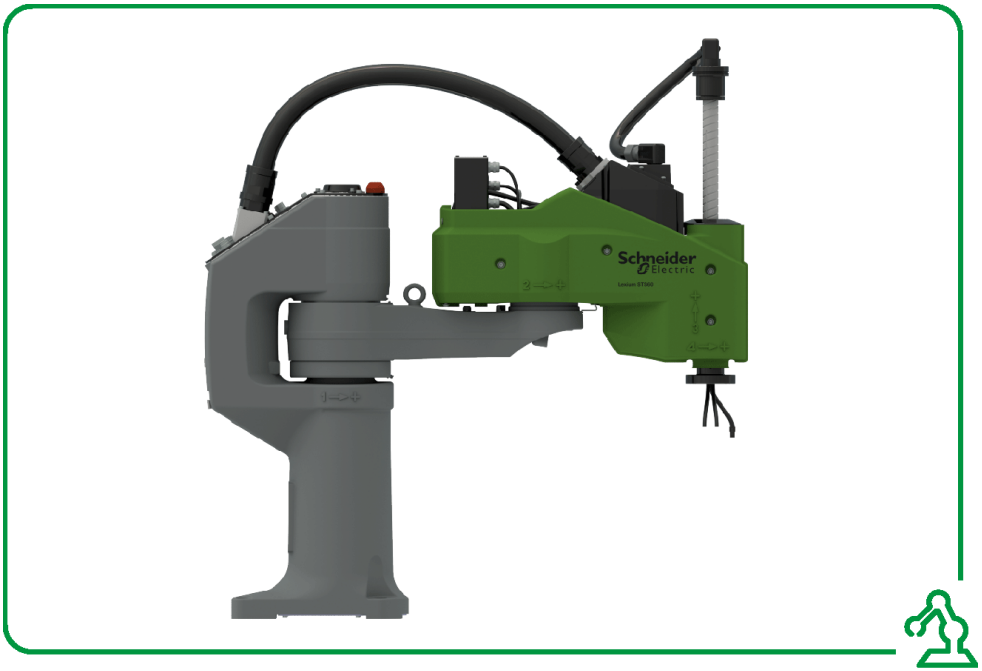
Lexium S Robot STS40/60/80

Hardware Guide

Original instructions

10/2020



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The information provided in this documentation contains general descriptions and/or technical characteristics of the performance of the products contained herein. This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications. It is the duty of any such user or integrator to perform the appropriate and complete risk analysis, evaluation and testing of the products with respect to the relevant specific application or use thereof. Neither Schneider Electric nor any of its affiliates or subsidiaries shall be responsible or liable for misuse of the information contained herein. If you have any suggestions for improvements or amendments or have found errors in this publication, please notify us.

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All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions must be followed.

Failure to use Schneider Electric software or approved software with our hardware products may result in injury, harm, or improper operating results.

Failure to observe this information can result in injury or equipment damage.

Table of Contents

Safety Information

Important Information

NOTICE

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

At a Glance

Document Scope

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

Follow the instructions within this manual to help:

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

Validity Note

This document has been updated for the release of EcoStruxure™ Machine Expert V1.2.5.

The technical characteristics of the devices described in the present document also appear online. To access the information online, go to the Schneider Electric home page *https://www.se.com/ww/en/download/*.

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

For product compliance and environmental information (RoHS, REACH, PEP, EOLI, etc.), go to *www.schneider-electric.com/green-premium*.

Related Documents

Title of Documentation	Reference Number
SchneiderElectricRobotics Library Guide (only available in the online help)	EIO0000002236 (EN) EIO0000002237 (GER)
Robotic Module Library Guide (only available in the online help)	EIO0000002234 (EN) EIO0000002235 (GER)
Lexium 62 Hardware Guide	*EIO0000001349 (EN)* *EIO0000001350 (GER)*

You can download these technical publications and other technical information from our website at https://www.se.com/ww/en/download/ .

Product Related Information

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

⚠⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Disconnect all power from all equipment including connected devices prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires.
- Place a "Do Not Turn On" or equivalent hazard label on all power switches and lock them in the non-energized position.
- Wait 15 minutes to allow the residual energy of the DC bus capacitors to discharge.
- Measure the voltage on the DC bus with a properly rated voltage sensing device and verify that the voltage is less than 42.4 Vdc.
- Do not assume that the DC bus is voltage-free when the DC bus LED is off.
- Block the motor shaft to prevent rotation prior to performing any type of work on the drive system.
- Do not create a short-circuit across the DC bus terminals or the DC bus capacitors.
- 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.

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.

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

⚠ WARNING

LOSS OF CONTROL

- The designer of any control scheme must consider the potential failure modes of control paths and, for certain critical control functions, provide a means to achieve a safe state during and after a path failure. Examples of critical control functions are emergency stop and overtravel stop, power outage and restart.
- Separate or redundant control paths must be provided for critical control functions.
- System control paths may include communication links. Consideration must be given to the implications of unanticipated transmission delays or failures of the link.
- Observe all accident prevention regulations and local safety guidelines.[1]
- Each implementation of this equipment must be individually and thoroughly tested for proper operation before being placed into service.

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

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

Terminology Derived from Standards

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

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

Among others, these standards include:

Standard	Description
IEC 61131-2:2007	Programmable controllers, part 2: Equipment requirements and tests.
ISO 13849-1:2015	Safety of machinery: Safety related parts of control systems. General principles for design.
EN 61496-1:2013	Safety of machinery: Electro-sensitive protective equipment. Part 1: General requirements and tests.
ISO 12100:2010	Safety of machinery - General principles for design - Risk assessment and risk reduction
EN 60204-1:2006	Safety of machinery - Electrical equipment of machines - Part 1: General requirements

Standard	Description
ISO 14119:2013	Safety of machinery - Interlocking devices associated with guards - Principles for design and selection
ISO 13850:2015	Safety of machinery - Emergency stop - Principles for design
IEC 62061:2015	Safety of machinery - Functional safety of safety-related electrical, electronic, and electronic programmable control systems
IEC 61508-1:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems: General requirements.
IEC 61508-2:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems: Requirements for electrical/electronic/programmable electronic safety-related systems.
IEC 61508-3:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems: Software requirements.
IEC 61784-3:2016	Industrial communication networks - Profiles - Part 3: Functional safety fieldbuses - General rules and profile definitions.
2006/42/EC	Machinery Directive
2014/30/EU	Electromagnetic Compatibility Directive
2014/35/EU	Low Voltage Directive

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

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

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

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

Dual Dimensions

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

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

Definition of the Elements Around the Machine

Person: general term identifying all individuals likely to be in general proximity of the Schneider Electric machine.

Staff: identifies the persons specifically employed and trained to install, operate, and service the Schneider Electric machine.

User: refers to the persons or the company responsible for operating the Schneider Electric machine.

Operator: refers to the person who starts or stops the robot, or controls its operation.

Chapter 1
Hazard Information

What Is in This Chapter?

This chapter contains the following topics:

Proper Use

Overview

This section contains information regarding the operation of the Lexium S robot. Qualified personnel *(see page 19)* working with the robot must read and observe this information. The robot was built in compliance with the recognized technical safety regulations.

Installation

The SCARA (Selective Compliance Assembly Robot Arm) robot is a partly completed machinery intended to be integrated into a machine or assembled with other components to form a machine or system. The robot is an open type robot that is intended to be installed into an enclosure to provide access protection.

The robot is fast moving equipment. These movements can be dangerous. You must ensure that the personnel programming, operating, maintaining, or repairing the robot or machine has undergone all necessary training and shown the competence required to carry out these tasks in full safety.

⚠ WARNING

MOVING PARTS OF THE ROBOT

- Comply with the specified operating conditions and all safety standards concerning robot-based applications.
- Inform operators of the hazards involved in robot-based applications.

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

Provide for Protective Measures

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

- Directive 2006/42/EC on machinery
- Standard ISO 10218-1:2011 Robots and robotic devices - Safety requirements for industrial robots - Part 1: Robots
- Standard ISO 10218-2:2011 Robots and robotic devices - Safety requirements for industrial robots - Part 2: Robot systems and integration
- Standard ISO 13857:2008 Safety of machinery - Safety distances to prevent hazard zones being reached by upper and lower limbs
- Standard ISO 14120:2015 Safety of machinery - Guards - General requirements for the design and construction of fixed and movable guards

- Standard EN 349:2008 Safety of machinery - Minimum gaps to avoid crushing of parts of the human body
- Standard ISO 13855:2010 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 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 robot and take appropriate security measures.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

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

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

If circumstances occur that affect the safety or cause changes to the operating behavior of the robot, then immediately shut down the robot 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 robot in the manner intended and described in this documentation, and other documentation concerning any other associated equipment.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Only use software and hardware components approved by Schneider Electric for use with this equipment.
- Update your application program every time you change the physical hardware configuration.

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

Misuse

The robot 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
- Mobile, movable, or floating systems
- Life support systems
- Domestic appliances
- Underground
- Highly saline environments (refer to *Technical Data* *(see page 43)* for materials used)
- Environments with increased radioactive radiation

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

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

To ensure reliability and precision in the movements of the robot, the machine environment must comply with the levels of electro-magnetic disturbance set out in the safety standards.

⚠ WARNING

UNINTENDED MOVEMENTS

- Ensure that the end-application installation environment conforms to the safety standards cited in the present documentation under *Provide for Protective Measures* *(see page 16)*.
- Perform, if necessary, a special electromagnetic compatibility (EMC) verification of the installation environment of the end-application.

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
- Qualified person
- System engineer
- Knowledge of the robot control system and the construction

Qualified Person

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

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

Staff Protection

Lexium S robots work with computer controlled mechanisms, capable of moving at high speed and exerting considerable force. Like all robots and most other types of industrial equipment, they must be controlled with great care by the user of the machine. All staff using Schneider Electric robots must be familiar with the hazard messages and requirements provided in the present manual.

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

The following sign, applied on different parts of the robot, indicates that there is a potential electrical danger and that only qualified service personnel may install or service the robot system.

⚠ ⚠ DANGER

ELECTRICAL SHOCK

Disconnect the electrical and pneumatic power supplies before carrying out any work on the robot.

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

Before powering up the system, make sure that all the electrical protection systems have been fitted and that there is no risk of electric shocks.

⚠⚠ DANGER

ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

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

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

Emergency Stop

The robot mechanics are not supplied with external brakes nor an emergency stop switch to trigger any external brakes.

⚠ 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 or external service 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.

The opening of the brakes may cause the robot to sag.

⚠ WARNING

SAGGING OF THE ROBOT

Ensure that the release of the motor brakes poses no subsequent risks in the zone of operation.

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

⚠ WARNING

UNINTENDED MOVEMENT OR MACHINE OPERATION

Be sure that the "emergency stop" button is within reach and at hand to the controls used to power the robot.

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

The safety devices must form an integral part of the design and installation of the machine. Operator training and compliance with the operating procedures constitute a major element in setting up the safety devices and systems.

Lexium S robots feature various interfaces that help the user to develop safety systems and devices for the machine.

NOTE: Do not use the emergency stop to power down the robot during normal conditions of use.

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.

Robot Motion

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

Motion sequences can occur when operating with robot mechanics, which allow operational staff to make misjudgments. For safety considerations (according to EN ISO 13849-1), consider the controller and the brakes as non-safety-related elements. Ensure that necessary protective measures are implemented.

The 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

- The robot must be operated only within an enclosure.
- Open or enter the enclosure for cleaning and maintenance purposes only.
- Design the enclosure to withstand an impact from the robot and to resist ejected parts from escaping the zone of operation.
- Design the enclosure to safely deactivate the robot as soon as a person enters the zone of operation of the robot.
- All barriers, protective doors, contact mats, light barriers, and other protective equipment, must be configured correctly and enabled whenever the robot mechanics are under power.
- Define the clearance distance to the zone of operation of the robot so the operational staff do not have access to, nor can be enclosed in, the robot mechanics zone of operation.
- Design the enclosure to account for the maximum possible travel paths of the robot; that is, the maximum path until the hardware safety system limits as well as the additional run-on paths, in case of a power interruption.

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

Certain robot working modes such as releasing the joint brake can lead to unforeseeable robot movements. For detailed information about travel path and power loss, refer to *Run-on Motions of the Robot* for Risk Analysis *(see page 98)*.

⚠ WARNING

UNINTENDED MOVEMENTS

Be sure that all persons are prohibited from entering or remaining in the isolation area in which the robot operates.

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

Following maintenance work, whether it involves mechanical, electrical, pneumatic, or software operations, it is advisable to make sure that the robot functions correctly. First verify this at low speed while the person stays outside the enclosure, and then during normal conditions of use. In particular, make sure that all the protective and safety systems are correctly in place, and that calibration of the robot is correct.

The robot is capable of strong accelerations and decelerations. Verify in the application whether:
- The robot hand and the tool are correctly sized and firmly fixed in place.
- The gripper is designed to hold the load with programmed accelerations and in the event of an electrical power or air failure affecting it.
- The robot is correctly attached *(see page 46)*.

The controlled area or isolation area in which the robot moves must be determined using protective devices (protective elements).

NOTE: Protective elements are devices protecting persons from a dangerous area. See the standards currently in force concerning safety for industrial handling equipment.

At the time of an emergency stop, the final position of the robot cannot be determined precisely because of the kinetic energy involved. It is thus necessary to make sure that no persons or obstructions are present in the working area of the robot when the robot is powered up.

⚠ WARNING

UNINTENDED MOVEMENTS

Be sure that all persons are prohibited from entering or remaining in the isolation area in which the robot operates.

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

Hot Surfaces

The metal surfaces of the robot may exceed 80 °C (176 °F) during operation.

⚠ WARNING

HOT SURFACES

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

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

Hazardous Movements

There can be different sources of hazardous movements:
- No or incorrect calibration of the drive
- Wiring or cabling errors
- Errors in the application program
- Component errors
- Error in the measured value and signal transmitter

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

⚠ DANGER

UNAVAILABLE OR INADEQUATE PROTECTION DEVICE(S)

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

Drive systems may perform unanticipated movements because of incorrect wiring, incorrect settings, incorrect data, or other errors.

⚠ WARNING

UNINTENDED MOVEMENT OR MACHINE OPERATION

- Carefully install the wiring in accordance with EMC standards.
- Do not operate the robot with undetermined settings and data.
- Perform comprehensive commissioning tests that include verification of configuration settings and data that determine position and movement.

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

The robot is mounted in a way that provides the maximum angular amplitudes defined in *Mechanical Data (see page 46)*.

Depending on the axes, the axis range can be limited by:
- Software settings
- Adjustable mechanical limit stop (available for axis 1 and axis 2) *(see page 168)*

Only the mechanical limit stops meet the safety requirements specified by the ISO 10218-1 standard to establish a restricted space around the robot. The range limitation system using software limits must only be used to protect the equipment and not to provide functional safety in the system.

⚠ WARNING

DEVIATION FROM THE SAFETY REQUIREMENTS

- Use the mechanical limit stops to comply with the safety requirements specified by the ISO 10218-1 standard.
- Do not use software-based range limitations for safety functions in the system.

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

The range limitation for moving the adjustable mechanical limit stops is set out in *Information About Modification of Ranges (see page 48)*.

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.
- Attach a sign on the robot mechanics if the noise emissions reach an excessive value.

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

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

Emissions

Some small amounts of grease lubricant emissions are to be expected over time. However, excessive grease lubricant emissions on or at the gearbox may be an indication of a damaged robot.

