium Cobot Cabinet Controller or to the I/O interface (pin 15 and 16) at the Lexium Cobot Compact Controller (SF3).
- Connecting a suitable safety-related external device to a two-channel safety-related digital input at the Lexium Cobot Controllers, if configured in EcoStruxure Cobot Expert (SF16).

Connected protective stops can be used together. If a protective stop is requested, the Lexium Cobot system stops the Lexium Cobot Arm motion. The Lexium Cobot Arm remains enabled and keeps the position (stop category 2 in accordance with IEC 60204-1 with a maximum response time of 350 ms). The executed program of the Lexium Cobot system is paused.

The following figure presents an example of the wiring of the Lexium Cobot Cabinet Controller.

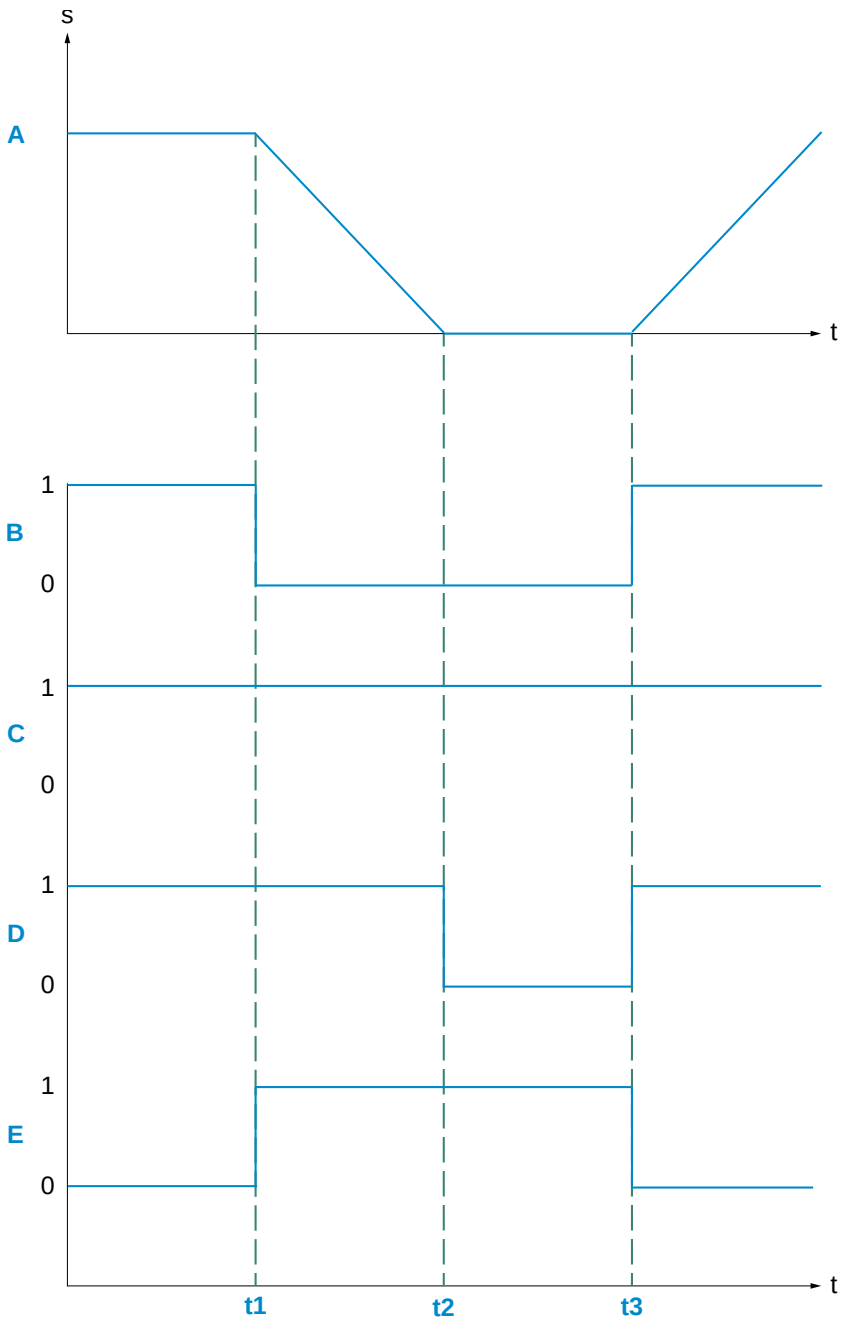


The Lexium Cobot Controllers can also control other systems with the following safety-related output:

Protective stop of the Lexium Cobot system two-channel safety-related digital output, if configured in EcoStruxure Cobot Expert (SF21).

For example, the status of one Lexium Cobot system can be connected to another Lexium Cobot system to synchronize the protective stop status.

The following graphic presents the default protective stop sequence with automatic reset.



s Motion speed

t Time

A Lexium Cobot Arm motion speed

B Protective stop input signal

C Lexium Cobot Arm powered on and enabled

D Output of SF21

E Program paused

t1 Protective stop pushbutton is pressed

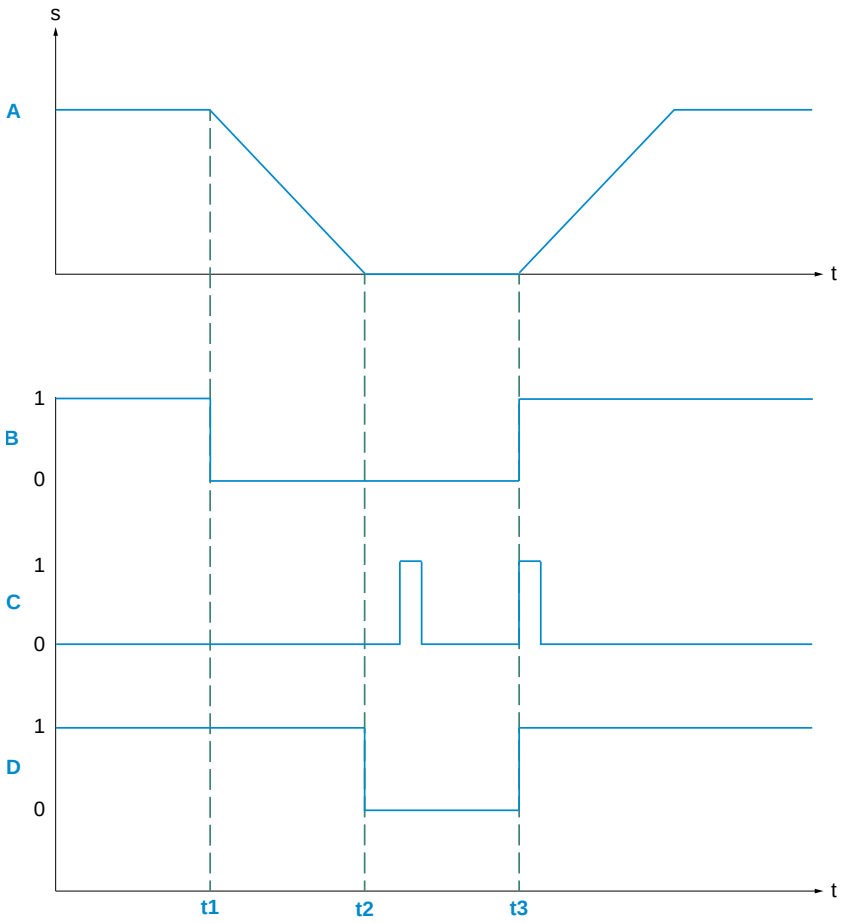
t2 Maximum stopping time of 350 ms

t3 Protective stop pushbutton is released

The protective stop is set to auto-reset by default. Alternatively, manual reset is possible using the following two-channel safety-related input:

Protective stop reset two-channel safety-related digital input at the Lexium Cobot Controllers, if configured by EcoStruxure Cobot Expert (SF17). Reset is requested by the rising edge signal.

The following graphic presents the protective stop sequence with manual reset configured.



s Motion speed

t Time

A Lexium Cobot Arm motion speed

B Protective stop input signal

C Protective stop manual reset input signal

D Output of SF21

t1 Protective stop pushbutton is pressed

t2 Maximum stopping time of 350 ms

t3 Protective stop pushbutton is released

Diagnostic

The Lexium Cobot Controllers monitor the status of the safety-related inputs. If inconsistent signals are detected, the Lexium Cobot system performs a category 2 stop. If the arm is still moving after the stopping time, a category 2 stop is performed as a fallback. The corresponding diagnostic messages are displayed in EcoStruxure Cobot Expert.

Hand Guiding / Manual Mode Safety Functions

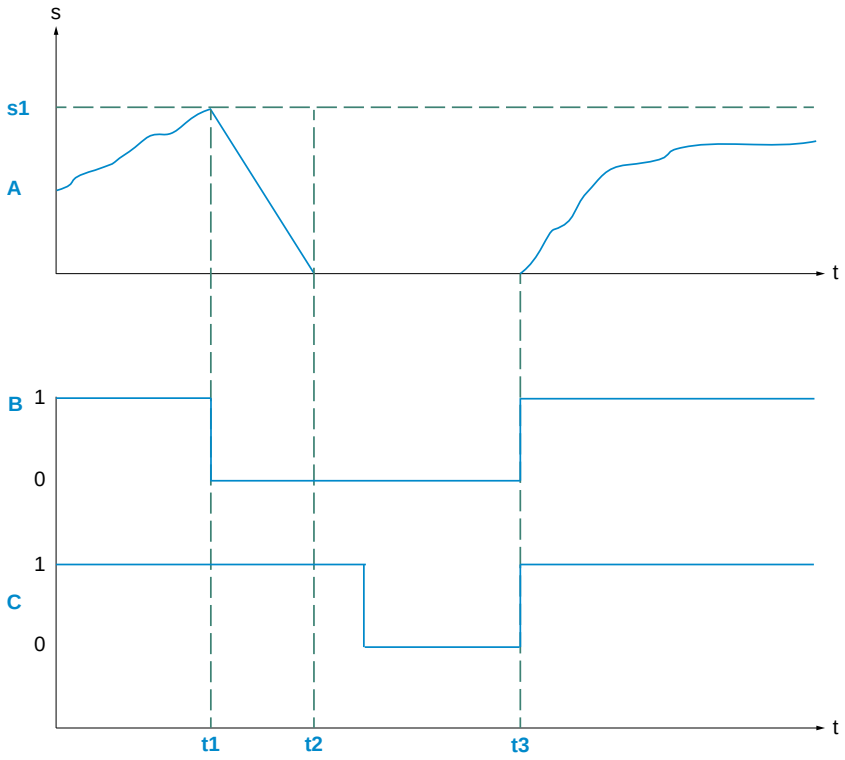
Functional Description

The hand-guided mode for the Lexium Cobot Arm can be activated by holding the **FREE** button or the **play/pause** button, both of which are located at the tool flange.