NOTICE
INOPERABLE EQUIPMENT INDICATED BY GEARBOX LUBRICANT EMISSIONS ● Verify the mechanics before, during, and after use. ● Shut down the mechanics immediately if lubricant emissions appear on the robot mechanics. **Failure to follow these instructions can result in equipment damage.**

Hanging Loads

The robot is capable of suspending heavy loads.

⚠ WARNING
FALLING LOADS Keep away from loads that are suspended. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

None of the axes is equipped with a counter balancing system.

⚠ WARNING
SAGGING OF AXES 3 AND 4 When the joint brake is released, engaging the cross-circuit of the motor is the only way of limiting the fall speed *(see page 152)*. **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 (gripper mounting) to the tool 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 may not influence the operation of the protective devices in any way and all EMERGENCY STOP buttons must be accessible all the time.

Analysis of Safety Around the Machine

Take into account the safety for the machine from the design and development stage on.

Before planning the installation of the machine, study the following points:

- Plan the safety strategies that reduce risks to an acceptable level.
- Define the tasks required for the foreseeable applications and assess the access and/or approach requirements.
- Identify the sources of risks including the detected failures and the failure modes associated with each of the tasks. The risks can involve:
  - The frame itself
  - Its association with other items of equipment
  - The interactions between persons and the frame.
- Assess and estimate the risks stemming from frame operation:
  - Programming risks
  - Operating risks
  - Risks during use
  - Maintenance risks for the machine.
- Select the protective methods:
  - Use of protective devices
  - Installation of signaling means
  - Compliance with safe working procedures.

These points are taken from the standards applicable to robots.

NOTE: This list is not exhaustive. Above all, comply with the applicable local, regional and/or national standards.

Information on Electrostatic Discharges (ESD)

A high ESD voltage (several thousand volts) creates danger for electronic components. A semi-conductor must be handled carefully to prevent degradation or destruction by ESD.

The following table indicates typical ESD voltages.

Source	Low relative humidity 10 - 20%	Average relative humidity 40%	High relative humidity 65 - 90%
Walking on carpet	35 kV	15 kV	1.5 kV

Source	Low relative humidity 10 - 20%	Average relative humidity 40%	High relative humidity 65 - 90%
Walking on vinyl	12 kV	5 kV	0.3 kV
Working at the workstation	6 kV	2.5 kV	0.1 kV
Plastified instructions	7 kV	2.6 kV	0.6 kV
Polyethylene bags	20 kV	2 kV	1.2 kV
Cellular polyurethane	18 kV	11 kV	1.5 kV

It is essential to guard against electrostatic discharges during an intervention concerning electronic components, subassemblies, and complete systems.

To handle electronic cards, Schneider Electric workstations are given a grounded coating that dissipates static electricity. Anti-static measures are nonetheless required to handle boards or electronic components.

NOTICE
ELECTROSTATIC DISCHARGE Use anti-static wrist straps connected to the robot body and to ground (earth) while handling boards, electronic components, or the electric harness to which they are connected. **Failure to follow these instructions can result in equipment damage.**

Safety-Related Conditions

The robot features the following safety devices:

Device	Paragraph
Axis limitation devices	Axis Range Limitation *(see page 24)* Modification of Ranges *(see page 48)*

A Category 3 PLd safety function is adequate for a temporary protection of the operator. A permanent protection of the operator may require a higher performance of the safety function. The required safety performance level can only be determined by an application-specific risk analysis.

The robot must only be operated in faultless conditions. Some safety functions require specific conditions of use to guaranty their integrity. Keep records of all safety-related actions on the robot and on the frame in a safety book, or the like. Take special care during maintenance and restarting phases.

Safe operation in the frame does not rely only on the safety functions of the robot. Refer to the instruction manuals of robot conditions of use. These considerations do not prevent from a detailed risk analysis related to the specificities of the frame. Take special care during installation and maintenance phases.

Risks Near the Robot

ISO 10218-1, 5.7.3 recommends that "wherever possible, a manual mode of operation shall be performed with all persons outside the safeguarded space".

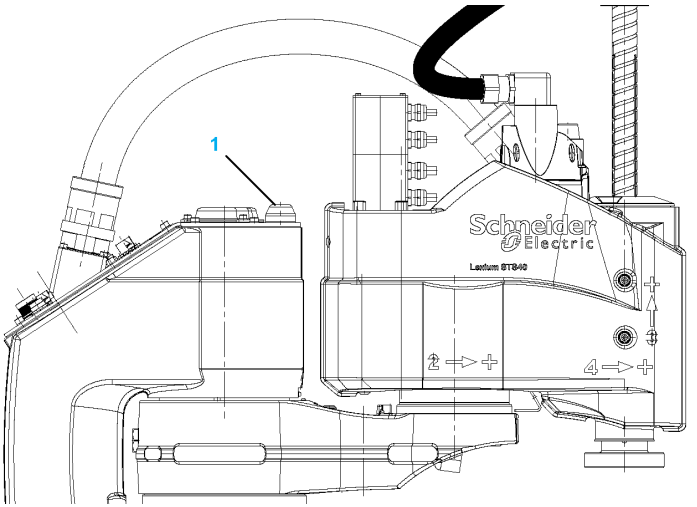
Secure the robot before any operation under its mechanical parts, in manual mode, maintenance, or when using the manual brake release function.

Before operating near the robot, ensure that the brakes are operational.

Risks near the robot:

- Risks of impingement between the moving robot and the frame environment.
- Risks of contact with moving edges or hot parts of the robot, even at low speed.
- Risks of potentially dangerous situations (falling part when opening the gripper, command of other moving parts in the frame...) due to the activation of output signals.
- Risks of reduced attention to other hazards in the frame (steps, other moving parts, sharp edges...) when paying attention to the robot.
- Risk of a sudden operator reaction to an unexpected robot movement, even at low speed (incorrect command for an operation, major axis movement caused by a small movement of the tool center, untoward program command).
- Risks of crushing during robot lifting or movement, or release of a joint brake.

When the robot is powered-on, a yellow indicator lamp (1), below on the robot is on to indicate that there is a potential danger. Robot movements are possible then and constitute a potential risk for the operator. This light is also on when the joint brake is released (on axis 3).



Options for Moving the Robot Without Drive Energy

The robot mechanics are not equipped with a security enclosure.

NOTE: Take appropriate security measures concerning the specific use before operating the robot.

⚠ WARNING
SAGGING OF THE ROBOT Ensure that the release of the motor brakes poses no subsequent risks in the zone of operation. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

If you have to move the complete robot manually, perform the following steps:

Step	Action
1	Switch the robot into a torque-free state.
2	Manually hold the robot in position.
3	Open the motor brakes. **NOTE:** The function for opening the brakes as well as for torque-free switching of the motors is not controlled by the equipment delivered with the product reference, but must be addressed by the application.
4	Manually move the robot. **NOTE:** A greater force could be necessary because the motor and the gearbox may pose resistance to movement.
5	Close the brakes.

Chapter 2
System Overview

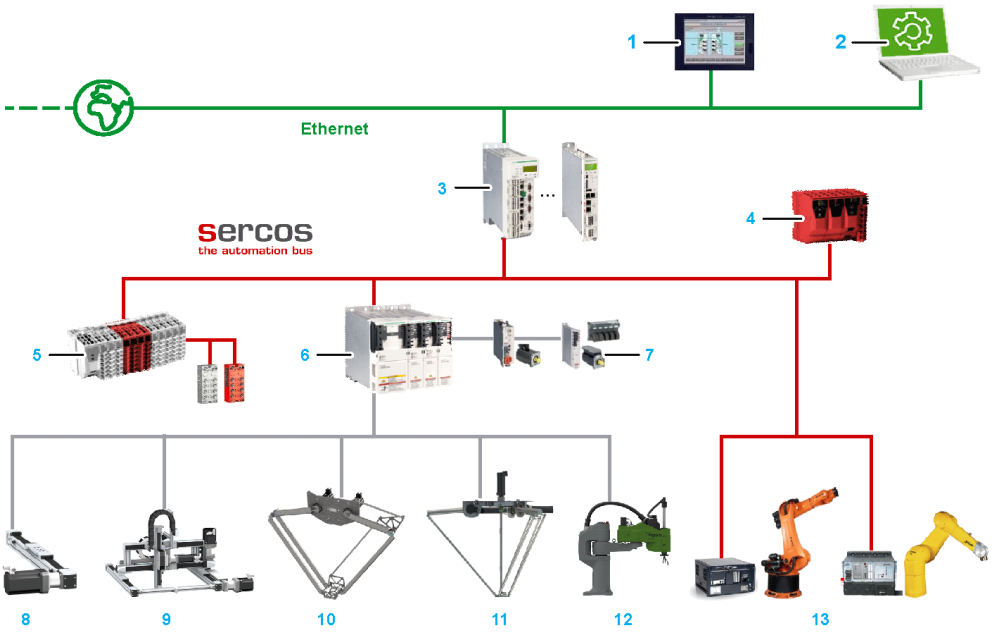
What Is in This Chapter?

This chapter contains the following topics:

System Architecture

Overview

The control system consists of several components, depending on its application. The following graphic presents an example of a PacDrive 3 system.

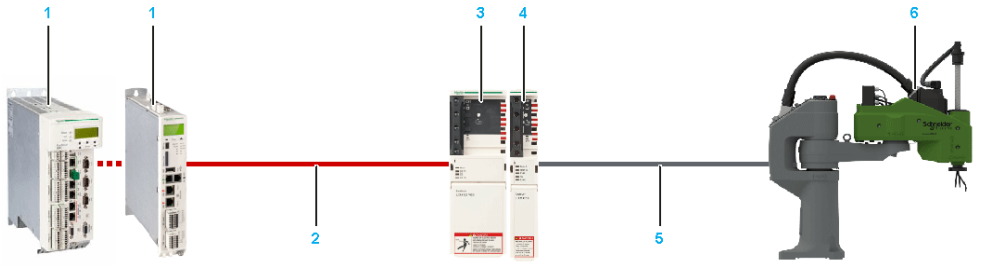


1 Harmony SCU HMI Controller
2 EcoStruxure Machine Expert
3 Motion Controller
4 Safety Controller
5 I/O
6 Drives
7 Motors
8 Single Axes (CAR, CAS, EAC, PAD, PAS, TAS)
9 Multi-Axis Systems (MAXH, MAXS, MAXP, MAXR)
10 Delta-2 Robots (Lexium T)
11 Delta-3 Robots (Lexium P)
12 SCARA Robots (Lexium S)
13 Articulated Robots

Product Overview

System Setup

The following figure presents an example of a system setup for one Lexium S robot. At a minimum, these are the equipments required to achieve performances described in this guide.



Number	Device name	Quantity(1)	Device type	Comment
1	Controller	1	LMC•00C…LMC•01C	Logic Motion Controller
2	Sercos cable	3	VW3E5001R•••	Sercos cable; the cable length depends on the distance between the controller and the cabinet.
3	Power supply(2)	1	LXM62PD84A11000	Lexium 62 Power Supply
4	Single drive	1	LXM62DD45•21000(3)	Lexium 62 Drive Module for the connection of the robot motor axis 1
	Single drive	1	LXM62DD15•21000(3)	Lexium 62 Drive Module for the connection of the robot motor axis 2
	Double drive	1	LXM62DU60•21000(3)	Lexium 62 Drive Module for the connection of the robot motor axis 3 and 4

(1) Quantity to be ordered.
(2) Lexium 52 cannot be used.
(3) The device type depends on the safety requirement.
(4) The device type depends on the robot reference and its characteristics. For further information, refer to *Type Code* *(see page 40)*.

Number	Device name	Quantity(1)	Device type	Comment
5	Motor cable for connection of drive and motor 1	1	VW3E1143R•••	PacDrive 3 motor cable; the cable length depends on the distance between cabinet and robot.
	Motor cable for connection of drive and motor 2, 3, 4	3	FCE319•••A100	
	Feedback cable for connection of drive and motors	4	FCE320•••A100	
	24 V cable	1	VW3E1169R•••	For supplying the joint brake and the level of arm 2 (for example, ARMIO board) with 24 V voltage and for connecting the signal of the joint brake. The cable length depends on the distance between cabinet and motor.
	I/O cable	1	VW3E4002R•••	For connection of digital or analog inputs/outputs at the standard configuration *(see page 79)*. The cable length depends on the distance between cabinet and motor.
	CAN bus cable	1	VW3E3067R•••	For connection of CAN bus at the configuration with ARMIO board *(see page 82)*. The cable length depends on the distance between cabinet and motor.
6	Lexium S robot	1	(4)	

(1) Quantity to be ordered.
(2) Lexium 52 cannot be used.
(3) The device type depends on the safety requirement.
(4) The device type depends on the robot reference and its characteristics. For further information, refer to *Type Code (see page 40)*.

System Performance of the Robots per Controller for a Robotic Application:

PacDrive LMC (Logic Motion Controller)	Sercos cycle time 1 ms		Sercos cycle time 2 ms	
	Simple control (1)	Control with velocity control (1)	Simple control (1)	Control with velocity control (1)
PacDrive LMC101	–	–	1	1
PacDrive LMC106	–	–	1	1

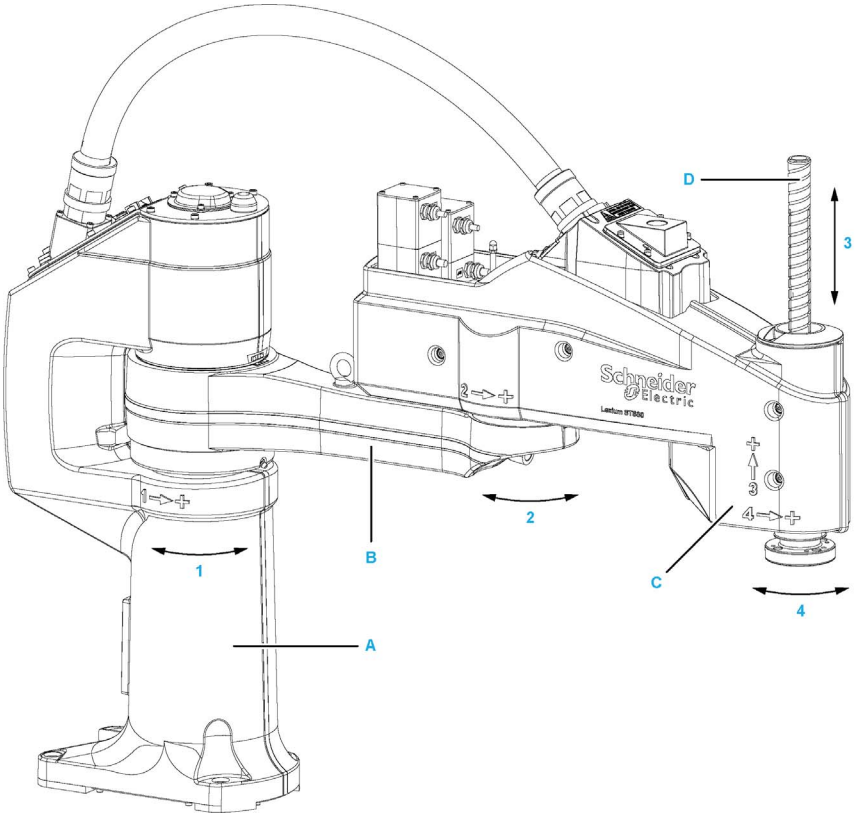
(1) Number of controllable robots (four axes per robot)

PacDrive LMC (Logic Motion Controller)	Sercos cycle time 1 ms		Sercos cycle time 2 ms	
	Simple control (1)	Control with velocity control (1)	Simple control (1)	Control with velocity control (1)
PacDrive LMC201	–	–	2	1
PacDrive LMC212	–	–	2	1
PacDrive LMC216	–	–	2	1
PacDrive LMC300	2	2	2	2
PacDrive LMC400	2	2	2	2
PacDrive LMC402	2	2	4	4
PacDrive LMC600	2	2	4	3
PacDrive LMC802	2	2	8	7
(1) Number of controllable robots (four axes per robot)				

System Performance of the Robots per Power Supply for a Robotic Application

Each robot must be operated with its own Lexium 62 Power Supply.

Components Overview



A Base / Console
B Arm 1
C Arm 2
D Ball screw
1 Axis 1 / Axis A
2 Axis 2 / Axis B
3 Axis 3 / Axis C
4 Axis 4 / Axis D

The Lexium S robot consists of segments or members interconnected by joints (see graphic above).

Movements on the robot axes are generated by servo motors coupled with position sensors.

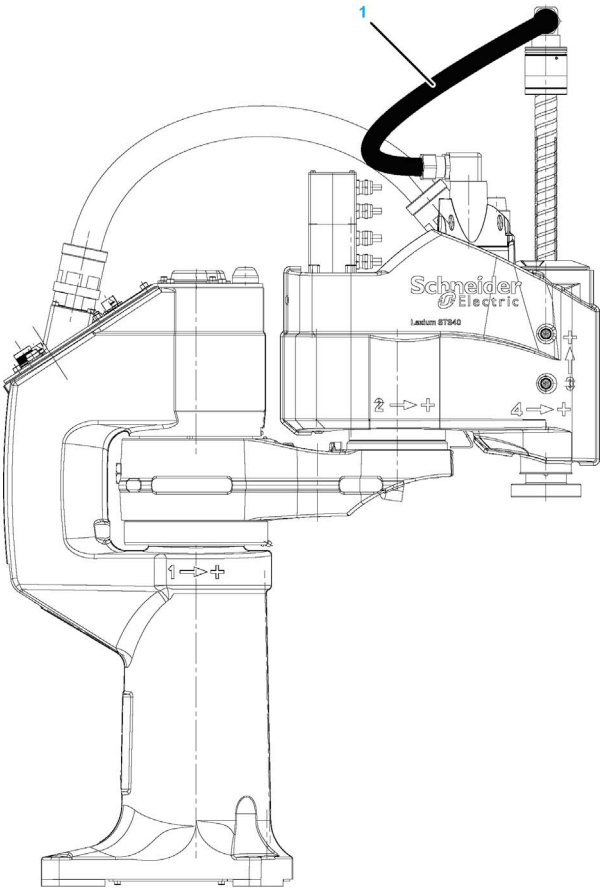
The robot assembly is linked to a counting system that provides data concerning the absolute position of the robot.

The robot assembly is flexible and is able to perform a variety of applications.

Example: Handling loads, assembly, processes, applying strips of glue, verifying and inspections. This list is not exhaustive. For further information, contact your local Schneider Electric representative.

The robot unit contains the motorization, the movement transmission mechanisms, the wiring harness, and the air systems and electric circuits.

Configuration for the User Input/Output Cable



1 Optional user input/output cable

The cable is turned towards the right-hand side of the robot STS40 and the left-hand side of the robot STS60/80. For robot STS60/80, you can change the direction to the right-hand side *(see page 145)*.

Type Code

Overview

Example of a type code for the Lexium S robot:

Character	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Example	L	X	M	S	T	S	4	0	F	2	0	0	0	0	0

Description of the type code structure with reference to the example stated above:

Character	Example	Item	Meaning
1…3	LXM	Product family	LXM = Lexium
4…6	STS	Robot / product type	STS = SCARA TS
7	4	Working area	4 = maximum reach 400 mm (15.7 in) 6 = maximum reach 600 mm (23.6 in) 8 = maximum reach 800 mm (31.5 in) Y = optional / replacement equipment
8	0	Number of active axes	0 = four active axes Y = optional / replacement equipment
9	F	Mounting position	F = floor-mounted W = wall-mounted Y = optional / replacement equipment
10	2	Type of drive of axis 3/4	2 = ball screw; stroke 200 mm (7.9 in) 3 = ball screw with bellow for protection of the ball screw; stroke 200 mm (7.9 in) 4 = ball screw; stroke 400 mm (23.6 in) 5 = ball screw with bellow for protection of the ball screw; stroke 400 mm (23.6 in) Y = optional / replacement equipment
(1) For more information on the optional equipment, contact your local Schneider Electric service representative.			

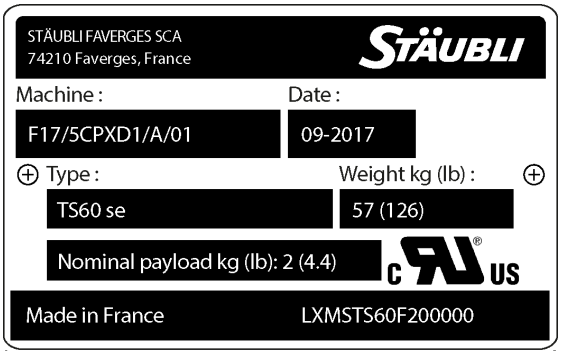
Character	Example	Item	Meaning
11…12	00	Variant / option	00 = without option A2 = ARMIO board with user input/output cable (for ball screw; stroke 200 mm (7.9 in)) A4 = ARMIO board with user input/output cable (for ball screw; stroke 400 mm (23.6 in)) C2(1) = special color for cover of axis 2 L1(1) = lubrication with H1 oil and grease M1(1) = mechanical limit stop for axis 1 M2(1) = mechanical limit stop for axis 2 T2(1) = Tool Connector with ARMIO board and user input/output cable (for ball screw; stroke 200 mm (7.9 in)) T4(1) = Tool Connector with ARMIO board and user input/output cable (for ball screw; stroke 400 mm (23.6 in)) YY = replacement equipment
13…15	000	Miscellaneous	••• = reserved for options. For example: replacement equipment number.

(1) For more information on the optional equipment, contact your local Schneider Electric service representative.

Type Plate

Overview

The Lexium S robots are identified by a type plate attached to the robot (see the following graphic).



NOTE: This label is not contractual, refer to the label placed on your machine.

For all requests concerning information, replacement part orders, or requests for intervention, please state the type and the serial number of the machine concerned, as set out on the type plate.

The retailer of the robot is:

Schneider Electric Automation GmbH
Schneiderplatz 1
97828 Marktheidenfeld, Germany

The manufacturer of the robot is:

Stäubli Faverges SCA
Place Robert Stäubli
74210 Faverges France

Chapter 3
Technical Data

What Is in This Chapter?

This chapter contains the following sections:

Section 3.1
Ambient Conditions

Ambient Conditions

Overview

Procedure	Parameter	Unit	Value
Operation(1)	Ambient temperature	°C (°F)	+5…+40 (+41…+104)
	Condensation	–	prohibited
	Relative humidity	%	30…95
Transport	Ambient temperature	°C (°F)	-20…+60 (-4…+140)
Long-term storage in transport packaging	Ambient temperature	°C (°F)	-20…+60 (-4…+140)
	Maximum storage period	years	2
(1) Installation altitude < 2000 m (6562 ft).			

NOTE:
- It may be necessary to perform a warm-up cycle before the performance data is obtained. A high ambient temperature may lead to limitations in the dynamic performance levels of the robot.
- For information about vibrations, contact your local Schneider Electric service representative.

For further information about storage conditions, refer to *Transport and Storage* *(see page 111)*.

Section 3.2
Mechanical Data of Lexium S Robots

What Is in This Section?

This section contains the following topics:

Robot STS40/60/80

Overview

Here you will find the following information regarding the Lexium S robots:

- Mechanical data *(see page 46)*
- Information about modification of ranges *(see page 48)*
- Mounting options *(see page 49)*
- Floor mounting *(see page 50)*
- Wall mounting *(see page 50)*
- Mounting flange dimensions of the base version for floor-mounting *(see page 51)*
- Mounting flange dimensions of the console version for wall-mounting *(see page 52)*

Mechanical Data

Category	Parameter	Unit	STS40	STS60	STS80
General data	Position repeatability (ISO 9283)	mm (in)	+/-0.01 (0.0039 in)		
Range	Range	mm (in)	400 (15.7)	600 (23.6)	800 (31.5)
	Internal radius	mm (in)	139 (5.5)	166 (6.5)	183 (7.2)
	Angular range (axis 1)	–	+/-105°	+/-125°(1)	+/-140°
	Angular range (axis 2)	–	+/-143°	+/-150°	+/-155°
	Stroke (axis 3)	mm (in)	200 (7.9)		
	Stroke (axis 3) (selectable)	mm (in)	400 (15.7)		
	Angular range (axis 4) with the user input/output cable	–	360° in either direction(2)		
Weight	Floor-mounted	kg (lb)	50.0 (110.2)	55.4 (122)	56.8 (125)
	Wall-mounted	kg (lb)	48.3 (106)	53.7 (118)	54.9 (121)

(1) Range of +/-140° can be configured. For further information, contact your local Schneider Electric service representative.
(2) Due to user input/output cables - value can be adjusted if necessary. For further information, contact your local Schneider Electric service representative.

Category	Parameter	Unit	STS40	STS60	STS80
Payload	Rated payload at nominal speed	kg (lb)	2 (4.4)		
	Maximum payload at reduced speed(3)	kg (lb)	8 (17.6)		
	Nominal inertia for axis 4	$kg \cdot m^2$ ($lb \cdot in^2$)	0.05 (0.08)		
	Maximal inertias for axis 4	$kg \cdot m^2$ ($lb \cdot in^2$)	0.1 (0.08)		
Force and torque(4)	Horizontal force (continuous / maximum)	N (lbf)	180 / 360 (40.5 / 81)		130 / 260 (29 / 58)
	Vertical force (continuous / maximum)	N (lbf)	260 / 520 (58 / 117)		
	Axis 4 torque (continuous(5) / maximum)	Nm (lbf-in)	7 / 14 (62 / 124)		
Maximum energy(6)	Maximum energy generated by the robot in the event of an impact	J	150	220	370
Noise level(7)	Noise level	db	72	79	79
Protection class	IP code	–	IP54		
Cleanliness class	Cleanliness class according to standard ISO 14644-1 (with optional bellows)	–	6		

(3) In all configurations and taking maximum inertias into account.
(4) At the center of the tool flange.
(5) Contact your local Schneider Electric service representative if axis 4 is configured as a continuous axis.
(6) This energy is calculated for the nominal load, at nominal speed, with a combination of the speeds for axis 1 and axis 2 and in an extended robot position.
(7) Depends on the conditions of use. When using several axes at nominal speed and nominal load, the noise level measured at a height of 1.60 m (63 in) and a distance of 1 m (39 in) from the maximum work range can reach the stated values.

NOTE: Safe limited speed (< 250 mm/s (9.8 in/s)) can be reached with an additional implementation. This requires Lexium safety modules and a safety program. For further information, contact your local Schneider Electric service representative.

Information About Modification of Ranges

The robot is mounted in a way that provides the maximum angular amplitudes defined in mechanical data of robot STS40/60/80 *(see page 46)*.

NOTE: The angular values shown in the drawings are software values and they can thus be reached.

Depending on the axes, the axis range can be limited by:
- Software settings
- Adjustable mechanical limit stop (available for axis 1 and axis 2) *(see page 168)*

⚠ WARNING

DEVIATION FROM THE SAFETY REQUIREMENTS

- Use the mechanical limit stops to comply with the safety requirements specified by the ISO 10218-1 standard.
- Do not use software-based range limitations for safety functions in the system.

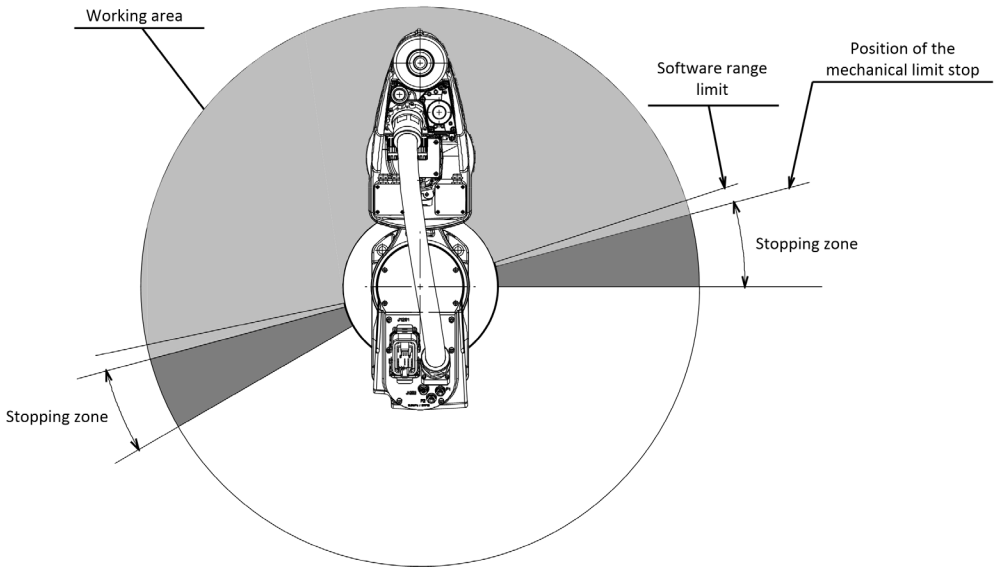
Failure to follow these instructions can result in death, serious injury, or equipment damage.

Mechanical limit stops are not included with the robot, and must be ordered separately.

The software range limit is adjusted by the nominal values *(see page 46)*.

NOTE: The software range limit can be reduced.

The axis range limitations involving mechanical systems must take the stopping distances into account.



Working area

Angular range within which the robot moves during normal operation. You can deliberately limit the range of the articulations using software, and also using adjustable mechanical limit stops.

Stopping zone (unusual operating zone)

Maximum angle necessary to stop the robot. When using the adjustable mechanical limit stop system, the stopping angle depends on the force of the impact (its maximum value is 21.5°).

⚠ WARNING
UNINTENDED EQUIPMENT OPERATION
Verify at low speed that the axis is able to move through the planned angular range, but no further, after changing a software range limit.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

NOTE: When using the adjustable mechanical limit stops, verify that they are correctly placed as compared with the desired limitations, and then define the software range limit at least 2.5° less.

Mounting Positions

The Lexium S robots can be mounted at:

- Floor – in base version *(see page 51)* or
- Vertical wall – in console version only *(see page 51)*

The attachment surface must be flat and metallic. Further, the attachment surface must have the strength and rigidity to support the robot and withstand the forces applied.

Floor Mounting

The base must be fixed in place using four M12 screws of property class 8.8 or greater, tightened to a torque of 77 Nm (682 lbf-in). You can position the robot precisely using two 8 mm (0.315 in) diameter alignment pins (not supplied). For further information, refer to the dimensional drawing of the mounting flange *(see page 51)*.