The Lexium Cobot Arm monitors the linear speed of the TCP in hand-guided mode (SF13). If the TCP speed limit is exceeded, the system stops the Lexium Cobot Arm motion and the Lexium Cobot Arm keeps the position (category 2 stop in accordance with IEC 60204-1 with a maximum response time of 350 ms).

The default value for the limit is 250 mm/s. This limit can be configured in EcoStruxure Cobot Expert. For detailed information on configuring the TCP speed limit in hand-guided mode, refer to the chapter For details, refer to *Safety Setting* in the *EcoStruxure Cobot Expert Software Guide*.

The following graphic presents the hand-guided mode sequence for SF13.



s Motion speed

t Time

A Lexium Cobot Arm motion speed

B Hand-guided mode is inactive (0) or active (1)

C **FREE** or **play/pause** button signal (1 = pressed, 0 = released)

s1 TCP speed limit in hand-guided mode

t1 TCP speed limit exceeded

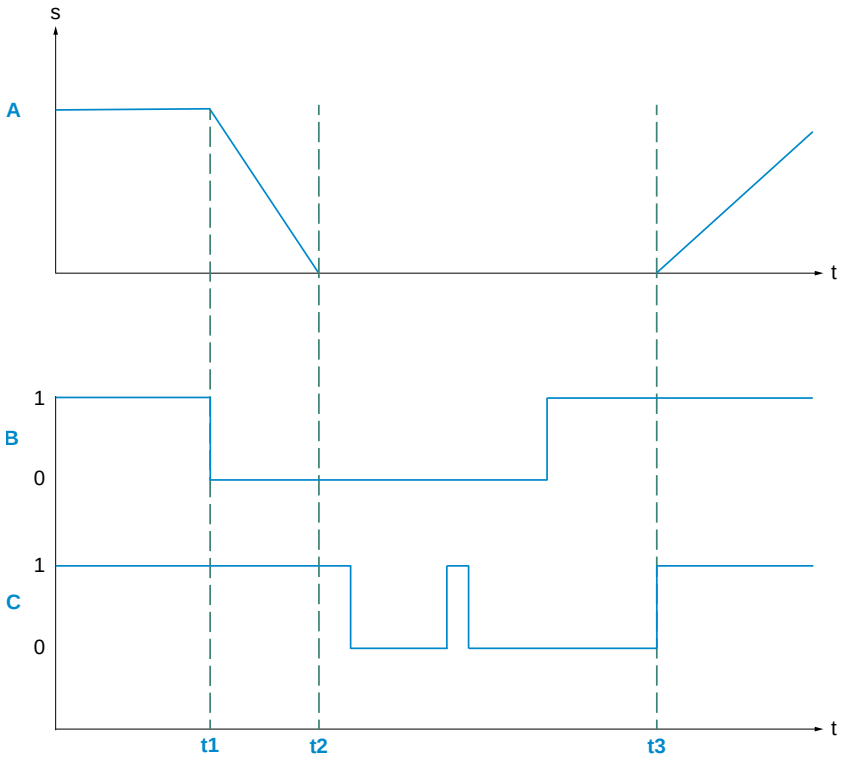
t2 Maximum stopping time of 350 mm/s

t3 **FREE** or **play/pause** button is pressed again

If configured in EcoStruxure Cobot Expert, an external 3-position enable switch can be connected to a two-channel safety-related digital input (SF27). The 3-position enable switch input only affects the manual mode (jogging).

If the signal of the 3-position enable switch is low, the system stops the Lexium Cobot Arm motion and the Lexium Cobot Arm keeps the position (category 2 stop in accordance with IEC 60204-1 with a maximum response time of 350 ms).

The following graphic presents the functional logic for SF27.



s Motion speed

t Time

A Lexium Cobot Arm motion speed

B 3-position enable switch input

C Jog signal (1 = active, 0 = released)

t1 3-position enable switch signal is low

t2 Maximum stopping time of 350 mm/s

t3 Jogging is requested again

Diagnostic

The Lexium Cobot Controllers monitor the state of the safety-related inputs. If inconsistent signals are detected, the Lexium Cobot system performs a category 2 stop. The corresponding diagnostic messages are displayed in EcoStruxure Cobot Expert.

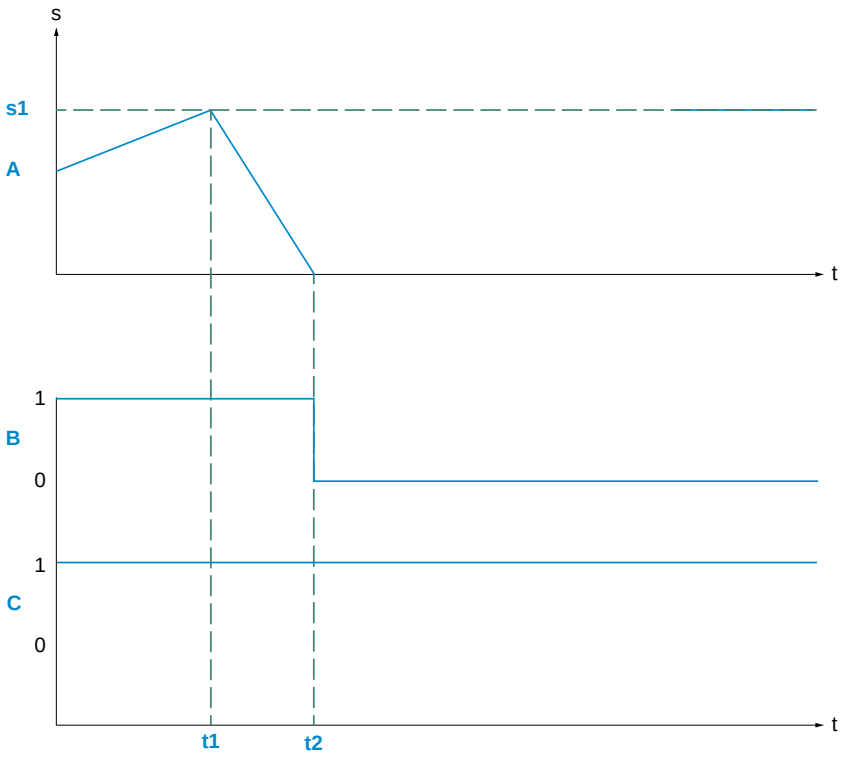
Speed Monitoring (Reduced Mode) Safety Functions

Functional Description

The Lexium Cobot system monitors the angular speed of each joint (SF5) and the linear speed of the TCP (SF9) of the Lexium Cobot Arm during operation. If the configured limits are exceeded, the Lexium Cobot system stops the Lexium Cobot Arm motion, engages the internal brake and removes power from the Lexium Cobot Arm joints after a maximum stopping time of 250 ms (category 1 stop in accordance with IEC 60204-1). The Lexium Cobot Arm remains powered but is disabled.

These limits must be configured in EcoStruxure Cobot Expert. For detailed information on configuring the joint speed limit and the TCP speed limit, refer to the chapter *Safety Setting* in the *EcoStruxure Cobot Expert Software Guide*.

The following graphic presents the speed monitoring sequence.



s Motion speed

t Time

A Lexium Cobot Arm joint / TCP speed

B Lexium Cobot Arm is disabled (0) or enabled (1)

C Lexium Cobot Arm is powered off (0) or powered on (1)

s1 Joint speed limit / TCP speed limit

t1 Joint speed limit or TCP speed limit exceeded

t2 Maximum stopping time of 250 ms

The Lexium Cobot also provides a reduced mode that can be configured according to your risk assessment. For detailed information on the configuration, refer to the chapter *Reduced Mode* in the *EcoStruxure Cobot Expert Software Guide*. The following table shows maximum allowed reduced mode values:

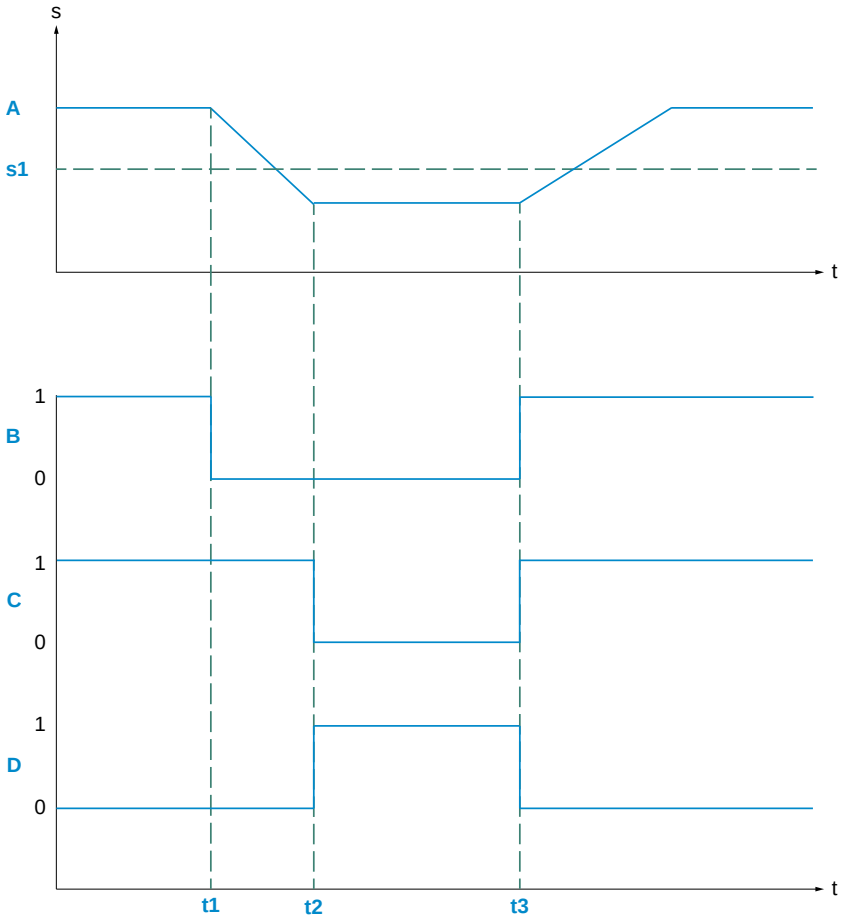
Commercial reference	Limit	Value	Unit
LXMRL03S0••• /	Maximum TCP speed	250 (0.82)	mm/s (ft/s)
	Maximum Lexium Cobot Arm speed	250 (0.82)	mm/s (ft/s)
	Momentum	0.8	kg*m/s
	Power	35	W
LXMRL05S0••• /	Maximum TCP speed	250 (0.82)	mm/s (ft/s)
	Maximum Lexium Cobot Arm speed	250 (0.82)	mm/s (ft/s)
	Momentum	2.4	kg*m/s
	Power	50	W
LXMRL07S0••• /	Maximum TCP speed	250 (0.82)	mm/s (ft/s)
	Maximum Lexium Cobot Arm speed	250 (0.82)	mm/s (ft/s)
	Momentum	2.5	kg*m/s
	Power	70	W
LXMRL12S0••• /	Maximum TCP speed	250 (0.82)	mm/s (ft/s)
	Maximum Lexium Cobot Arm speed	250 (0.82)	mm/s (ft/s)
	Momentum	10	kg*m/s
	Power	100	W
LXMRL18S0•••	Maximum TCP speed	250 (0.82)	mm/s (ft/s)
	Maximum Lexium Cobot Arm speed	250 (0.82)	mm/s (ft/s)
	Momentum	9	kg*m/s
	Power	120	W

NOTE: The Lexium Cobot Arm adjusts its motion parameters to the momentum and the power limits. However, the resulting speed does not exceed 250 mm/s. If the actual values are equal to or smaller than the reduced values, they are retained.

The reduced mode of Lexium Cobot system can be activated by a low signal on any configured two-channel safety-related digital input on the Lexium Cobot Controllers (SF18). If needed, the status of the reduced mode can be provided by a configured two-channel safety-related output, as *In Reduced Mode* (SF24) or *Not In Reduced Mode* (SF25).

NOTE: The deceleration is performed with a configured deceleration for the program sequence.

The following graphic presents the speed monitoring sequence in reduced mode.



s Motion speed

t Time

A Lexium Cobot Arm motion speed

B Reduced Mode input signal

C In Reduced Mode output signal

D Not In Reduced Mode output signal

s1 TCP / Lexium Cobot Arm speed limit

t1 Reduced mode is activated

t2 Reduced mode is reached

t3 Reduced mode is deactivated

Diagnostic

The Lexium Cobot Controllers monitor the speed. If the Lexium Cobot Arm exceeds the configured TCP and joint speed limits, the Lexium Cobot system performs a category 1 stop.

The state of the safety-related inputs is monitored. If inconsistent signals are detected, the Lexium Cobot Arm switches into reduced mode. The corresponding diagnostic messages are displayed in EcoStruxure Cobot Expert.

Torque and Power Limitations Safety Functions

Functional Description

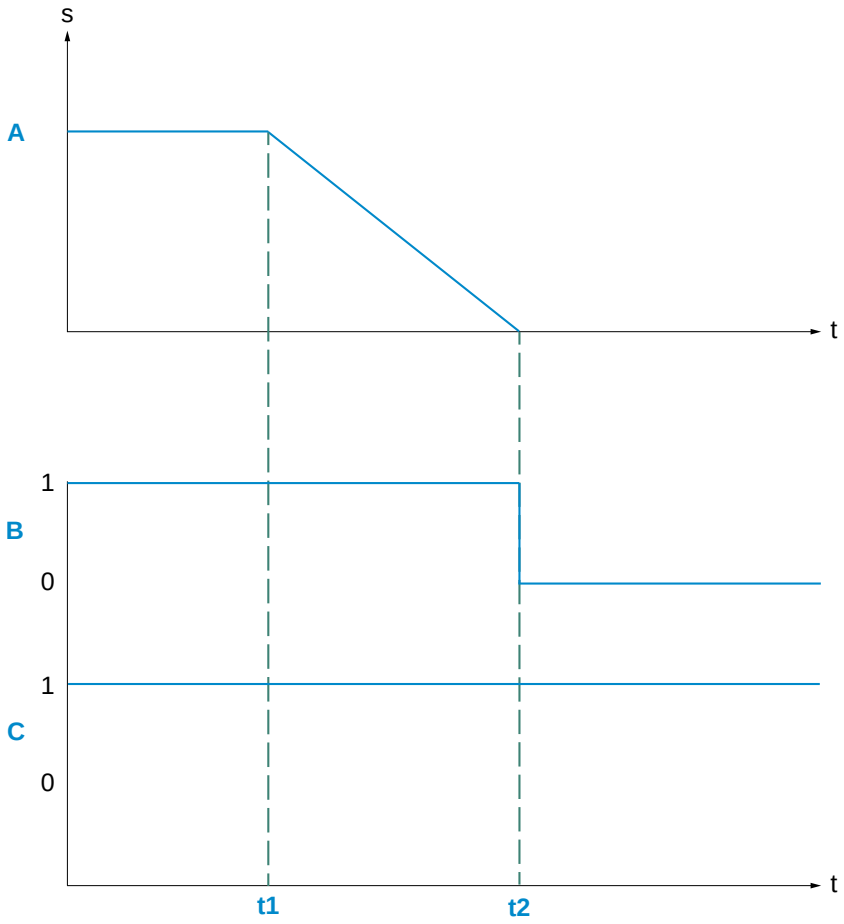
The Lexium Cobot system monitors the power of the Lexium Cobot Arm and can limit it if necessary. The robot power limit is used to limit the total motion power (SF8). This limit must be configured in EcoStruxure Cobot Expert. For detailed information on configuring the robot power limit, refer to the chapter *Collision Protection* in the *EcoStruxure Cobot Expert Software Guide*.

The Lexium Cobot system also has several safety functions to help protect the Lexium Cobot Arm from equipment damage. These functions are not accessible for users (it is a factory setting that considers the capacity of the joint). These functions monitor the following parameters and trigger a defined safe state if the safety limits are exceeded:

- Joint Torque Limit for each joint (SF6)
- Joint Power Limit for each joint (SF7)

If any of the limits is exceeded, the Lexium Cobot system stops the Lexium Cobot Arm motion, engages the internal brake, and removes power from the Lexium Cobot Arm joints after a maximum stopping time of 250 ms (category 1 stop in accordance with IEC 60204-1). The Lexium Cobot Arm remains powered but is disabled.

The following graphic presents the sequence of force and power limits.



s Motion speed

t Time

A Lexium Cobot Arm motion speed

B Lexium Cobot Arm is disabled (0) or enabled (1)

C Lexium Cobot Arm is powered off (0) or powered on (1)

t1 Robot power limit, joint torque limit, or joint power limit exceeded

t2 Maximum stopping time of 250 ms

Diagnostic

The Lexium Cobot Controllers monitor the power and torque parameters of the Lexium Cobot Arm. If the Lexium Cobot Arm exceeds the joint torque, joint power and configured robot power limits, the Lexium Cobot system performs a category 1 stop.

Collision Protection Safety Functions

Functional Description

The Lexium Cobot system provides the following options to detect collisions of the Lexium Cobot Arm:

- Collision is monitored by various feedback parameters of the joints (SF14).
- The Lexium Cobot Controllers estimate the TCP force via joint angles and joint torques. If the TCP force exceeds the configured limit, the system detects a collision (SF26).
- The Lexium Cobot system monitors the position deviation of every joint (SF12).

The collision sensitivity (SF14 and SF26) must be configured in EcoStruxure Cobot Expert. For detailed information on configuring the collision protection settings,The Lexium Cobot system monitors the power of the Lexium Cobot Arm and can limit it if necessary. The robot power limit is used to limit the total motion power (SF8). This limit must be configured in EcoStruxure Cobot Expert. For detailed information on configuring the robot power limit, refer to the chapter *Collision Protection* in the *EcoStruxure Cobot Expert Software Guide*.