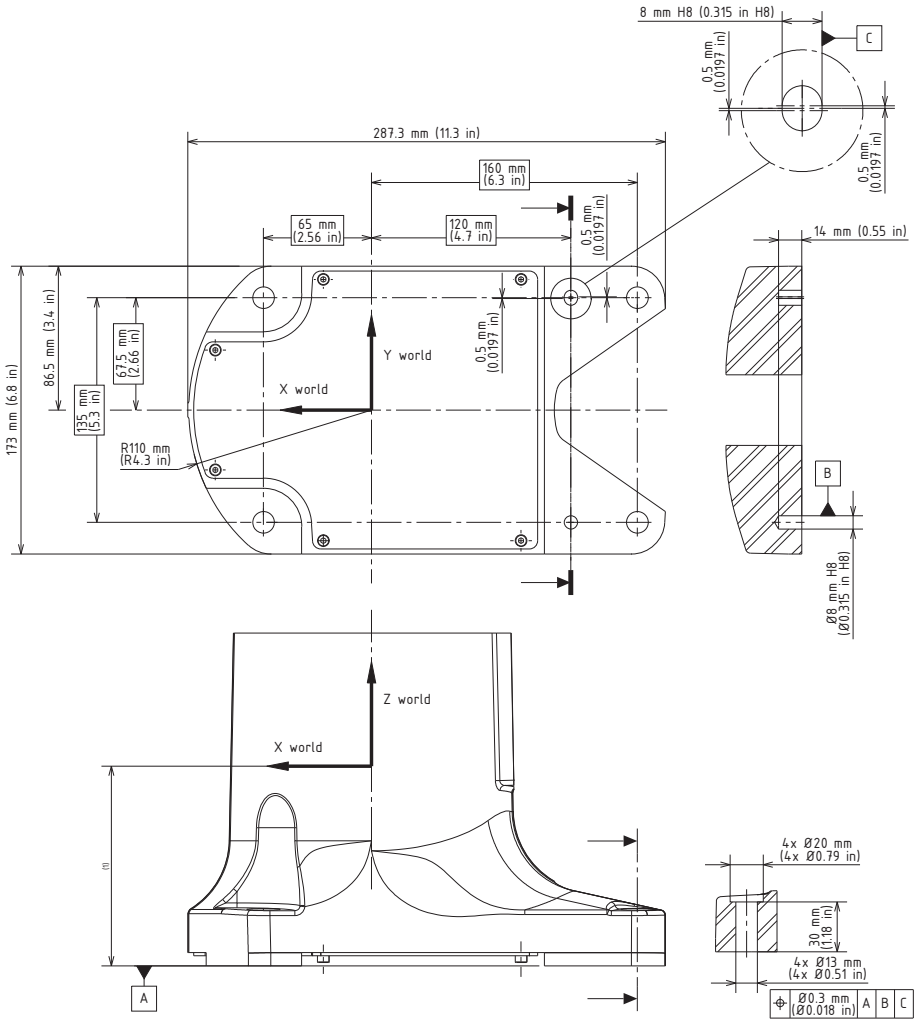
Wall Mounting

The robot can be mounted on a wall in the optional console version. The console must be fixed with six M12 screws of property class 8.8 or greater, tightened to a torque of 77 Nm (682 lbf-in). You can position the robot precisely using two 8 mm (0.315 in) diameter alignment pins (not supplied). For further information, refer to the dimensional drawing of the mounting flange *(see page 52)*.

The connection cable is supplied as standard with a straight outlet connector in base and console version.

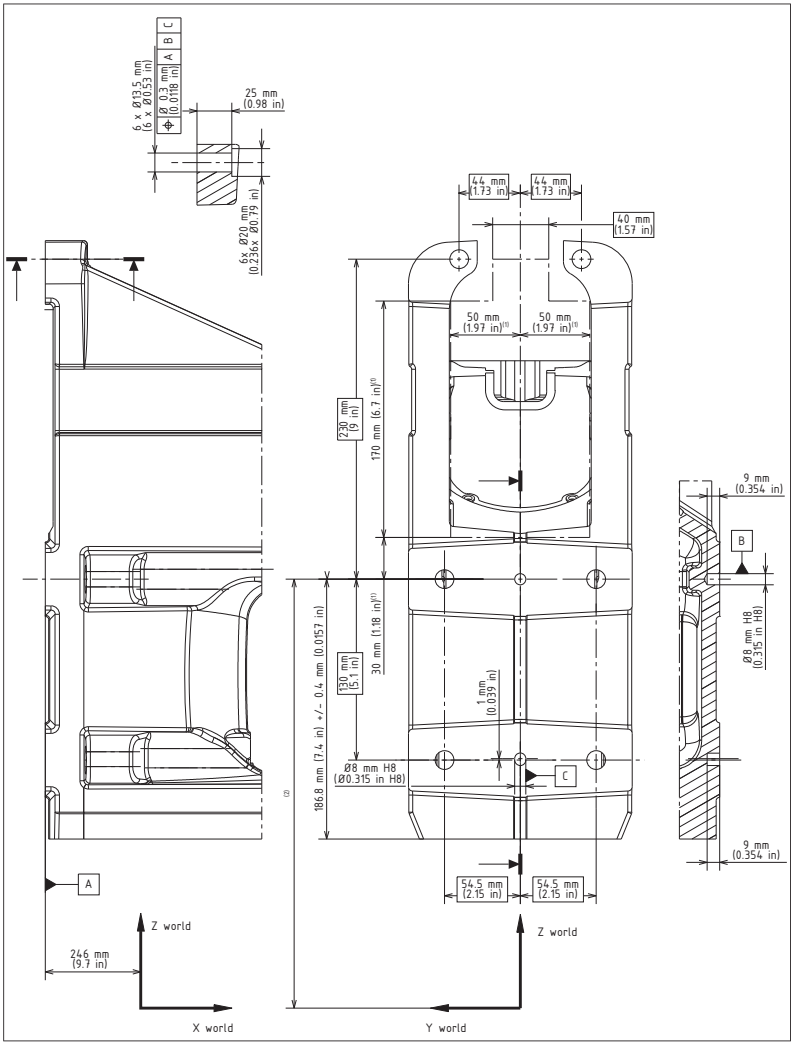
On either robot versions (base or console), it is possible to fit either of the connector configurations. However, for the wall-mounted console version, leave an opening in the holder to enable the cable and connector to be passed through it (these openings are defined in the dimensional drawing of the mounting flange *(see page 52)*.

Mounting Flange Dimensions of the Base Version for Floor-Mounting



(1) Low position of axis 3. See the values and the figures in mechanical data of robot STS40/60/80 *(see page 46)*.

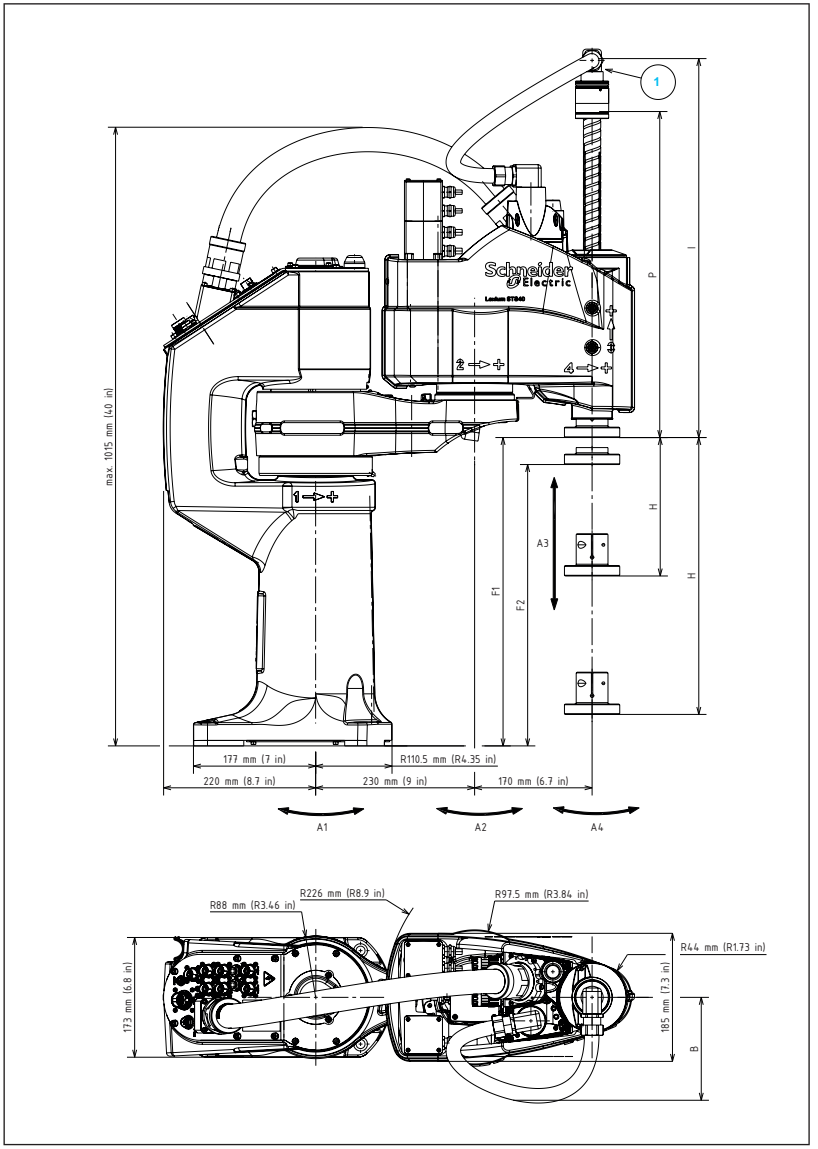
Mounting Flange Dimensions of the Console Version for Wall-Mounting



(1) Dimensions of the minimum opening left in the holder to install the connection cable.
(2) Low position of axis 3. See the values and the figures in mechanical data of robot STS40/60/80 *(see page 46)*.

Robot STS40

Dimensional Drawing Robot LXMSTS40F

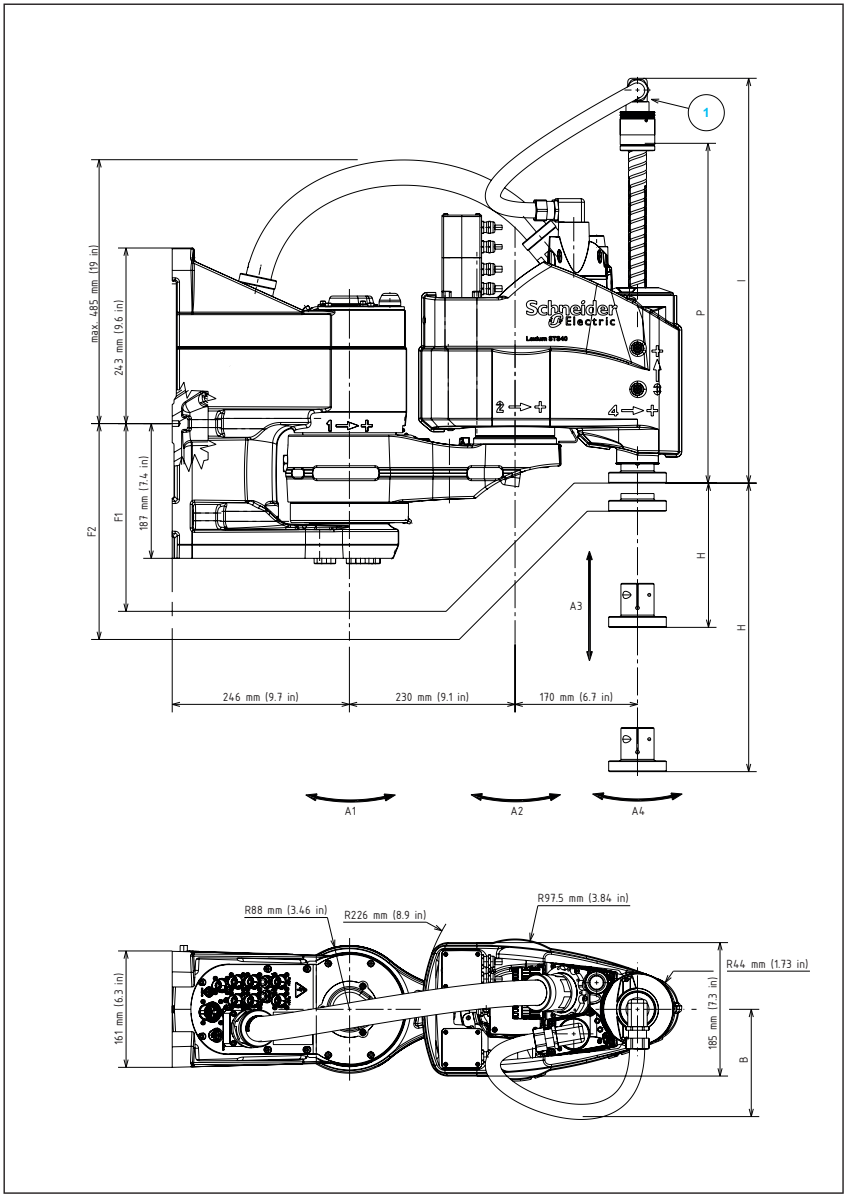


1 User input/output cable

Configuration	Parameter	Label	Length in mm (in)	
All	Stroke axis 3	H	200 (7.9)	400 (15.7)
Standard(1)	Ball screw length	P	471 (18.5)	671 (26.4)
	Height	F1	445 (17.5)	
With bellows for the protection of the ball screw	Ball screw length	P	555 (22)	801 (31.5)
	Height	F2	406 (16)	381 (15)
With user input/output cable, horizontal output configuration	Height of the user installation	I	548 (21.6)	769 (30)
	Overall measurements of the user installation	B	175 (6.9)	
With user input/output cable, horizontal output configuration and bellows	Height of the user installation	I	587 (23)	833 (33)
	Overall measurements of the user installation	B	175 (6.9)	

(1) The subsequent installation or replacement of variants (for example bellow) in a standard configuration influences the length. This leads to a zero shift in the height.

Dimensional Drawing Robot LXMSTS40W with Console

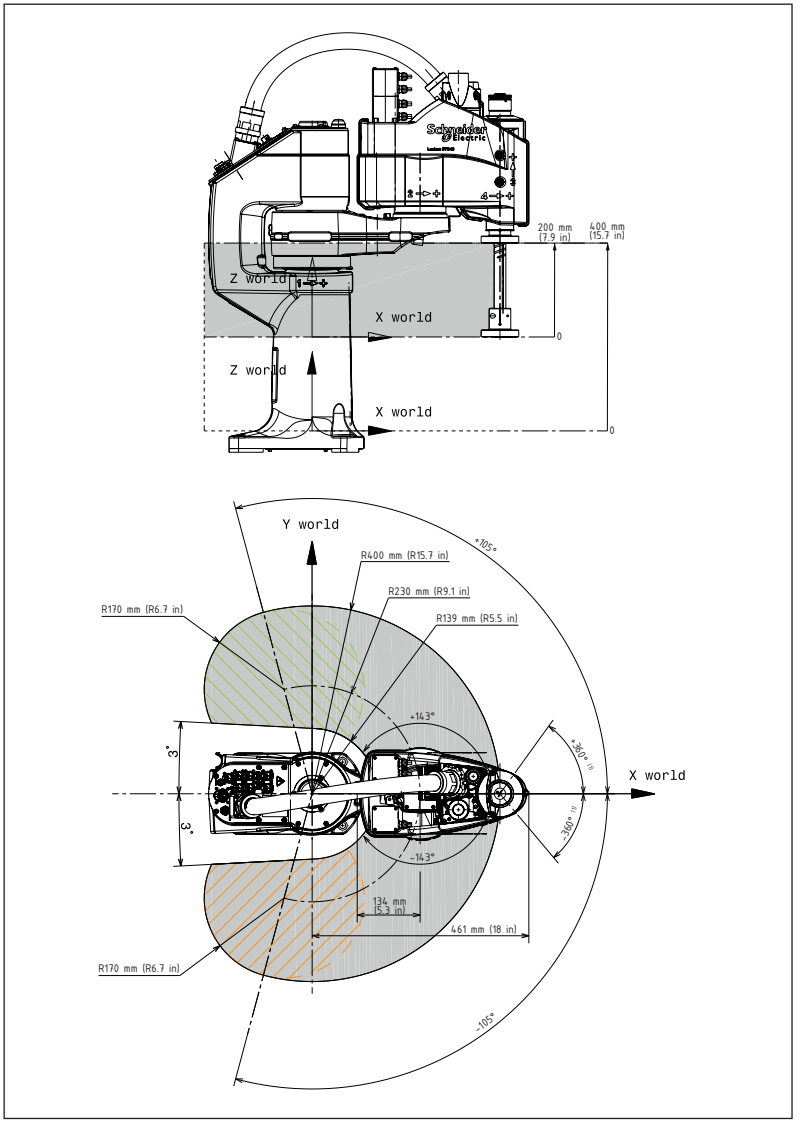


1 User input/output cable

Configuration	Parameter	Label	Length in mm (in)	
All	Stroke axis 3	H	200 (7.9)	400 (15.7)
Standard(1)	Ball screw length	P	471 (18.5)	671 (26.4)
	Height	F1	83 (3.3)	
With bellows for the protection of the ball screw	Ball screw length	P	555 (22)	801 (31.5)
	Height	F2	122 (4.8)	147 (5.8)
With user input/output cable, horizontal output configuration	Height of the user installation	I	548 (21.6)	769 (30)
	Overall measurements of the user installation	B	175 (6.9)	
With user input/output cable, horizontal output configuration and bellows	Height of the user installation	I	587 (23)	833 (33)
	Overall measurements of the user installation	B	175 (6.9)	

(1) The subsequent installation or replacement of variants (for example bellow) in a standard configuration influences the length. This leads to a zero shift in the height.