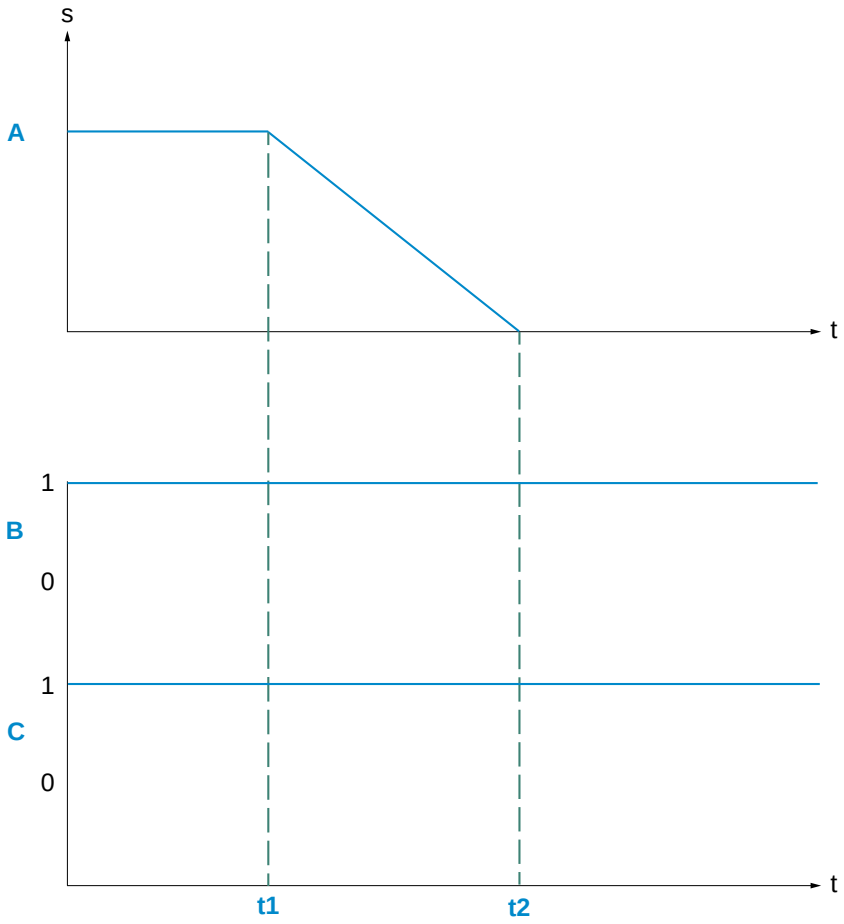
NOTE: The appropriate configuration of collision detection for your specific application depends on your risk assessment.

If a collision is detected, the Lexium Cobot system stops the Lexium Cobot Arm motion. The Lexium Cobot Arm remains enabled and keeps the position (category 2 stop in accordance with IEC 60204-1 with a maximum response time of 350 ms). The executed program of the Lexium Cobot system is paused.

NOTE: The post-collision procedure can be configured to **Program terminated and rebound**. In this configuration, the Lexium Cobot Arm performs a short backward movement and the program being executed is stopped and terminated. For further information on the post-collision procedure and its configuration,

The Lexium Cobot system monitors the power of the Lexium Cobot Arm and can limit it if necessary. The robot power limit is used to limit the total motion power (SF8). This limit must be configured in EcoStruxure Cobot Expert. For detailed information on configuring the robot power limit, refer to the chapter *Collision Protection* in the *EcoStruxure Cobot Expert Software Guide*.

The following graphic presents the collision protection sequence.



s Motion speed

t Time

A Lexium Cobot Arm motion speed

B Lexium Cobot Arm is disabled (0) or enabled (1)

C Lexium Cobot Arm is powered off (0) or powered on (1)

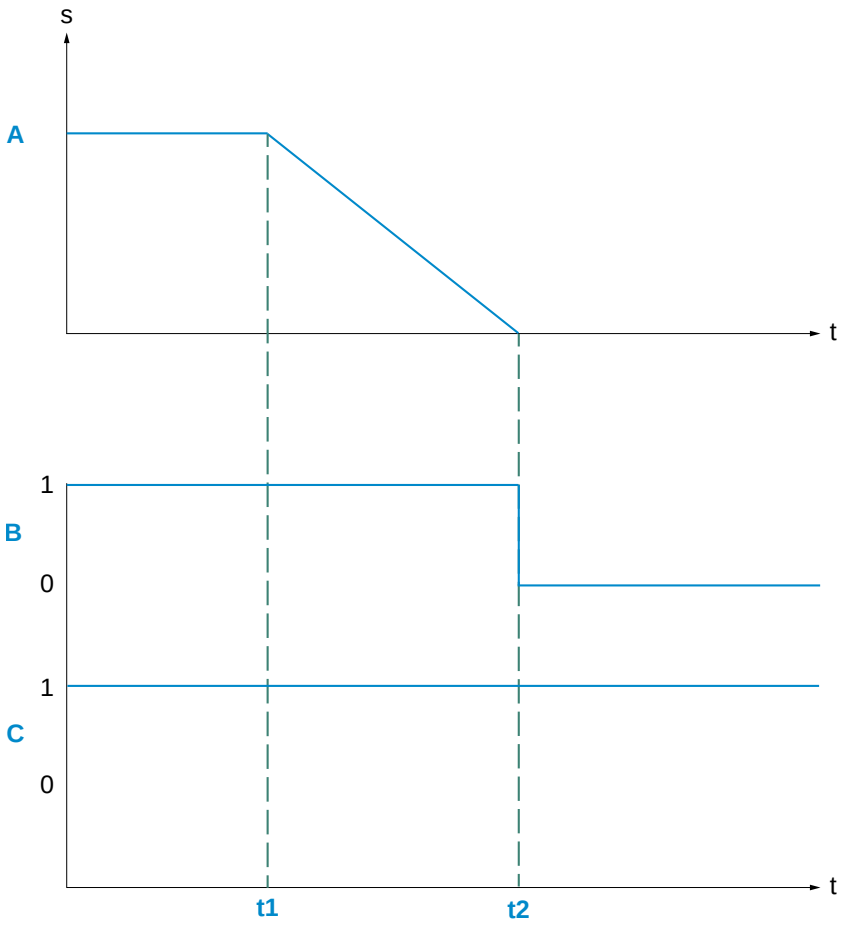
t1 Collision detected

t2 Maximum stopping time of 350 ms

The Lexium Cobot system monitors the position of the TCP in real time (SF12). If the position deviation exceeds the internal limit, the Lexium Cobot system stops the Lexium Cobot Arm motion, engages the internal brake, and removes power from the Lexium Cobot Arm joints after a maximum stopping time of 250 ms (category 1 stop in accordance with IEC 60204-1). The Lexium Cobot Arm remains powered but is disabled.

NOTE: The internal position deviation limit is a factory setting that cannot be modified. It considers the internal parameters of the joints.

The following graphic presents the collision protection sequence triggered by position deviation.



s Motion speed

t Time

A Lexium Cobot Arm motion speed

B Lexium Cobot Arm is disabled (0) or enabled (1)

C Lexium Cobot Arm powered off (0) or powered on (1)

t1 Collision triggered by position deviation

t2 Maximum stopping time of 250 ms

Diagnostic

The Lexium Cobot Controllers monitor different parameters of the Lexium Cobot Arm to detect a collision. If a collision is detected, the Lexium Cobot system performs a category 2 stop.

If the position deviation limit is exceeded, even if no collision is detected, the system performs a category 1 stop.

Position Monitoring Safety Functions

Functional Description

The Lexium Cobot system provides the following options to limit the Lexium Cobot Arm motion:

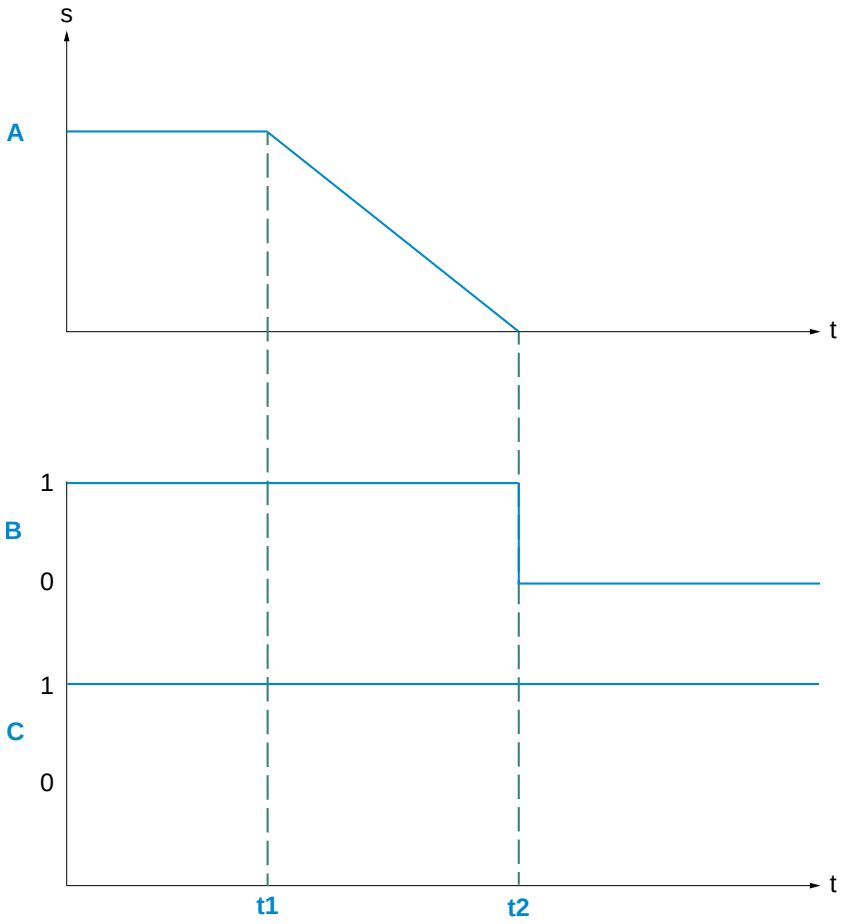
- Reducing the permitted movement (position) range for each joint (SF4)
- Limiting the permitted orientation of the tool (SF10)
- Limiting the position in space by setting safety planes (SF11)

The different position monitoring functions can be combined. These functions must be configured in EcoStruxure Cobot Expert. For detailed information on configuring the joint position limit, tool orientation limit, and TCP position limit (safety planes), refer to the chapter *Safety Setting* in the *EcoStruxure Cobot Expert Software Guide*.

If the Lexium Cobot Arm exceeds one or more of the limits, the Lexium Cobot system stops the Lexium Cobot Arm motion, engages the internal brakes, and removes power from the Lexium Cobot Arm joints after a maximum stopping time of 250 ms (category 1 stop in accordance with IEC 60204-1). The Lexium Cobot Arm remains powered but is disabled.

NOTE: For safety planes, the response can be changed in EcoStruxure Cobot Expert to either Protective Stop (category 2 stop, refer to Protective Stop Safety Functions, page 142) or Reduced Mode (refer to Speed Monitoring (Reduced Mode) Safety Functions, page 147).

The following graphic presents the position monitoring sequence.



s Motion speed

t Time

A Lexium Cobot Arm motion speed

B Lexium Cobot Arm is disabled (0) or enabled (1)

C Lexium Cobot Arm powered off (0) or powered on (1)

t1 Position limit exceeded

t2 Maximum stopping time of 250 ms

Diagnostic

The Lexium Cobot Controllers monitor the joint position, TCP position, and tool orientation. If the defined limits are exceeded, the Lexium Cobot system performs a category 1 stop.

Motion Status Safety Functions

Functional Description

The Lexium Cobot system provides the following options for monitoring the Lexium Cobot Arm motion:

- Robot in Motion status two-channel safety-related digital output, if configured in EcoStruxure Cobot Expert (SF22).

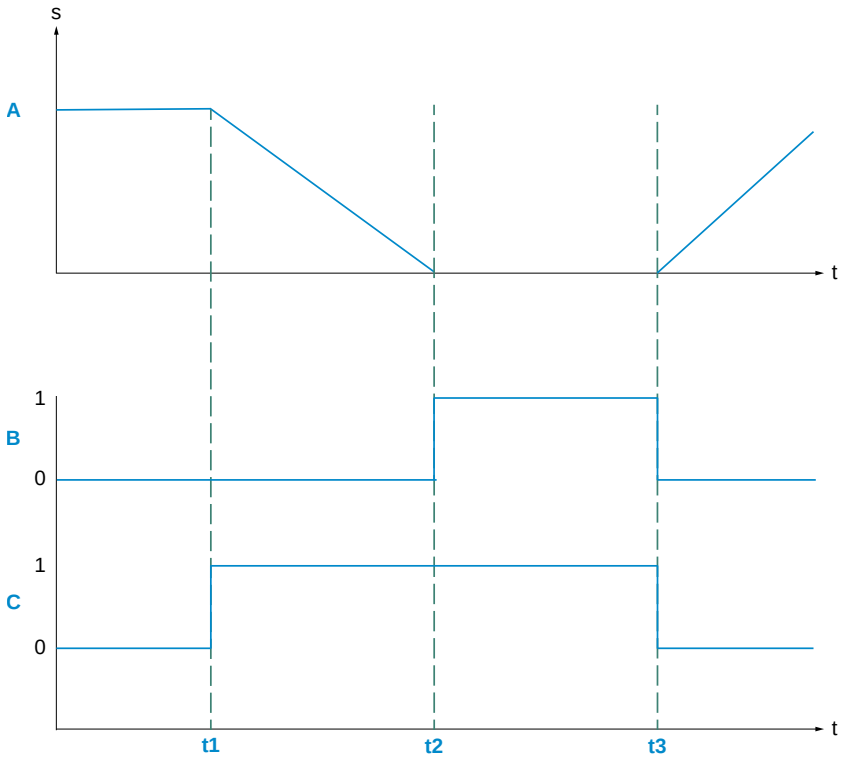
  This output is FALSE (low) when the Lexium Cobot Arm is moving.

- Robot Not Stopping status two-channel safety-related digital output, if configured in EcoStruxure Cobot Expert (SF23).

  This output is FALSE (low) when the Lexium Cobot Arm is not in a defined safe state (emergency stop or protective stop).

  The output signal is TRUE (high) if the Lexium Cobot Arm is decelerated to stop and stays TRUE (high) while the Lexium Cobot Arm is at standstill due to an active defined safe state (emergency stop or protective stop).

The following graphic presents the logic of the outputs.



For detailed information on these outputs, refer to the following graphic:

s Motion speed

t Time

A Lexium Cobot Arm motion speed

B Robot In Motion signal

C Robot Not Stopping signal

t1 Emergency stop or protective stop is requested and the Lexium Cobot Arm decelerates

t2 Maximum stopping time

t3 Lexium Cobot Arm is moving again

Safety-Related Key Data

Overview

The designated safety functions have been designed and tested for functional safety according to the following standards:

- IEC 60204-1
- ISO 13849-1

Values for the Lexium Cobot with Lexium Cobot Cabinet Controller

According to the above listed standards, the values for the Lexium Cobot with Lexium Cobot Cabinet Controller safety functions are as follows.

Group of safety functions	Safety function	Maximum stopping time / safety stop distance	MTTFd in years	Diagnostics coverage (DC)	Common cause failure (CCF)
Emergency stop	SF1 – Emergency Stop Button on the Control Stick	250 ms / 250 mm	126.47	INPUT: 90% LOGIC: 60% OUTPUT: 90%	95
	SF2 – External Emergency Stop Button		88.08		
	SF15 – Additional Emergency Stop Input		155.67		
	SF19 – Emergency Stop Button State (Digital Output)	n/a	124.25		
	SF20 – Emergency Stop State (Digital Output)				
Protective stop	SF3 – External Protective Stop	350 ms / 350 mm	76.53	INPUT: 90% LOGIC: 60% OUTPUT: 90%	95
	SF16 – Additional Protective Stop Input		76.53		
	SF17 – Protective Stop Reset Input	n/a	155.67		
	SF21 – Protective Stop State (Digital Output)		75.72		
Hand guiding / manual mode	SF13 – TCP Speed Limit in Hand Guiding	350 ms / 350 mm	62.22	INPUT: 99% LOGIC: 60% OUTPUT: 99%	75
	SF27 – 3-Position Enable Switch Input		68.84	INPUT: 90% LOGIC: 60% OUTPUT: 90%	95
Speed monitoring (Reduced Mode)	SF5 – Joint Speed Limit	250 ms / 250 mm	190.40	INPUT: 99%	95
	SF9 – TCP Speed Limit		62.22	LOGIC: 60% OUTPUT: 99%	75
	SF18 – Reduced Mode Input	n/a	76.53	INPUT: 90%	95
	SF24 – In Reduced Mode (Digital Output)	350[1)] ms / n/a	89.25	LOGIC: 60%	
	SF25 – Not in Reduced Mode (Digital Output)			OUTPUT: 90%	
Torque and power limitations	SF6 – Joint Torque Limit	250 ms / 250 mm	192.83	INPUT: 99%	75
	SF7 – Joint Power Limit			LOGIC: 60%	
	SF8 – Robot Power Limit		67.53	OUTPUT: 99%	
Collision protection	SF12 – TCP Position Mismatch Limit	250 ms / 250 mm	62.22	INPUT: 99%	75
	SF14 – Collision Protection	350 ms / 350 mm	67.53	LOGIC: 60%	
	SF26 – TCP Force Limit		60.14	OUTPUT: 99%	
Position monitoring	SF4 – Joint Position Limit	250 ms / 250 mm	190.40	INPUT: 90%	95
	SF10 – Tool Orientation Limit		62.22	LOGIC: 60%	75
	SF11 – Safety Planes			OUTPUT: 90%	

Group of safety functions	Safety function	Maximum stopping time / safety stop distance	MTTFd in years	Diagnostics coverage (DC)	Common cause failure (CCF)
Motion status	SF22 – Robot in Motion (Digital Output)	100[1] ms / n/a	89.25	INPUT: 90% LOGIC: 60% OUTPUT: 90%	95
	SF23 – Robot Not Stopping (Digital Output)				

n/a not applicable

[1] For DIO it is not a maximum stopping time but maximum response time.

NOTE: All safety functions achieved PL d with category 3 according to ISO 13849-1:2023.

Values for the Lexium Cobot with Lexium Cobot Compact Controller

According to the above listed standards, the values for the Lexium Cobot with Lexium Cobot Compact Controller safety functions are as follows.

Group of safety functions	Safety function	Maximum stopping time / safety stop distance	MTTFd in years	Diagnostics coverage (DC)	Common cause failure (CCF)
Emergency stop	SF1 – Emergency Stop Button on the Control Stick	250 ms / 250 mm	121.78	INPUT: 90% LOGIC: 90% OUTPUT: 90%	75
	SF2 – External Emergency Stop Button		196		
	SF15 – Additional Emergency Stop Input				
	SF19 – Emergency Stop Button State (Digital Output)	n/a	105.19		
	SF20 – Emergency Stop State (Digital Output)				
Protective stop	SF3 – External Protective Stop	350 ms / 350 mm	78.49	INPUT: 99% LOGIC: 90% OUTPUT: 99%	75
	SF16 – Additional Protective Stop Input				
	SF17 – Protective Stop Reset Input	n/a			
	SF21 – Protective Stop State (Digital Output)		71.49	INPUT: 90% LOGIC: 90% OUTPUT: 90%	
Hand guiding / manual mode	SF13 – TCP Speed Limit in Hand Guiding	350 ms / 350 mm	65.46	INPUT: 99% LOGIC: 90% OUTPUT: 99%	75
	SF27 – 3-Position Enable Switch Input		63.85		
Speed monitoring (Reduced Mode)	SF5 – Joint Speed Limit	250 ms / 250 mm	199.52	INPUT: 99% LOGIC: 90% OUTPUT: 99%	75
	SF9 – TCP Speed Limit		65.46		
	SF18 – Reduced Mode Input	n/a	78.49		
	SF24 – In Reduced Mode (Digital Output)	350[1] ms / n/a	82.29	INPUT: 90% LOGIC: 90% OUTPUT: 90%	
	SF25 – Not in Reduced Mode (Digital Output)				
Torque and power limitations	SF6 – Joint Torque Limit	250 ms / 250 mm	203.13	INPUT: 99% LOGIC: 90% OUTPUT: 99%	75
	SF7 – Joint Power Limit				
	SF8 – Robot Power Limit		72.30		
Collision protection	SF12 – TCP Position Mismatch Limit	250 ms / 250 mm	65.46	INPUT: 99% LOGIC: 90% OUTPUT: 99%	75
	SF14 – Collision Protection	350 ms / 350 mm	72.30		
	SF26 – TCP Force Limit		61.11		

Group of safety functions	Safety function	Maximum stopping time / safety stop distance	MTTFd in years	Diagnostics coverage (DC)	Common cause failure (CCF)
Position monitoring	SF4 – Joint Position Limit	250 ms / 250 mm	199.52	INPUT: 99% LOGIC: 90% OUTPUT: 99%	75
	SF10 – Tool Orientation Limit		65.46		
	SF11 – Safety Planes				
Motion status	SF22 – Robot in Motion (Digital Output)	100[1] ms / n/a	82.29	INPUT: 90% LOGIC: 90% OUTPUT: 90%	75
	SF23 – Robot Not Stopping (Digital Output)				

n/a not applicable

[1] For DIO it is not a maximum stopping time but maximum response time.