Working Area of Robot STS40

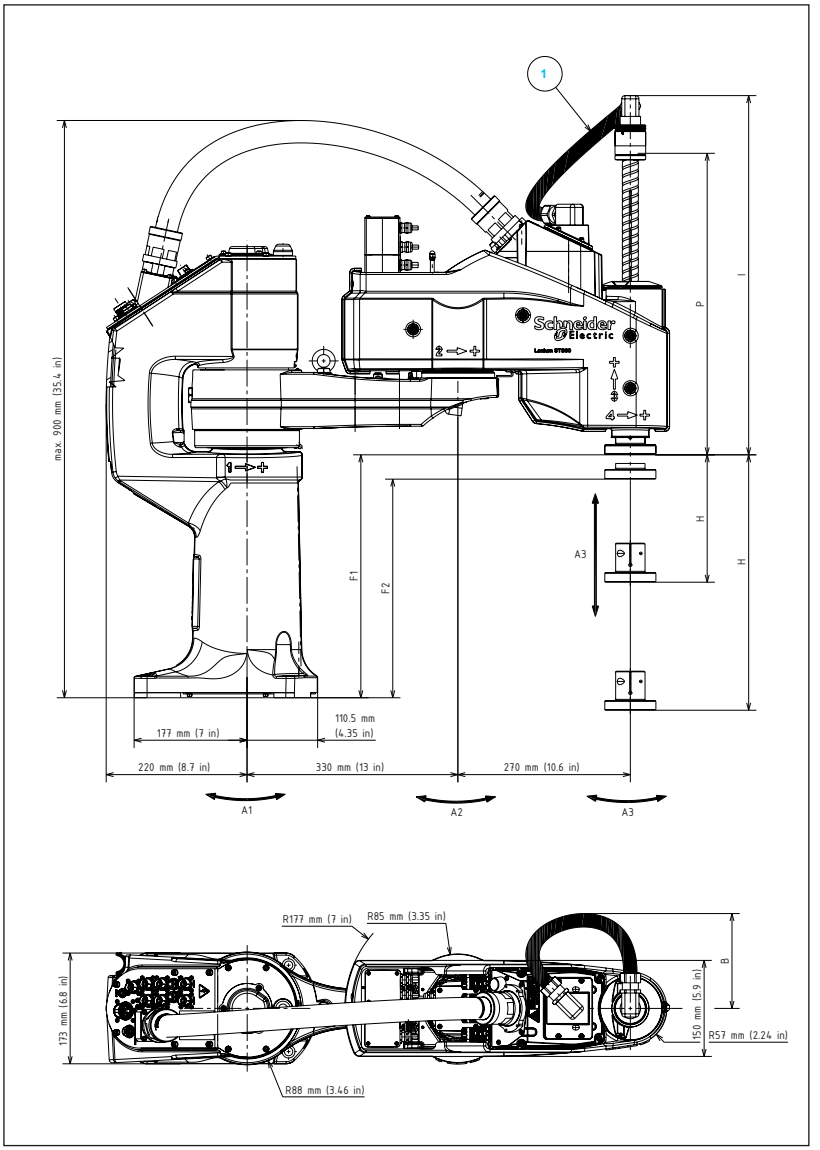


(1) 360° in either direction due to user input/output user cables - value can be adjusted if necessary. For further information, contact your local Schneider Electric service representative.

NOTE: The orange and green circles represent the reduced working area in relation to the arm configuration (left or right).

Robot STS60

Dimensional Drawing Robot LXMSTS60F

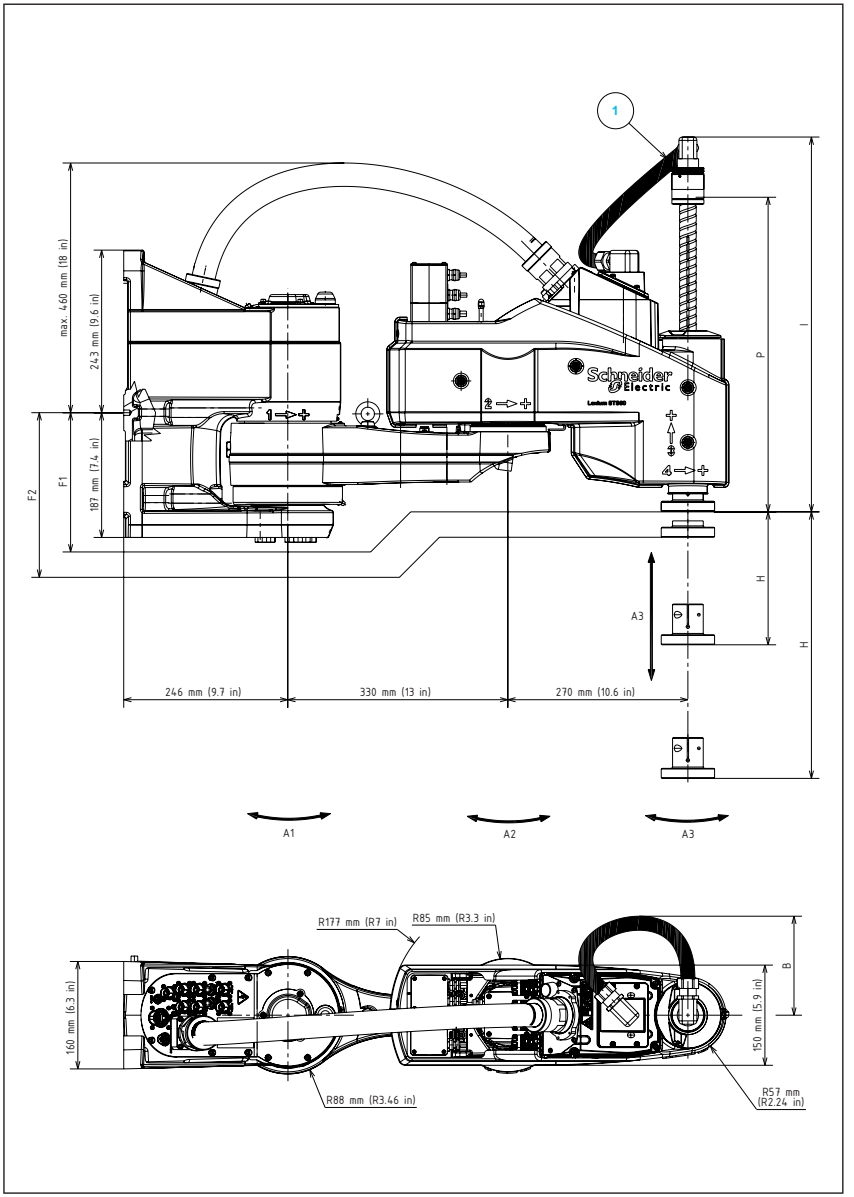


1 User input/output cable

Configuration	Parameter	Label	Length in mm (in)	
All	Stroke axis 3	H	200 (7.9)	400 (15.7)
Standard(1)	Ball screw length	P	471 (18.5)	671 (26.4)
	Height	F1	380 (15)	
With bellows for the protection of the ball screw	Ball screw length	P	555 (22)	801 (31.5)
	Height	F2	341 (13.4)	316 (12.4)
With user input/output cable, horizontal output configuration	Height of the user installation	I	575 (22.6)	769 (30)
	Overall measurements of the user installation	B	175 (6.9)	165 (6.5)
With user input/output cable, horizontal output configuration and bellows	Height of the user installation	I	614 (24)	833 (33)
	Overall measurements of the user installation	B	175 (6.9)	165 (6.5)
(1) The subsequent installation or replacement of variants (for example bellow) in a standard configuration influences the length. This leads to a zero shift in the height.				

NOTE: You can change the orientation of the user input/output cable to the right-hand side *(see page 145)*.

Dimensional Drawing Robot LXMSTS60W with Console

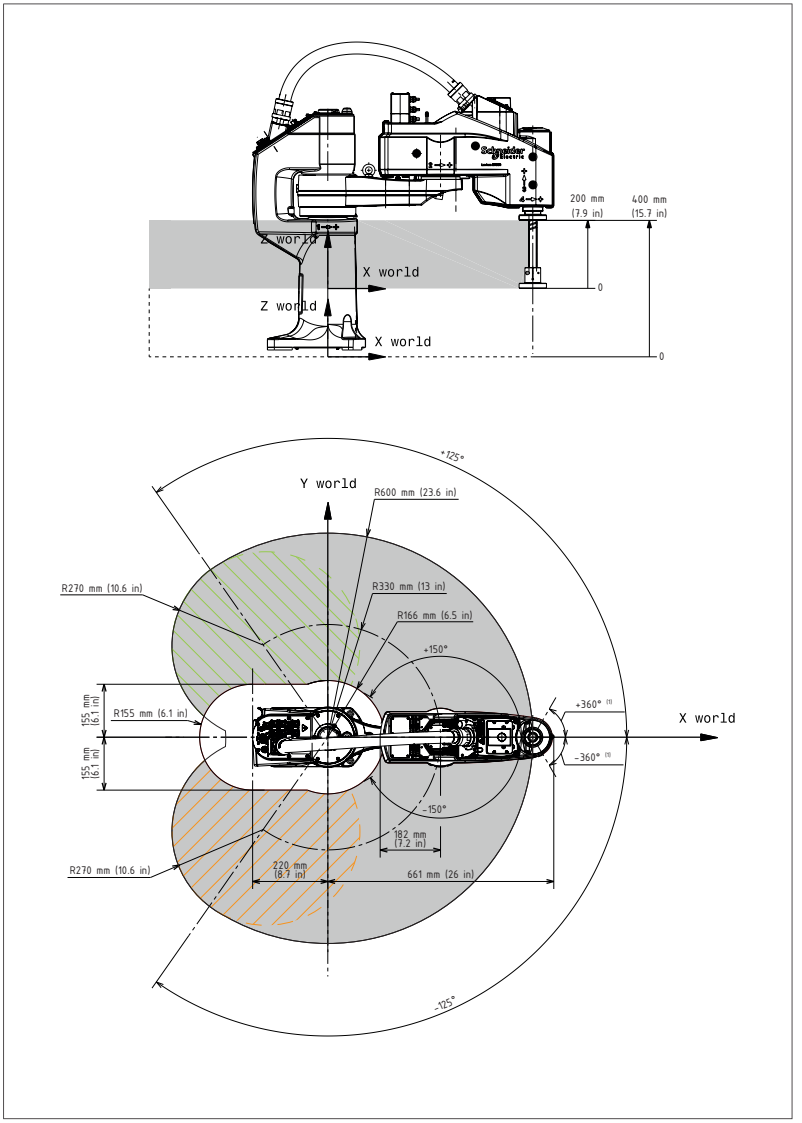


1 User input/output cable

Configuration	Parameter	Label	Length in mm (in)	
All	Stroke axis 3	H	200 (7.9)	400 (15.7)
Standard(1)	Ball screw length	P	471 (18.5)	671 (26.4)
	Height	F1	148 (5.8)	
With bellows for the protection of the ball screw	Ball screw length	P	555 (22)	801 (31.5)
	Height	F2	187 (7.4)	212 (8.3)
With user input/output cable, horizontal output configuration	Height of the user installation	I	575 (22.6)	769 (30)
	Overall measurements of the user installation	B	175 (6.9)	
With user input/output cable, horizontal output configuration and bellows	Height of the user installation	I	614 (24)	833 (33)
	Overall measurements of the user installation	B	175 (6.9)	
(1) The subsequent installation or replacement of variants (for example bellow) in a standard configuration influences the length. This leads to a zero shift in the height.				

NOTE: You can change the orientation of the user input/output cable to the right-hand side *(see page 145)*.

Working Area of Robot STS60

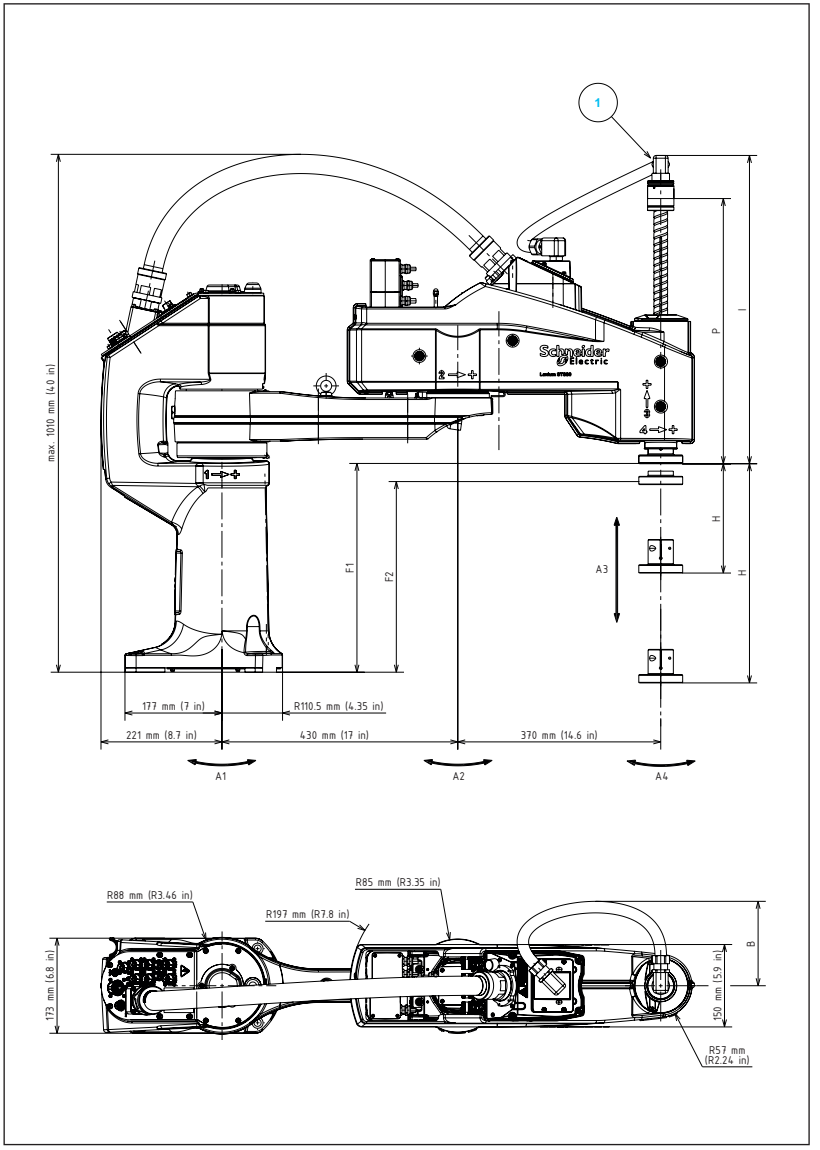


(1) 360° in either direction due to user input/output user cables - value can be adjusted if necessary. For further information, contact your local Schneider Electric service representative.