NOTE: All safety functions achieved PL d with category 3 according to ISO 13849-1:2023.

Operator Risk Estimation and Reduction

In some applications, additional operator protection such as point-of-operation guarding must be provided and/or technical measures must be taken to help avoid or at least limit any possible impact forces caused by the overall system to the operator. Depending on your risk assessment, take into account the applicable values for impact forces in accordance with ISO/TS 15066. 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 where 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 safety measures 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 safety measures related to point-of-operation protection must be coordinated with the related collaborative robotic equipment and software programming.

⚠WARNING

CRUSHING, SHEARING, CUTTING AND IMPACT INJURY

- Avoid contact exposure to sensitive areas of the body, including the skull, forehead, larynx, eyes, ears or face.
- Define the clearance distance to the collaboration zone of operation of the Lexium Cobot Arm to be within the mechanical limits such that the operational staff do not have access to, nor can be enclosed between, the Lexium Cobot Arm user-defined collaboration zone and the mechanical limits of operation.
- Ensure that movement of the Lexium Cobot Arm is in accordance to the user-defined limits as soon as a person enters the collaboration zone of operation.
- All barriers, protective doors, contact mats, light barriers, visual protection system, and other protective equipment must be connected, configured correctly and enabled whenever the robot mechanics are under power.
- The Lexium Cobot Arm must always be considered active even though the Lexium Cobot Arm has reached an intermediate stop position waiting for a run command.

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

NOTE: The configuration of the robot mechanics, the Tool Center Point (TCP) velocity, as well as the additional payload have an effect on the total energy, which can potentially be a source of damage and injury.

As inertia and payload of the Lexium Cobot increases, so do the physical requirements for controlling and reducing forces and pressures.

⚠WARNING

UNINTENDED MACHINE OPERATION

- Use appropriate risk mitigation measures taking into account the inertia and the payload of the Lexium Cobot.
- Coordination of safety measures and mechanical/electrical interlocks for point-of-operation protection is outside the scope of the software or other implementation referenced in this documentation.

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

Initial Start-Up

Powering on the Lexium Cobot Cabinet Controller

The Lexium Cobot Controllers can be powered on via the Control Stick.

To power on the controller via the Control Stick, press the **On/Off** button on the Control Stick.

Powering on the Lexium Cobot Compact Controller

The Lexium Cobot Compact Controller can be powered on via the Control Stick or the power button on its housing.

To power on the Lexium Cobot Compact Controller via the Control Stick, press the **On/Off** button on the Control Stick.

To power on the Lexium Cobot Compact Controller via the power button, press the power button on the housing.

Powering on the Lexium Cobot Arm

There are two options to power on the Lexium Cobot Arm:

- Powering on via Control Stick
- Powering on via EcoStruxure Cobot Expert software

To power on the Lexium Cobot Arm via the Control Stick, proceed as follows:

Step	Action
1	Press the **Lock/Function** button on the Control Stick for 3 seconds to unlock the Control Stick **Result:** The lock indicator on the Control Stick is off.
2	Press the **Power/Enable** button on the Control Stick to power on the Lexium Cobot Arm. **Result:** Lexium Cobot Arm illuminated ring changes to blue illumination (Lexium Cobot status: Power ON).
3	Hold the **Lock/Function** button on the Control Stick while you press the **Power/Enable** button to enable the Lexium Cobot Arm. **Result:** Lexium Cobot Arm illuminated ring changes to green illumination (Lexium Cobot status: Enabled).

You can also power on the Lexium Cobot Arm via EcoStruxure Cobot Expert. For further Information, refer to the chapter *Starting Up the Lexium Cobot System* in the *EcoStruxure Cobot Expert Software Guide*.

Setting the Monitoring

Software Limits for Working Space

For the definition of application-specific software limits, refer to the EcoStruxure Cobot Expert Software Guide.

Testing the Additional Protective Devices

- Verify the emergency stops and the operator protective devices.
- Comply with the relevant standards, design the protective devices to stop the Lexium Cobot Arm without leaving the path (category 1 stop).

Verifying the Monitoring

- Slowly move the Lexium Cobot Arm beyond the limits of the preset working space in order to verify that this is prevented by the preset monitoring.
- Individually move the Lexium Cobot Arm beyond the maximum/minimum angles in order to verify that this is prevented by the preset monitoring.

Start-Up

Overview

When the Lexium Cobot is operated for the first time, there is a risk of unintended equipment operation caused by possible wiring errors, improper mounting and fastening, or unsuitable parameters.

⚠WARNING

UNINTENDED EQUIPMENT OPERATION

- Verify that the Lexium Cobot is properly and firmly fastened.
- Take all necessary measures to ensure that the moving parts of the Lexium Cobot Arm 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 Lexium Cobot Arm power supply is disabled unintentionally, for example as a result of power outage, errors or functions, the Lexium Cobot Arm is no longer decelerated in a controlled way.

⚠WARNING

UNINTENDED EQUIPMENT OPERATION

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

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

⚠WARNING

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.

For further information, refer to Heat Dissipation, page 20.

NOTE: Perform a start-up for an already configured Lexium Cobot when using the Lexium Cobot under modified operating conditions. For further information, refer to *Hazard Information*, page 12.

Commissioning Procedure

Proceed as follows, to commission the Lexium Cobot:

NOTICE
INOPERABLE EQUIPMENT / REDUCTION OF LIFETIME Ensure that the operating conditions of set cycles include a minimum of 20% of idle time within the total cycle time. **Failure to follow these instructions can result in equipment damage.**

Step	Action
1	Comply with the instructions provided in this manual.
2	Verify that the load conforms to the specified payloads for the Lexium Cobot Arm before operating.
3	Assign the Lexium Cobot controller and Lexium Cobot Arm in EcoStruxure Cobot Expert.
4	Configure the installation setting of the Lexium Cobot Arm. For further Information, refer to the chapter *Installation Settings* in the *EcoStruxure Cobot Expert Software Guide*.
5	Verify the calibration and position and direction of the joints.
6	Verify the orientation of the world coordinate system in the manual operation interface. For further Information, refer to the chapter Manual Operation Interface *Manual Operation Interface* in the *EcoStruxure Cobot Expert Software Guide*. **NOTE:** The world coordinate system depends on the mounting position.
7	Configure the collision protection settings in accordance to the safety-related requirements of your application. For further information on the configuration, refer to the chapter *Collision Protection* in the *EcoStruxure Cobot Expert Software Guide*.
8	Perform initial tests at reduced velocity and verify the functionality of the Lexium Cobot Arm.
9	Verify that the operating condition of set cycles is lower than 80% of the total cycle time. **NOTE:** For a total cycle time of 10 seconds take care of maximum 8 seconds cycle running time and 2 seconds waiting period. If you exceed the duty cycle proportion of 80%, you may reduce the lifetime of the gearboxes of the Lexium Cobot joints.
10	Optionally, configure the home position for the **Home** button operation of the Control Stick. For further information on the Control Stick operations, refer to Lexium Cobot Control Stick Details, page 55, and for the configuration of the home position, refer to the chapter *Robot Pose* in the *EcoStruxure Cobot Expert Software Guide*.
11	In case of using several Lexium Cobot systems, optionally assign unique names for the devices for easier identification. For further information, refer to the chapter *Initial Settings* in the *EcoStruxure Cobot Expert Software Guide*.

Starting the Default Program

There are two options for automatically starting the program set as default on the Lexium Cobot Arm:

- Starting via Control Stick
- Starting via EcoStruxure Cobot Expert software

To start the default program via the Control Stick press the **Start/Stop** button on the Control Stick.

For further information on starting and setting the default program via EcoStruxure Cobot Expert, refer to the chapter Default Program *Default Program* in the *EcoStruxure Cobot Expert Software Guide*.

Mounting the Payload

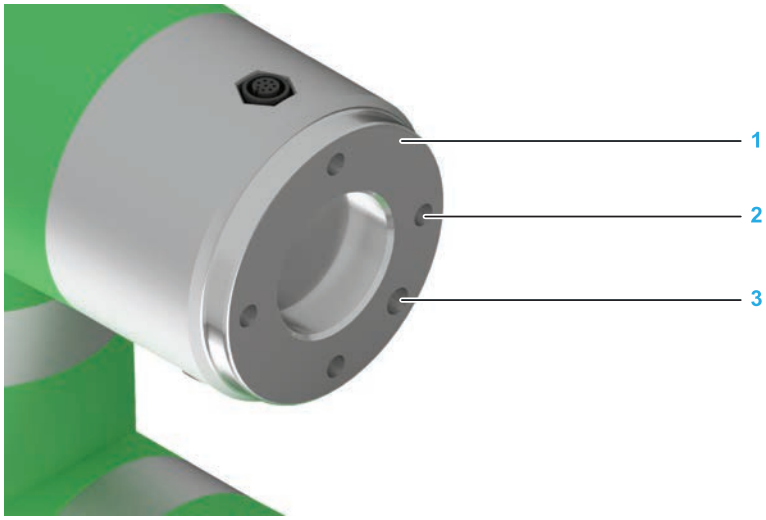
Mounting the End-Effector

Prerequisites

Observe the following prerequisites to help avoid incorrect operation of the Lexium Cobot:

- Verify that the load conforms to the specified payloads for the Lexium Cobot Arm before operating.
- Limit the maximum payload of the motor in accordance with the maximum load capacity of the Lexium Cobot Arm. For further information, refer to Load Capacity of Lexium Cobot Arm, page 90.