NOTE: The orange and green circles represent the reduced working area in relation to the arm configuration (left or right).

Robot STS80

Dimensional Drawing Robot LXMSTS80F

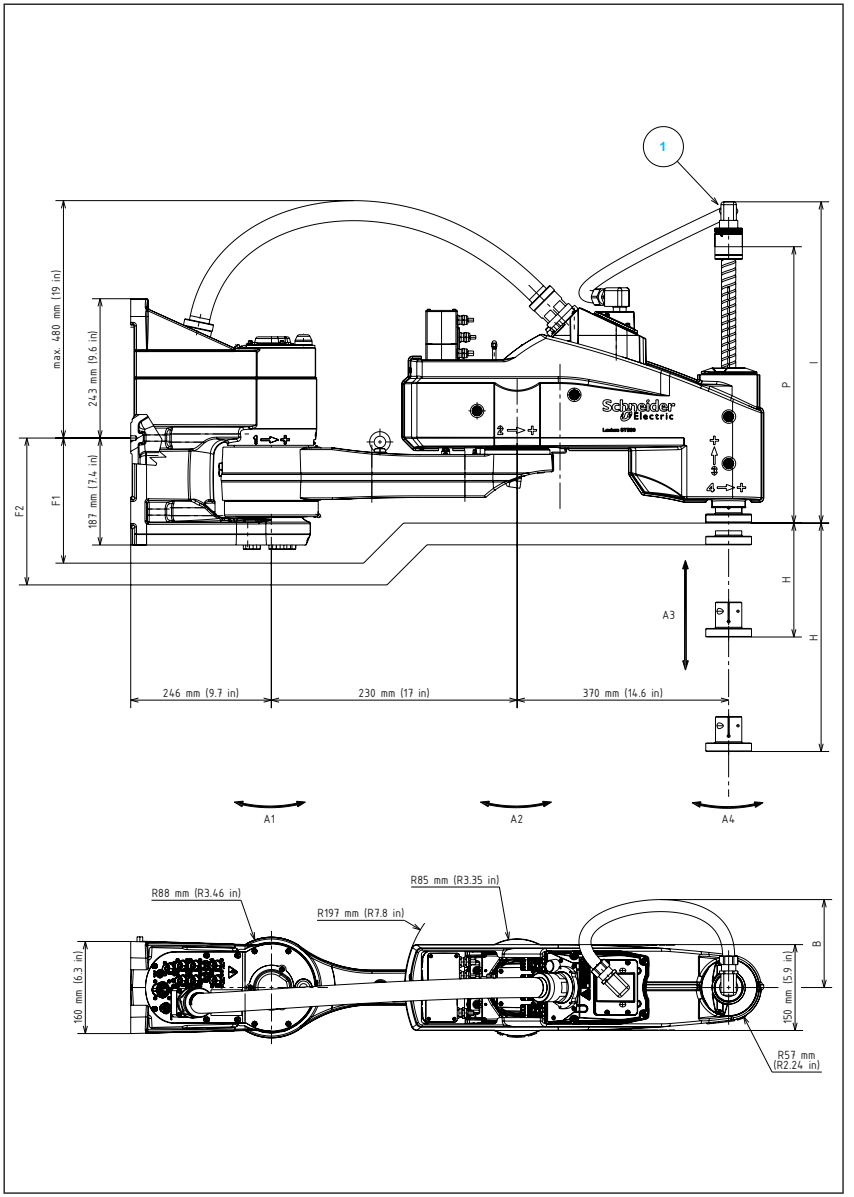


1 User input/output cable

Configuration	Parameter	Label	Length in mm (in)	
All	Stroke axis 3	H	200 (7.9)	400 (15.7)
Standard(1)	Ball screw length	P	471 (18.5)	671 (26.4)
	Height	F1	380 (15)	
With bellows for the protection of the ball screw	Ball screw length	P	555 (22)	801 (31.5)
	Height	F2	341 (13.4)	316 (12.4)
With user input/output cable, horizontal output configuration	Height of the user installation	I	588 (23)	782 (31)
	Overall measurements of the user installation	B	190 (7.5)	200 (7.9)
With user input/output cable, horizontal output configuration and bellows	Height of the user installation	I	627 (24.7)	846 (33)
	Overall measurements of the user installation	B	190 (7.5)	200 (7.9)
(1) The subsequent installation or replacement of variants (for example bellow) in a standard configuration influences the length. This leads to a zero shift in the height.				

NOTE: You can change the orientation of the user input/output cable to the right-hand side *(see page 145)*.

Dimensional Drawing Robot LXMSTS80W with Console

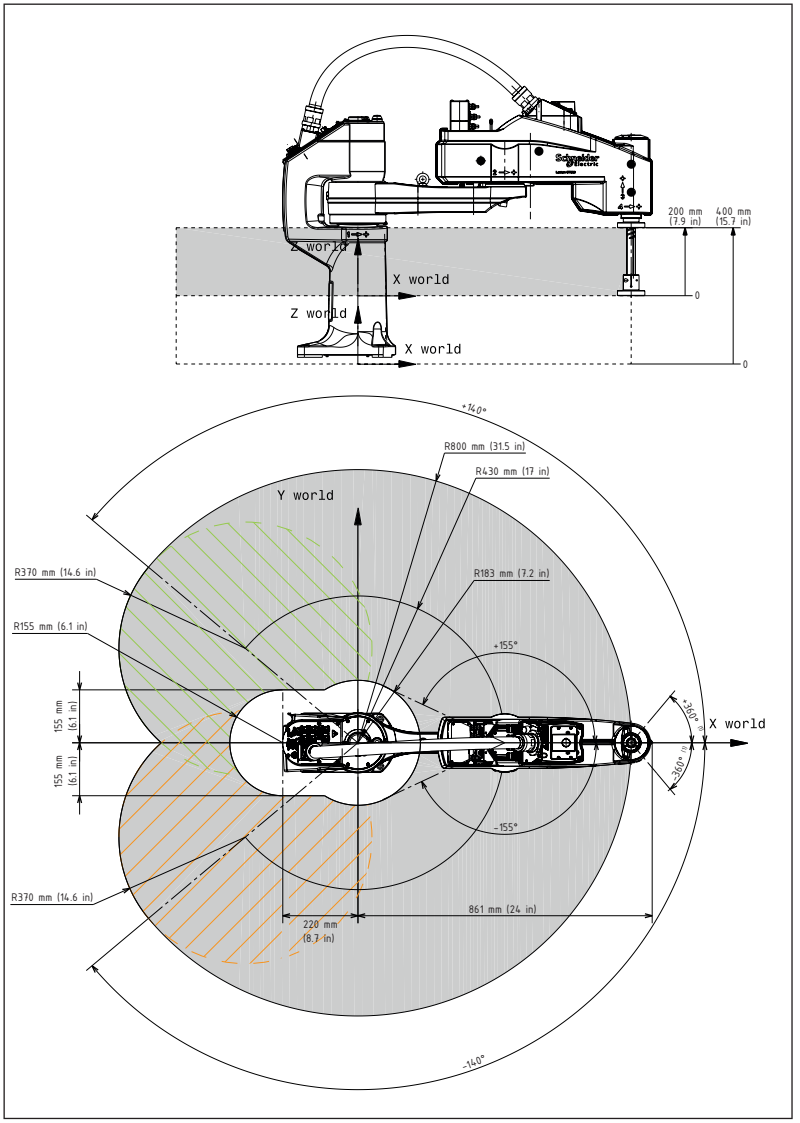


1 User input/output cable

Configuration	Parameter	Label	Length in mm (in)	
All	Stroke axis 3	H	200 (7.9)	400 (15.7)
Standard(1)	Ball screw length	P	471 (18.5)	671 (26.4)
	Height	F1	148 (5.8)	
With bellows for the protection of the ball screw	Ball screw length	P	555 (22)	801 (31.5)
	Height	F2	187 (7.4)	212 (8.3)
With user input/output cable, horizontal output configuration	Height of the user installation	I	588 (23)	782 (31)
	Overall measurements of the user installation	B	190 (7.5)	200 (7.9)
With user input/output cable, horizontal output configuration and bellows	Height of the user installation	I	627 (24.7)	846 (33)
	Overall measurements of the user installation	B	190 (7.5)	200 (7.9)
(1) The subsequent installation or replacement of variants (for example bellow) in a standard configuration influences the length. This leads to a zero shift in the height.				

NOTE: You can change the orientation of the user input/output cable to the right-hand side *(see page 145)*.

Working Area of Robot STS80



(1) 360° in either direction due to user input/output - value can be adjusted if necessary. For further information, contact your local Schneider Electric service representative.

NOTE: The orange and green circles represent the reduced working area in relation to the arm configuration (left or right).

Section 3.3
Electrical Connections

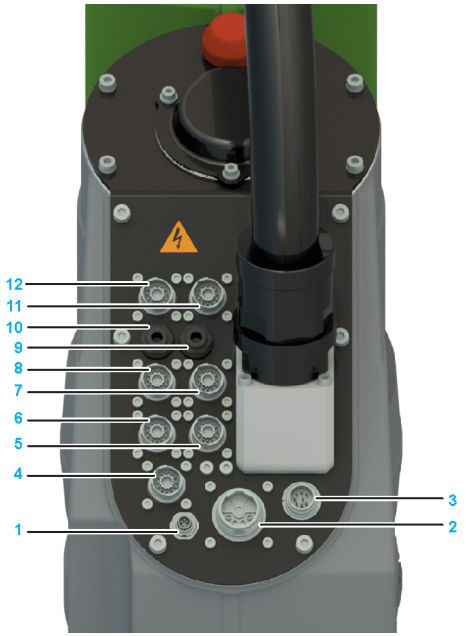
What Is in This Section?

This section contains the following topics:

Overview of the Connection Plate

Overview

Connection plate on the base or console of the robot STS40/60/80.



1 X1210 – 24 V voltage connection
2 X1221 – Motor axis 1 power connection
3 X1202 – CAN bus or I/O connection
4 X1211 – Motor axis 1 encoder connection
5 X1222 – Motor axis 2 power connection
6 X1212 – Motor axis 2 encoder connection
7 X1223 – Motor axis 3 power connection
8 X1213 – Motor axis 3 encoder connection
9 P1 – Pneumatic connection
10 P2 – Pneumatic connection
11 X1224 – Motor axis 4 power connection
12 X1214 – Motor axis 4 encoder connection

Power Connection for Motor Axis 1

Observe the bending radius for the cable (fixed installation):

- VW3E1143R••• – minimum bending radius: 62 mm (2.44 in)

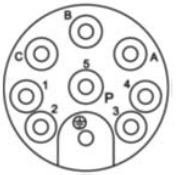
Representation	Pin	Designation	Meaning	Range
	1	W	Performance	3 x 0...480 Vac
	2	PE	Protective ground (earth) cable	–
	3	U	Performance	3 x 0...480 Vac
	4	V	Performance	3 x 0...480 Vac
	A	Brake +	Brake	24 Vdc
	B	Brake -	Brake	0 Vdc
	C	PTC	Temperature sensor	–
	D	PTC	Temperature sensor	–

NOTE: For connecting the motor axis 1 of the robot to the Lexium 62 Drive Module, refer to the *Lexium 62 Hardware Guide*.

Power Connection for Motor Axis 2, 3, and 4

Observe the bending radius for the cable (fixed installation):

- FCE319•••A100 – minimum bending radius: 46 mm (1.8 in)

Representation	Pin	Designation	Meaning	Range
	1	PTC+	Temperature Sensor	–
	2	PTC-	Temperature Sensor	–
	3	Brake+	Brake	24 Vdc
	4	Brake-	Brake	0 Vdc
	–	–	–	–
	⏚	PE	Protective ground (earth) cable	–
	A	U	Performance	3 x 0...480 Vac
	B	V	Performance	3 x 0...480 Vac
	C	W	Performance	3 x 0...480 Vac

NOTE: For connecting the motor axis 2, 3, and 4 of the robot to the Lexium 62 Drive Module, refer to the *Lexium 62 Hardware Guide*.

Encoder Connection for Motor Axis 1, 2, 3, and 4

Observe the bending radius for the cable (fixed installation):

- FCE320•••A100 – minimum bending radius: 34 mm (1.34 in)

Representation	Pin	Designation	Meaning	Range
	1	COS	–	–
	2	REF COS	–	–
	3	SIN	–	24 Vdc
	4	REF COS	–	–
	5	DATA+	–	–
	6	DATA-	–	–
	7	+10 V	–	+10 V
	8	ENC 0 V	–	0 V
	9	–	–	–
	10	–	–	–
	11	–	–	–
	12	–	–	–
	P	–	–	–

Connection for CAN Bus

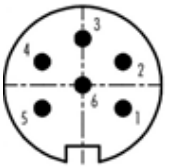
The CAN bus cable is for CAN bus connection if an ARMIO board is mounted. Then connect this cable (part number VW3E3067R•••) to the connection X1202 at the robot.

The stated bit rates result in the following maximum cable lengths of one bus segment:

- 1 Mbit/s ≈ maximum cable length 20 m (66 ft)
- 500 kbit/s ≈ maximum cable length 75 m (246 ft)

Observe the bending radius for the cable (fixed installation):

- VW3E3067R••• – minimum bending radius: 61 mm (2.4 in)

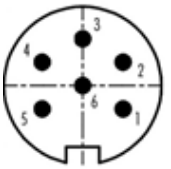
Representation	Pin	Designation	Meaning	Range
	1	CAN-L	–	–
	2	CAN-H	–	–
	3	CAN-GND	–	–
	4	–	–	–
	5	–	–	–
	6	–	–	–

Connection for I/O

The I/O cable is for connection of inputs/outputs to have digital or analog inputs/outputs at output flange of the robot if no ARMIO board is mounted. Then connect this cable (part number VW3E4002R•••) to the connection X1202 at the robot.

Observe the bending radius for the cable (fixed installation):

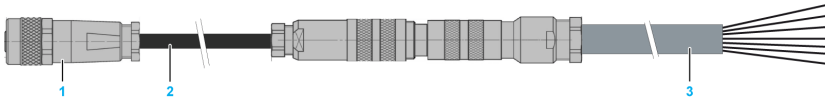
- VW3E4002R••• – minimum bending radius: 32 mm (1.26 in)

Representation	Pin	Designation	Meaning	Range
	1	Black 1	Input/output	–
	2	Black 2		–
	3	Black 3		–
	4	Black 4		–
	5	Black 5		–
	6	Black 6		–

Connection for 24 V Voltage

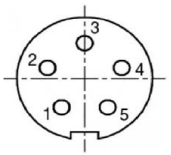
The 24 V cable (part number VW3E1169R•••) is used to supply the joint brake and the 24 V connector XB2 available under the harness cover on arm 2 (for example to connect the ARMIO board) with 24 V voltage and to connect the signal of the joint brake.

The cable consists of a 5-wire cable and a 7-wire cable which are connected to each other by appropriate connectors. Connect the connector of the 5-wire cable to the connection X1210 at the robot and the 7-wire cable to the electrical cabinet.



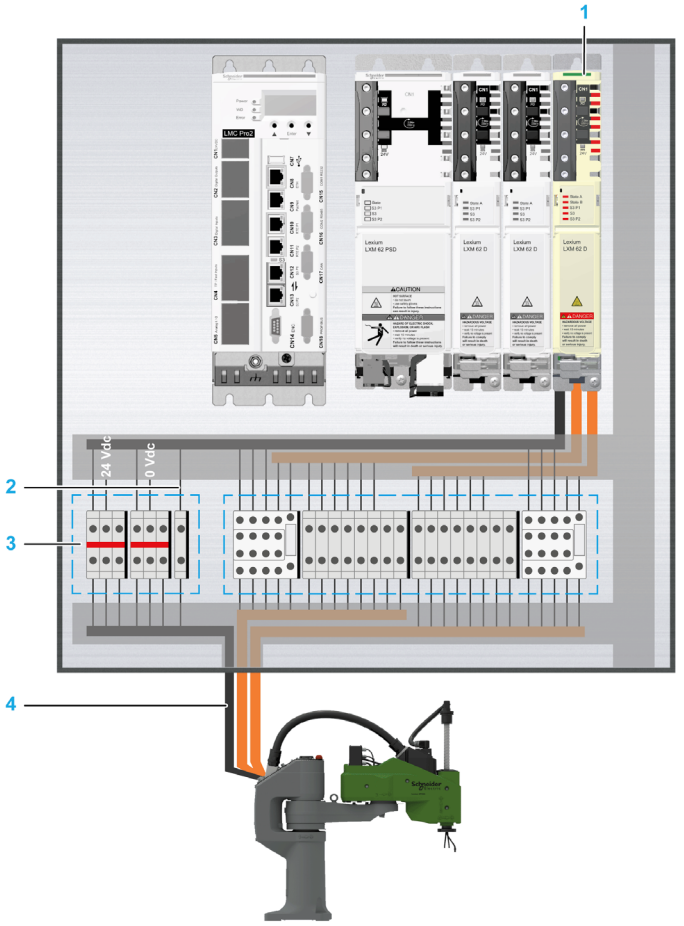
1 Connector of the 5-wire cable
2 5-wire cable
3 7-wire cable

Observe the bending radius for the cable (fixed installation):
- VW3E1169R••• 5-wire cable – minimum bending radius: 24 mm (0.94 in)
- VW3E1169R••• 7-wire cable – minimum bending radius: 54 mm (2.13 in)

Representation	Pin / wire	Designation	Meaning	Range
Connector of the 5-wire cable 	1	Brown	–	24 Vdc
	2	White	–	24 Vdc
	3	Blue	–	0 Vdc
	4	Black	–	0 Vdc
	5	Grey	Signal	24 Vdc
7-wire cable	1	Black 1	–	24 Vdc
	2	Black 2	–	24 Vdc
	3	Black 3	–	24 Vdc
	4	Black 4	–	0 Vdc
	5	Black 5	–	0 Vdc
	6	Black 6	–	0 Vdc
	7	Black 7	Signal	24 Vdc

The following figure presents an example of a circuit diagram for connecting the 24 V cable:

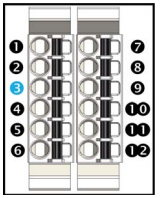
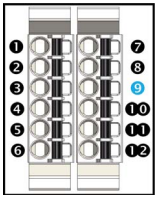
NOTE: Ensure that the grounding of the Lexium 62 I/O and the 24 V voltage supply is at the same potential.



1 Lexium 62 Drive Module for connection of motor axis 3 and 4
2 Signal wire (from terminal strips to Lexium 62 Drive Module inputs/outputs)
3 Circuit for connecting the 24 V cable in the electric cabinet
4 24 V cable (VW3E1169R•••)

At the electric cabinet, connect the wires 1, 2, and 3 to 24 Vdc and the wires 4, 5, and 6 to 0 Vdc.

To connect the brake release signal, verify whether the motor/axis 3 of the robot is connected to axis A (CN8) or to axis B (CN10) at the Lexium 62 Cabinet Drive. Then connect pin 7 of the 24 V cable (part number VW3E1169R•••) either to pin 3 (for axis A) or to pin 9 (for axis B) of the CN4 connector at the Lexium 62 Cabinet Drive.

Connection of motor/axis 3 at Lexium 62 Cabinet Drive	Connection for 24 V cable at Lexium 62 Cabinet Drive	Pin of CN4 connection	Wire of 24 V cable(1)
Axis A (CN8) 	CN4 	Pin 3 	7
Axis B (CN10) 	CN4 	Pin 9 	

Wiring

Overview

The robot is preconnected for the following three circuits:

- Standard configuration *(see page 79)*
- Configuration with ARMIO board *(see page 82)*
- Configuration with Tool Connector (optional equipment) *(see page 178)*

User interface data

User interface STS40/60/80	Available under the harness cover on the arm 2		Available on the tool flange		
	Standard	With ARMIO board	Standard	With ARMIO board	With Tool Connector (TC)
Digital inputs / outputs (I/O)	–	8/8	–	8/8	5/8
Analog inputs / outputs (I/O)	–	4/4	–	(4/4)(1)	–
Electric cable	6x 0.24 mm^2 (AWG24) shielded cable	–	6x 0.14 mm^2 (AWG36) shielded cable	–	–
Maximum voltage per connector	50 Vdc	24 Vdc	50 Vdc	24 Vdc	24 Vdc
Maximum current per connector(2)	2 A				

(1) 4/4 analog inputs/outputs are available at arm 2.
(2) The maximum current per connector depends on the application (for example, devices, cable length).

Power consumption

Category	Parameter	Unit	STS40	STS60	STS80
Electrical Data	Power consumption for a typical pick & place cycle with (nominal weight) 2 kg (4.4 lb)	kw (hp)	1.2 (1.6)		

⚠ WARNING
FALLING HEAVY LOAD Verify in the application that the gripper is designed to hold the load with the accelerations programmed, as well as in the event of an electrical power outage or an inoperative air supply. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

Inputs/Outputs

For the characteristics, installation, and use of these inputs/outputs, refer to chapters *Electrical Connections (see page 68)* and *Electrical Installation (see page 126)*.

Standard Configuration

Overview

In its standard version, the robot is supplied with integrated inputs/outputs on the tool flange. Therefore, the robot features a harness of six wires between the base and the tool flange.

Connection at the Level of the Base (or Console)

The robot is factory fitted with a BINDER 5-point connector (reference X1210) and a BINDER 6-point connector (reference X1202).

- BINDER 5-point connector (connection X1210)
  Fit the complete connection cable with a female BINDER connector to the connection X1210 to provide the function (24 V cable – for example, to release the joint brake). The cable is set with open wires at the other end and it is available in different lengths (reference VW3E1169R•••).
- BINDER 6-point connector (connection X1202)
  As an option, you can fit a complete connection cable with a female BINDER connector to the connection X1202 to provide the function (digital or analog input/output). The cable is set with open wires at the other end and it is available in different lengths) (reference VW3E4002R•••).

Opening the brakes of axis 3 and 4 may lead to a sagging of the axes.

⚠ WARNING
SAGGING OF THE ROBOT Ensure that release of the motor brakes of axis 3 and 4 pose no subsequent risks in the zone of operation. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

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

Connection at the Level of the Arm 2

In its standard version, the robot is supplied with a complete ready-to-use harness. The harness is connected to the XB1 socket at the level of the Arm 2 to provide the function. The other end of this harness (located on the robot tool flange) is fitted with a MOLEX Micro-Fit 3.0 8-point male contact box and AWG 26-30 MOLEX Micro-Fit male contacts.

The six wires of the harness can be used as desired, as digital or analog inputs/outputs:

- Nominal voltage: 60 Vdc / 25 Vac maximum
- Input current: 2 A maximum per contact

There is a one to one correspondence between the pins of the XB1 and the X1202 connectors.

Connections at the Tool Flange

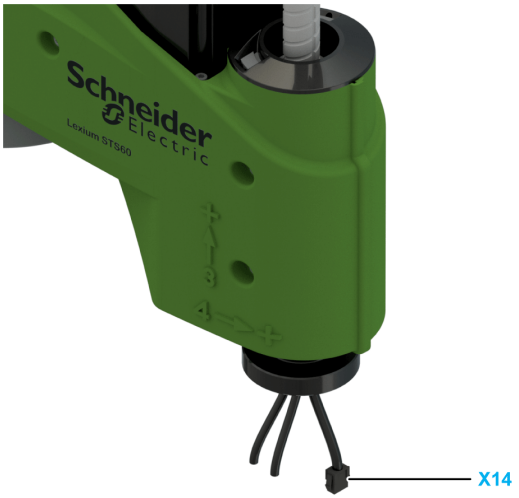
This connection configuration uses the connections available on the XB1 connector installed under the robot harness cover 2 *(see page 79)*.

The user cable is connected to XB1 on the arm 2 before it reaches the tool interface. Once the cable has been installed, the X14 connector is wired up as shown in the array below.

Socket	Pin	Color	Socket	Pin
XB1	1	Pink	X14	1
	2	Gray		2
	3	Yellow		3
	4	Green		4
	5	White		5
	6	Brown		6
	7	Black		7
	8	–		8

Setting Up the Tool Interface Connection for the Standard Configuration

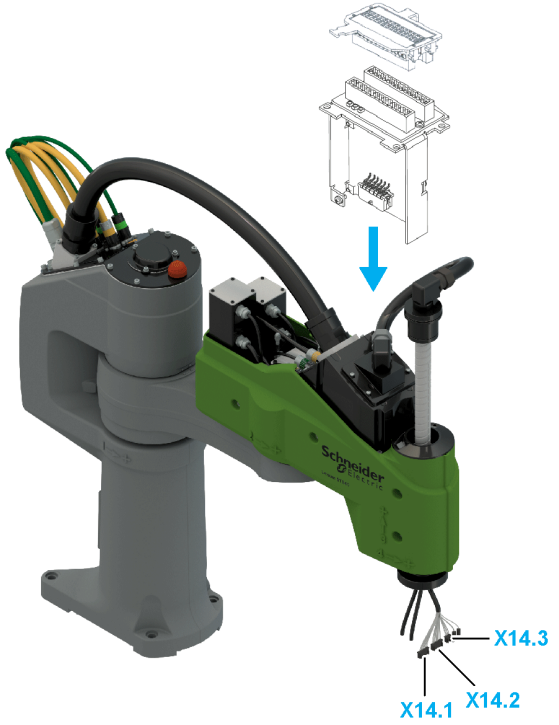
Type of connection: one 8-point MOLEX Micro-Fit 3.0 male contact box.



Configuration with ARMIO Board

Overview

In the ARMIO board version, the robot is supplied with integrated digital and analog inputs/outputs on the tool flange.



Connection at the Level of the Base (or Console)

In its configuration with an ARMIO board the robot is supplied with the following connectors:

- BINDER 5-point connector (connection X1210)
  Fit the complete connection cable with a female BINDER connector to the connection X1210 to provide the function (24 V cable – for example, to release the joint brake). The cable is set with open wires at the other end and it is available in different lengths (reference VW3E1169R•••).
- BINDER 6-point connector (connection X1202)
  As an option, you can fit a complete connection cable with a female BINDER connector to the connection X1202 to provide the function (CAN bus). The cable is set with a 9-point connector at the other end and it is available in different lengths (reference VW3E3067R•••).

Connection at the Level of the Arm 2

Digital inputs:

- Nominal voltage: 24 Vdc (minimum 20 Vdc, maximum 28 Vdc)
- Voltage for logical 0: 0…11 Vdc
  Voltage for logical 1: 16…28 Vdc
- Input current: 11 mA maximum
- Response time (hardware and software): 6 ms

Digital outputs:

- Nominal voltage: 24 Vdc (minimum 20 Vdc, maximum 28 Vdc)
- Maximum current per output: 0.5 A
- Maximum current for all outputs: 2 A
- Response time (hardware and software): 6 ms maximum

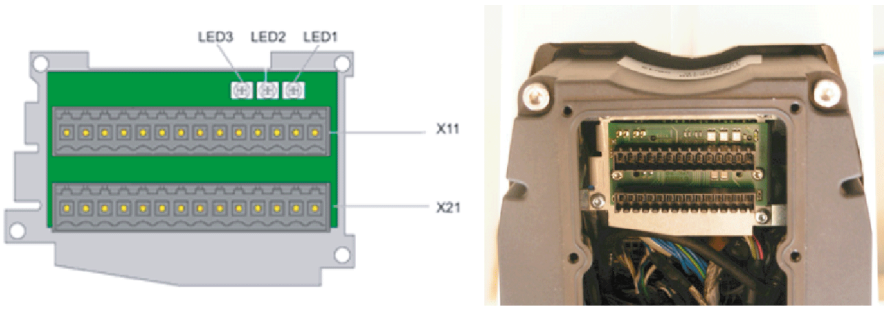
Analog inputs:

- Input voltage: +/-10 V
- Resolution: 78 mV
- Accuracy: 5%
- Response time: 6 ms

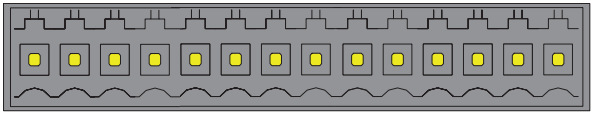
Analog outputs:

- Output voltage: 0/+10 V
- Resolution: 2.4 mV
- Accuracy: 5%
- Response time: 6 ms

Identification Marks on the ARMIO Board

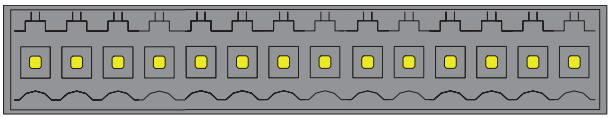


X11



Pin	Correspondence
1	cAout 0
2	cAout 1
3	cDout0
4	cDout1
5	cDout2
6	cDout3
7	cDout4
8	cDout5
9	cDout6
10	cDout7
11	+24 Vdc
12	0 V
13	cAout2
14	cAout3

X21



Pin	Correspondence
14	cDin0
13	cDin1
12	cDin2
11	cDin3
10	cDin4
9	cDin5

Pin	Correspondence
8	cDin6
7	cDin7
6	cAin3
5	0 V analog
4	cAin2
3	cAin1
2	0 V analog
1	cAin0

Connection at the Tool Flange

Electrical diagram

Identification of the Connections

This connection uses the ARMIO board fitted under the cover of arm 2 *(see page 82)*.

The user cable is connected on the arm 2 to X11 and X21 before leading to the tool interface. Once the cable has been installed, the X14.1, X14.2 and X14.3 sockets are connected as shown in the following table.