Mounting the End-Effector

Step	Action
1	Fasten the end-effector to the mounting points provided for this purpose on the Lexium Cobot Arm tool flange (1): • Pitch circle diameter DIN ISO 9409-1, 50 mm (1.97 in): 4x M6 (2), tightening torque: 15 Nm (133 lbf-in), property class of the screw: 12.9 or greater • Pitch circle diameter 50 mm (1.97 in): 1x fitting hole diameter 6 H7 (3)  For further information on the flange dimensions, refer to Dimensional Drawing of Lexium Cobot Arm, page 58.
2	Calibrate the end-effector in EcoStruxure Cobot Expert, if this has not yet been done during initial start-up. For further information on calibrating the end-effector, refer to the chapter *TCP Settings* in the *EcoStruxure Cobot Expert Software Guide*.
3	Set the payload in EcoStruxure Cobot Expert. For further information, refer to the chapter *Load Setting* in the *EcoStruxure Cobot Expert Software Guide*. **NOTE:** Observe the permissible weights and distances that results in load capacity of the Lexium Cobot Arm.

Supply of the End-Effector

Feeding the Media to the End-Effector

Step	Action
1	Feed in the media line from cables, hoses, and other media, via the base to the joints and tubes. **NOTE:** Verify that the additional loads on the joints and tubes are as small as possible, to help avoid damage to the Lexium Cobot Arm due to dynamic forces. Verify that attaching additional media guide fasteners to joints and tubes does not damage the Lexium Cobot Arm.
2	Feed the media lines from the joints and tubes of the Lexium Cobot Arm to the tool flange. **NOTE:** Verify the correct routing and fastening of the media line to help prevent any collision of cables, hoses, other media and moving parts.

⚠WARNING

UNINTENDED EQUIPMENT OPERATION

- Joints and tubes must not be damaged by attaching additional media guide fasteners.
- Distribute loads to joints and tubes in a way that minimizes the rotational forces on the Lexium Cobot Arm.

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

Removing power from the Lexium Cobot controller during operation of the Lexium Cobot Arm may cause a loss of control of the end-effector. The Lexium Cobot Arm must be disabled and powered off before removing power from the Lexium Cobot controller.

⚠WARNING

UNCONTROLLED EQUIPMENT OPERATION

Ensure that the Lexium Cobot Arm is disabled and powered off before removing power from the Lexium Cobot Controllers.

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

Optional Equipment

What's in This Chapter

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Lexium Cobot Cabinet Controller Power Supply Cable

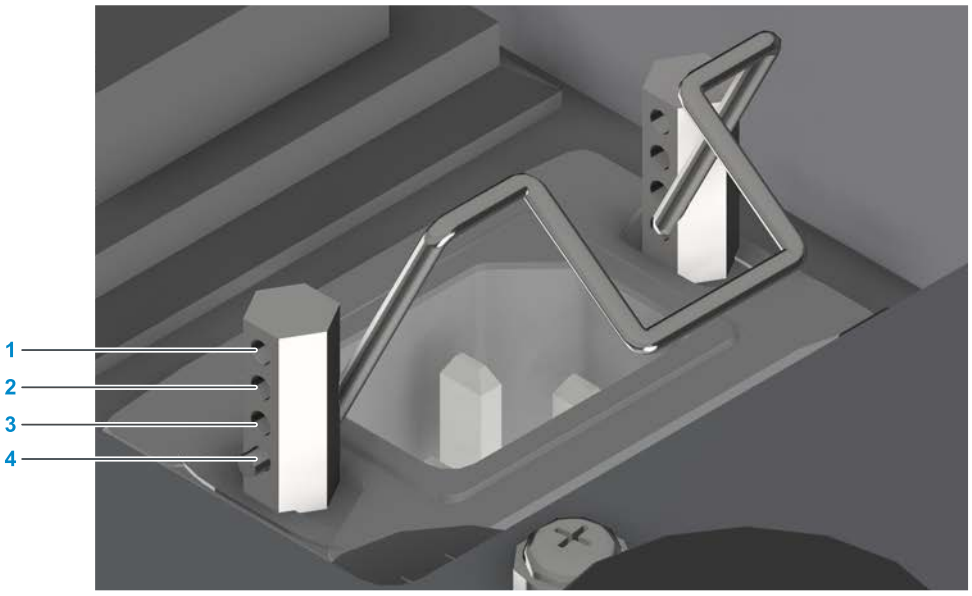
Some applications require a specific power supply cable for Lexium Cobot Cabinet Controller in accordance with local standards. For such applications, you can apply the available power supply cables for the markets in the USA, China, Great Britain, India and South Korea (sold separately).

Country	Item reference	Cable length
USA	LXMRL00YYCUS	3.0 m (9.8 ft)
China	LXMRL00YYCCN	3.0 m (9.8 ft)
Great Britain	LXMRL00YYCGB	3.0 m (9.8 ft)
India	LXMRL00YYCIN	3.0 m (9.8 ft)
South Korea	LXMRL00YYCKR	3.0 m (9.8 ft)

NOTE: Only available via service department. For further information contact your local Schneider Electric service representative.

The Lexium Cobot Cabinet Controller includes a locking clip on the power supply connector (CN11). Make sure that the locking clip is inserted in the correct position of the latch:

- Market China and Great Britain: Fourth hole (4)
- Market India and South Korea: Third hole (3)



NOTE: The main connectors of the power supply cables for the European and US markets are equipped with a cord retention system. The locking clip on the power supply connector is not required for use.

Add-on Handheld for Tablet

Product Overview

Some applications require additional functionalities in regards of enhanced safety functions as 3-position enabling device. For such applications, you can use an add-on presence control device for 3-position enabling.

For example, you can use the third party device IDEC HT3P (reference HT3P-SLNP-5M). The HT3P is designed to firmly hold a tablet and offers a hard-wired emergency stop switch and a hard-wired 3-position release switch.

For further information, refer to the IDEC HT3P instruction sheet.

Cabling the Add-on Handheld for Tablet

The following table presents an example of cabling the IDEC HT3P product as an add-on handheld for a tablet.

IDEC HT3P cable open wired				**Cabling to LXMRL••C1•••**				**Cabling to LXMRL00C2••• ***			
Pin	**Wire color**	**Dedication**	**Description**	**Index**	**Name**	**Pin**	**Label**	**Index**	**Name**	**Pin**	**Label**
1	Yellow	USB Power Supply (optional)	24 V dc	CN1	DI Digital Input	10	V+	I/O	I/O Input and output interface for digital outputs, 24 V dc supply, remote power on and off, and RS485 connection	2	24 V dc
2	Yellow/white		0 V	CN2	DO Digital Output	9	V-	I/O		12	0 V
3	Gray		FE	CN2	DO Digital Output	15	V-	I/O		12	0 V
1	Brown	Enabling switch	Contact 1 (C)	CN1	DI Digital Input	1	DI1	I/O		4	DIQ1
2	Brown/white		Contact 1 (NO)	CN1	DI Digital Input	9	V+	I/O		12	0 V
3	Blue		Contact 2 (C)	CN3	DI Digital Input	1	DI9	I/O		5	DIQ2
4	Blue/white		Contact 2 (NO)	CN3	DI Digital Input	9	V+	I/O		13	0 V
1	Red	Emergency Stop Switch	LED 24 V dc (status indication)	CN2	DO Digital Output	8	DO8	I/O		2	24 V dc
2	Black		LED 0 V (status indication)	CN2	DO Digital Output	16	V-	I/O		6	DIQ3
3	Green		Contact 1 (NC)	CN8	Power Control power supply, Safety functions	1	V+		Emergency stop interface	1	24 V dc
4	Green/white		Contact 1 (NC)	CN8		7	S11			3	S11
5	Red/white		Contact 2 (NC)	CN8		8	S12			4	S12
6	Black/white		Contact 2 (NC)	CN8		2	V+			2	24 V dc
* For the Lexium Cobot Compact Controller, use additional terminals for proper cabling.											

Integrating and Starting-Up the Add-On Handheld

The following procedure is described using the IDEC HT3P as an example. To integrate and start up the IDEC HT3P as an add-on handheld for a tablet, perform the following steps:

Step	Action
1	Power off the Lexium Cobot controller.
2	Cable the add-on handheld for tablet to the Lexium Cobot controller in accordance with Cabling the Add-on Handheld for Tablet, page 170.
3	In EcoStruxure Cobot Expert, configure the digital inputs as **Three Position Enable Input**. For further Information, refer to the chapter *Special Safety IO* in the *EcoStruxure Cobot Expert Software Guide*. • For Lexium Cobot Cabinet Controller: DI1 and DI9 • For Lexium Cobot Compact Controller: DIQ1 and DIQ2 **NOTE:** The DI or DIQ may vary depending on your cabling.
4	Configure the digital output as **Emergency Stop Status** output. For further Information, refer to the chapter *I/O Panel* in the *EcoStruxure Cobot Expert Software Guide*. • For Lexium Cobot Cabinet Controller: DO8 • For Lexium Cobot Compact Controller: DIQ3 **NOTE:** Status indication of Emergency Stop output is not a safety-rated function.
5	Power on the Lexium Cobot controller.
6	Perform initial tests at reduced velocity to verify the functionality of the Lexium Cobot and add-on handheld interaction.

Maintenance and Repair

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Maintenance, Repair, and Cleaning

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

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.
- Insulate any unused conductors on both ends of the connection cable.

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, DOM)
- Detailed description of the issue
- Previous and associated circumstances

Maintenance Plan

Overview

The maintenance intervals may have to be adapted to the greatly varying operational hours depending on the application.

The maintenance intervals take into account the natural wear and tear based on how you operate the Lexium Cobot Arm, as well as the number of times you move it without drive energy. For example power outage during operation or manually moving without drive energy.

Maintenance Schedule

Intervals	Action
Every 150 hours of operation or weekly	Visually inspect the Lexium Cobot system and verify for any damage or loose or missing moving parts.
	Verify the inlet and outlet filter of the Lexium Cobot Controllers for any dirt or blockage.
	Verify that there is no wear or damage to the cables and replace them if necessary.
	Verify the Lexium Cobot Controllers and the Lexium Cobot Arm for exceptional heat dissipation and noise emission.
	Verify that the Lexium Cobot Arm keeps the position while powering on and off the Lexium Cobot Arm.
Every 1,000 hours of operation or every three months	Verify the connections for tight fit.
	Clean the Lexium Cobot mechanics.
	Verify that the exposed bolts on the outside of the Lexium Cobot Arm are tightened with the correct torque, including mounting of end effector at tool flange.
	Verify the Lexium Cobot Arm for leakages at the joints.
Annually, or according to frequent power outage during operation	Verify the brake function during operation. Inspect the position of the Lexium Cobot Arm for possible deviation if a power outage occurs during operation or after manually moving without drive energy.
Every 20,000 hours of operation	Visually inspect the Lexium Cobot Arm and verify for any damage and whether it still fits your application needs and replace it if necessary.

NOTICE

INOPERABLE EQUIPMENT / REDUCTION OF LIFETIME

- Use a soft cloth to remove dust or process residue from the Lexium Cobot Arm.
- Do not blow off dust or process residue from the Lexium Cobot Arm using air blowers, compressed air or similar equipment.
- Do not clean the Lexium Cobot Controllers inlet and outlet filters while installed using air blowers, compressed air, vacuum cleaners or similar equipment.

Failure to follow these instructions can result in equipment damage.

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

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.
- Insulate any unused conductors on both ends of the motor cable.

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

The Lexium Cobot heats up significantly when subjected to heavy loads and/or high performance.

⚠WARNING

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.

For further information, refer to Heat Dissipation, page 20.

Filter Cleaning and Replacement

Step	Action
1	Power off the Lexium Cobot Cabinet Controller.
2	Remove the nut from the filter housings and remove the filters.
3	Clean the dust adhering to the filter by blowing it out in the opposing direction to the airflow while installed. **NOTE:** When there is dirt, apply warm water or a neutral detergent. If it still cannot be cleaned, it should be replaced.
4	Installation should be carried out in the reverse order of removal.

NOTE: When cleaning with warm water or a neutral detergent, it should be fully dried before re-installation.

NOTICE

INOPERABLE EQUIPMENT AND REDUCTION OF SERVICE LIFE

Do not clean the inlet and outlet filters of the Lexium Cobot Cabinet Controller with air blowers, compressed air, vacuum cleaners or similar equipment while they are installed.

Failure to follow these instructions can result in equipment damage.

Verification of Mechanical Position

The mechanical position of each of the joints needs to be identical to the measures represented by the software in the Lexium Cobot Controllers. The recalibration of a joint is necessary in the following cases:

- Replacement of joints
- Over-twisting of joints.

NOTE: For replacement and calibration of joints, contact your local Schneider Electric service representative.

To verify that the mechanical position of the joint matches with its representation in the software, each axis needs to be moved in a specific position. The following description explains how the zero position for each joint should be achieved.

Figure	Description
	Zero position of joint 1: Align joint 1 parallel to the electrical connector and turn it counterclockwise by 90°.
	Zero position of joint 2 and 3: • Follow the instruction for zero position of joint 1. • Move the upper and the lower tube of the Lexium Cobot Arm so that they form a straight line and align joint 3 at a vertical angle with the upper tube. The angle between the installation mounting surface and this straight line (upper and lower tube) is 90°.

	Zero position of joint 4 and 5: • Follow the instruction for zero position of joints 1 to 3. • Bring the joint 5 to the 12 o'clock position and align joints 4 and 6 horizontally respectively parallel to the installation mounting surface.
	Zero position of joint 6: • Follow the instruction for zero position of joints 1 to 5. • Move the tool flange I/O connector of joint 6 in 12 o'clock position. The four tapped holes dedicated to the end-effector mounting need to be aligned in the 3, 6, 9 and 12 o'clock position.

Replacement Equipment and Accessories

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Replacement Equipment Inventory

Overview

Keeping a stock of the components helps ensure the availability of your Lexium Cobot. Only exchange devices with identical types to help ensure compatibility.

Indicate the following information on the replacement equipment order, which can be found on the Lexium Cobot type plate:

Parameter	Example value	Position on type plate
Item name	Lexium Cobot - Standard Robot max 3 kg	First line
Item reference (type code)	LXMRL03S0000	Second line
Hardware revision	00	HW

Replacement Equipment Stock

Replacement Equipment for the Lexium Cobot Arm

This following table presents the replacement equipment for the Lexium Cobot Arm.

Item description and content	Representation	Item reference	To be used for
End-effector M8 connection cable, length 400 mm (15.7 in)		LXMRL00YY011 Only available via service department. For further information contact your local Schneider Electric service representative.	LXMRL03S0000 / LXMRL05S0000 / LXMRL07S0000 / LXMRL12S0000 / LXMRL18S0000
Power supply cable, length 6 m (19.7 ft)	–	LXMRL05YY018 Only available via service department. For further information contact your local Schneider Electric service representative.	LXMRL05S0000 / LXMRL07S0000 / LXMRL12S0000 / LXMRL18S0000

Replacement Equipment for the Lexium Cobot Cabinet Controller

This following table presents the replacement equipment for the Lexium Cobot Cabinet Controller.

Item description and content	Representation	Item reference	To be used for
Control Stick for the Lexium Cobot Cabinet Controller		LXMRL00YY013 Only available via service department. For further information contact your local Schneider Electric service representative.	LXMRL03C1000 / LXMRL07C1000 / LXMRL12C0000
Power supply cable, 3 m (9.8 ft)	–	LXMRL00YY009 Only available via service department. For further information contact your local Schneider Electric service representative.	LXMRL03C1000 / LXMRL07C1000 / LXMRL12C0000

Replacement Equipment for the Lexium Cobot Compact Controller

This following table presents the replacement equipment for the Lexium Cobot Compact Controller.

Item description and content	Representation	Item reference	To be used for
Control Stick for the Lexium Cobot Compact Controller		LXMRL00YY019 Only available via service department. For further information contact your local Schneider Electric service representative.	LXMRL00C2000
Lexium Cobot Arm power supply adapter cable, 0.15 m (0.49 ft)	–	LXMRL00YY020 Only available via service department. For further information contact your local Schneider Electric service representative.	LXMRL00C2000

Troubleshooting

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Troubleshooting

Overview

Issue	Probable cause	Solution
Lexium Cobot is not reachable via EcoStruxure Cobot Expert.	Lexium Cobot controller is powered off.	Power on the Lexium Cobot controller.
	Blocked by firewall.	Verify the firewall settings.
	Not connected to the WiFi of the Lexium Cobot controller.	Connect to the WiFi of the Lexium Cobot controller.
	Not connected to the Lexium Cobot controller via Ethernet cable.	Verify the connection and functionality of the cable.
	Incorrect IP address.	Configure the IP settings accordingly.
Lexium Cobot Arm could not be enabled.	Joint x: self-learning flow or servo overcurrent Mechanical blocking of joint x.	Release the brake of joint x. Contact your local Schneider Electric service representative
	Emergency stop is pressed.	Release the emergency stop button.
Lexium Cobot Arm is not powering on.	The simulation mode is active.	Switch to the physical Lexium Cobot.
	Emergency stop is pressed.	Release the emergency stop button.
Emergency stop	Emergency stop is pressed.	Release the emergency stop button.
	No Control Stick connected.	Connect the Control Stick properly.
Default program is not executed.	Default program is not selected.	Select a default program in EcoStruxure Cobot Expert.
Home pose is not as intended.	Home pose has not been adjusted on initial start-up.	Adjust the home pose in EcoStruxure Cobot Expert.
Login to Lexium Cobot controller via EcoStruxure Cobot Expert is not possible.	Time period of the certificate is not valid.	Verify the date and time setting and adjust if necessary.
Unexpected stop of Lexium Cobot Arm during movement.	Overheating of the Lexium Cobot controller.	Verify that there is sufficient airflow.

Appendices

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Further Information About the Manufacturer

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Contact Addresses

Manufacturer

Schneider Electric Automation GmbH

(Subsidiary of Schneider Electric Industries SAS FR-93500 Rueil Malmaison)

Schneiderplatz 1

97828 Marktheidenfeld, Germany

Phone: +49 9391 603 5000

Internet: www.se.com

Other Contacts

See the homepage for additional contact addresses:

Contact Center | Schneider Electric Global (se.com)

Product Training Courses

Product Training Courses

Schneider Electric offers a number of product training courses.

The Schneider Electric training instructors will help you take advantage of the extensive possibilities offered by the system.

See the website (www.se.com) for further information and the seminar schedule.

Disposal

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Disposal

Information on the Disposal of Schneider Electric Products

The robot is delivered on a recyclable pallet. Further packaging comprises cartons and films.

NOTE: The components consist of different materials which can be recycled and must be disposed of separately. Do not return the packaging to the manufacturer.

Dispose of the packaging in accordance with the relevant local, regional or national regulations.

Dispose of the packaging at the disposal sites provided for this purpose.

Dispose of robot in accordance with the applicable local, regional or national regulations.

NOTE: The gearbox units contain lubricants whose disposal may be subject to local, regional, or national regulations apart from the packaging.

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As standards, specifications, and design change from time to time, please ask for confirmation of the information given in this publication.

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