Socket	Pin	Color	Socket	Pin	Function
X21	14	Gray	X14.1	1	cDin0
	13	White, green	X14.1	2	cDin1
	12	White, yellow	X14.1	3	cDin2
	11	White, brown	X14.1	4	cDin3
	10	White, orange	X14.1	5	cDin4
	9	Orange	X14.3	1	cDin5
	8	Yellow	X14.3	2	cDin6
	7	Green	X14.3	3	cDin7
X11	3	White	X14.2	1	cDout0
	4	White, black	X14.2	2	cDout1
	5	White, violet	X14.2	3	cDout2
	6	Blue	X14.2	4	cDout3
	7	Black	X14.2	5	cDout4
	8	White, gray	X14.2	6	cDout5
	9	White, blue	X14.2	7	cDout6
	10	White, red	X14.2	8	cDout7
X11	11	Red	X14.1	6	+24 V
	12	Violet	X14.3	4	0 V
	12	Brown	X14.1	7	0 V
X21	5	Green, yellow	Protective ground (earth)	–	–
X21	2	Blue	Protective ground (earth)	–	–

Setting Up the Tool Interface Connection for the Configuration with ARMIO Board

Type of connections Molex 2.50 mm (0.098 in) SPOX:

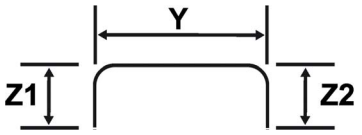
- Two 8-pins, article: 22-01-1084
- One 4-pin, article: 22-01-10449

NOTE: These connections are also suitable for the Tool Connector *(see page 178)*.

Section 3.4
Performance Data

Typical Cycle Time

Robot Path (pick-place-pick):



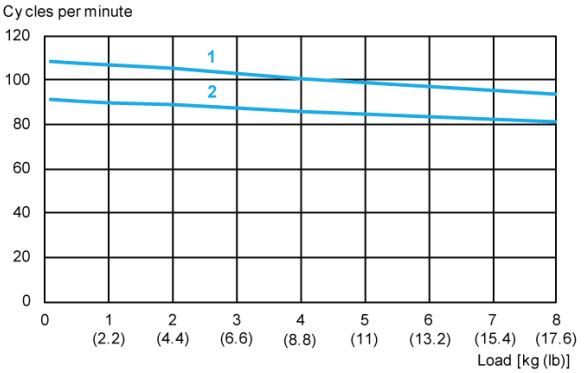
NOTE: It may be necessary to perform a warm-up cycle before the performance data is obtained.

Cycle Times of Robot STS40

Measurements performed in the center (center of x-direction and in 65% of y-direction) of the working area with PacDrive 3 and using the `SchneiderElectricRobotics` library with an ambient temperature of 20 °C (68 °F).

Path Z1 x Y x Z2 in mm (in)	load [kg (lb)]	Cycle times [s]	Cycles per minute
25 x 305 x 25 (0.98 x 12 x 0.98)	0.1 (0.22)	0.554	108
	0.5 (1.1)	0.558	108
	1.0 (2.2)	0.562	107
	2.0 (4.4)	0.570	105
	4.0 (8.8)	0.594	101
	8.0 (17.6)	0.642	93
70 x 400 x 70 (2.76 x 15.7 x 2.76)	0.1 (0.22)	0.658	91
	0.5 (1.1)	0.662	91
	1.0 (2.2)	0.666	90
	2.0 (4.4)	0.674	89
	4.0 (8.8)	0.698	86
	8.0 (17.6)	0.742	81

(1) Cycle times include the movement back and forth. A position is considered as reached if the robot remains within a range of +/-0.25 mm (0.0098 in) around the target position.



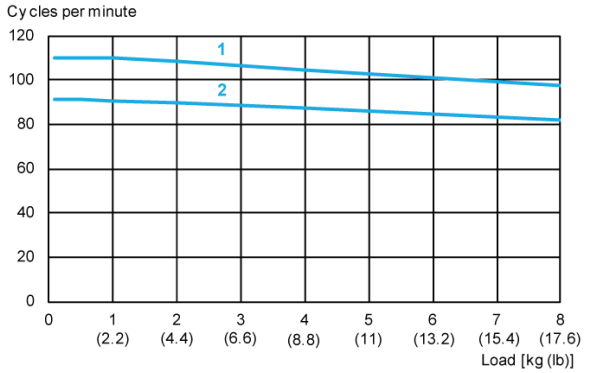
(1) 25 x 305 x 25 mm (0.98 x 12 x 0.98 in)
(2) 70 x 400 x 70 mm (2.76 x 15.7 x 2.76 in)

Cycle Times of Robot STS60

Measurements performed in the center (center of x-direction and in 65% of y-direction) of the working area with PacDrive 3 and using the `SchneiderElectricRobotics` library with an ambient temperature of 20 °C (68 °F).

Path Z1 x Y x Z2 in mm (in)	load [kg (lb)]	Cycle times [s]	Cycles per minute
25 x 305 x 25 (0.98 x 12 x 0.98)	0.1 (0.22)	0.546	110
	0.5 (1.1)	0.546	110
	1.0 (2.2)	0.546	110
	2.0 (4.4)	0.554	108
	4.0 (8.8)	0.574	105
	8.0 (17.6)	0.614	98
70 x 400 x 70 (2.76 x 15.7 x 2.76)	0.1 (0.22)	0.654	92
	0.5 (1.1)	0.654	92
	1.0 (2.2)	0.662	91
	2.0 (4.4)	0.666	90
	4.0 (8.8)	0.686	87
	8.0 (17.6)	0.734	82

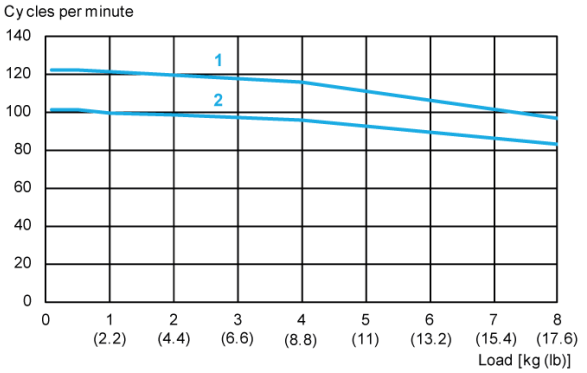
(1) Cycle times include the movement back and forth. A position is considered as reached if the robot remains within a range of +/-0.25 mm (0.0098 in) around the target position.



(1) 25 x 305 x 25 mm (0.98 x 12 x 0.98 in)
(2) 70 x 400 x 70 mm (2.76 x 15.7 x 2.76 in)

Measurements performed sideways (first pick position center of x-direction and 65% of y-direction) of the working area with PacDrive 3 and using the `SchneiderElectricRobotics` library with an ambient temperature of 20 °C (68 °F).

Path Z1 x Y x Z2 in mm (in)	load [kg (lb)]	Cycle times [s]	Cycles per minute
25 x 305 x 25 (0.98 x 12 x 0.98)	0.1 (0.22)	0.490	122
	0.5 (1.1)	0.490	122
	1.0 (2.2)	0.494	121
	2.0 (4.4)	0.502	120
	4.0 (8.8)	0.518	116
	8.0 (17.6)	0.623	96
70 x 400 x 70 (2.76 x 15.7 x 2.76)	0.1 (0.22)	0.594	101
	0.5 (1.1)	0.594	101
	1.0 (2.2)	0.602	100
	2.0 (4.4)	0.610	98
	4.0 (8.8)	0.630	95
	8.0 (17.6)	0.726	83
(1) Cycle times include the movement back and forth. A position is considered as reached if the robot remains within a range of +/-0.25 mm (0.0098 in) around the target position.			



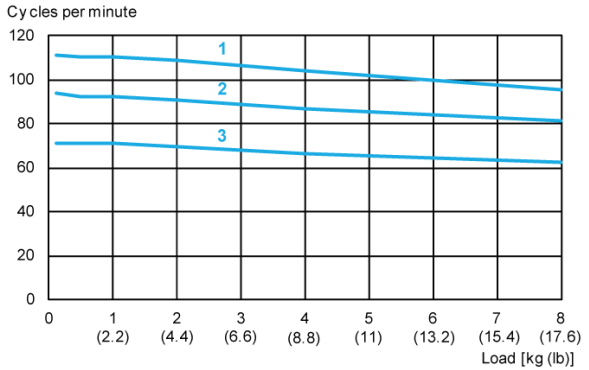
(1) 25 x 305 x 25 mm (0.98 x 12 x 0.98 in)
(2) 70 x 400 x 70 mm (2.76 x 15.7 x 2.76 in)

Cycle Times of Robot STS80

Measurements performed in the center (center of x-direction and in 65% of y-direction) of the working area with PacDrive 3 and using the `SchneiderElectricRobotics` library with an ambient temperature of 20 °C (68 °F).

Path Z1 x Y x Z2 in mm (in)	load [kg (lb)]	Cycle times [s]	Cycles per minute
25 x 305 x 25 (0.98 x 12 x 0.98)	0.1 (0.22)	0.538	112
	0.5 (1.1)	0.542	111
	1.0 (2.2)	0.542	111
	2.0 (4.4)	0.550	109
	4.0 (8.8)	0.574	105
	8.0 (17.6)	0.626	96
70 x 400 x 70 (2.76 x 15.7 x 2.76)	0.1 (0.22)	0.638	94
	0.5 (1.1)	0.650	92
	1.0 (2.2)	0.650	92
	2.0 (4.4)	0.658	91
	4.0 (8.8)	0.690	87
	8.0 (17.6)	0.738	81
(1) Cycle times include the movement back and forth. A position is considered as reached if the robot remains within a range of +/-0.25 mm (0.0098 in) around the target position.			

Path Z1 x Y x Z2 in mm (in)	load [kg (lb)]	Cycle times [s]	Cycles per minute
90 x 700 x 90 (3.54 x 27.6 x 3.54)	0.1 (0.22)	0.842	71
	0.5 (1.1)	0.842	71
	1.0 (2.2)	0.842	71
	2.0 (4.4)	0.858	70
	4.0 (8.8)	0.898	67
	8.0 (17.6)	0.958	63
(1) Cycle times include the movement back and forth. A position is considered as reached if the robot remains within a range of +/-0.25 mm (0.0098 in) around the target position.			

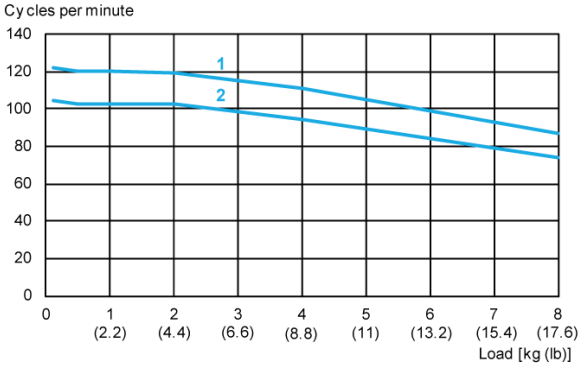


(1) 25 x 305 x 25 mm (0.98 x 12 x 0.98 in)
(2) 70 x 400 x 70 mm (2.76 x 15.7 x 2.76 in)
(3) 90 x 700 x 90 mm (3.54 x 27.6 x 3.54 in)

Measurements performed sideways (first pick position center of x-direction and 65% of y-direction) of the working area with PacDrive 3 and using the `SchneiderElectricRobotics` library with an ambient temperature of 20 °C (68 °F).

Path Z1 x Y x Z2 in mm (in)	load [kg (lb)]	Cycle times [s]	Cycles per minute
25 x 305 x 25 (0.98 x 12 x 0.98)	0.1 (0.22)	0.490	122
	0.5 (1.1)	0.498	120
	1.0 (2.2)	0.498	120
	2.0 (4.4)	0.502	120
	4.0 (8.8)	0.542	111
	8.0 (17.6)	0.686	87
(1) Cycle times include the movement back and forth. A position is considered as reached if the robot remains within a range of +/-0.25 mm (0.0098 in) around the target position.			

Path Z1 x Y x Z2 in mm (in)	load [kg (lb)]	Cycle times [s]	Cycles per minute
70 x 400 x 70 (2.76 x 15.7 x 2.76)	0.1 (0.22)	0.574	105
	0.5 (1.1)	0.582	103
	1.0 (2.2)	0.582	103
	2.0 (4.4)	0.582	103
	4.0 (8.8)	0.638	94
	8.0 (17.6)	0.814	74
(1) Cycle times include the movement back and forth. A position is considered as reached if the robot remains within a range of +/-0.25 mm (0.0098 in) around the target position.			



(1) 25 x 305 x 25 mm (0.98 x 12 x 0.98 in)
(2) 70 x 400 x 70 mm (2.76 x 15.7 x 2.76 in)

Section 3.5
Design of the Robot Frame

Design of the Robot Frame

Overview

Use the Lexium S robot for floor or wall mounting. For special applications, contact your local Schneider Electric service representative.

- When determining the suspension height of the robot, observe the overall height of the gripper (suction cup or other product pickups).
- For the design of the robot frame, account for possible varying gripper heights. Possibly design the robot suspension in a height-adjustable manner.

The precision of the robot in the application is also determined by the frame. Deformations of the frame cause imprecisions on the Tool Center Point (TCP).

General Requirements Regarding the Frame

The frame must not only withstand permanently the forces and torques (refer to *Mechanical Data* of the respective robot *(see page 45)*), but also have sufficient stiffness so that the deformations and vibrations which occur do not lead to any major deviations on the TCP. Ensure a sufficient transverse bracing in the frame.

Note the forces and torques to be taken up by the frame during normal operation: The configuration of the robot mechanism, the speed, the acceleration, as well as the connected payload, affect the total energy, and may possibly cause damage.

NOTE: Fasten the robot with screws of property class 8.8 or greater. For more information, refer to the respective dimensional drawing in *Mechanical Data* *(see page 45)*.

⚠ WARNING

CRUSHING, SHEARING, CUTTING AND IMPACT INJURY

- The robot must be operated only within an enclosure.
- Open or enter the enclosure for cleaning and maintenance purposes only.
- Design the enclosure to withstand an impact from the robot and to resist ejected parts from escaping the zone of operation.
- Design the enclosure to safely deactivate the robot as soon as a person enters the zone of operation of the robot.
- All barriers, protective doors, contact mats, light barriers, and other protective equipment, must be configured correctly and enabled whenever the robot mechanics are under power.
- Define the clearance distance to the zone of operation of the robot so the operational staff do not have access to, nor can be enclosed in, the robot mechanics zone of operation.
- Design the enclosure to account for the maximum possible travel paths of the robot; that is, the maximum path until the hardware safety system limits as well as the additional run-on paths, in case of a power interruption.

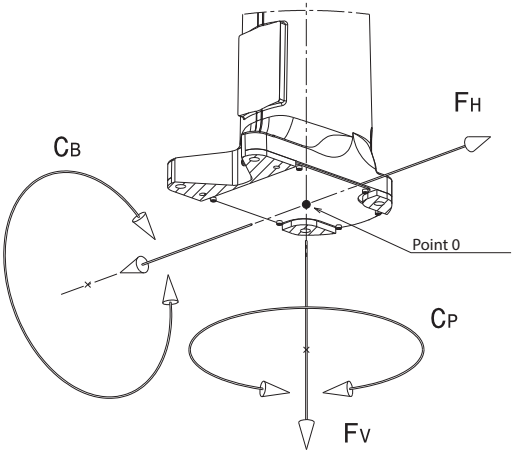
Failure to follow these instructions can result in death, serious injury, or equipment damage.

To dimension the support, take into account the maximum loads generated by the robot in motion at point 0 which are:

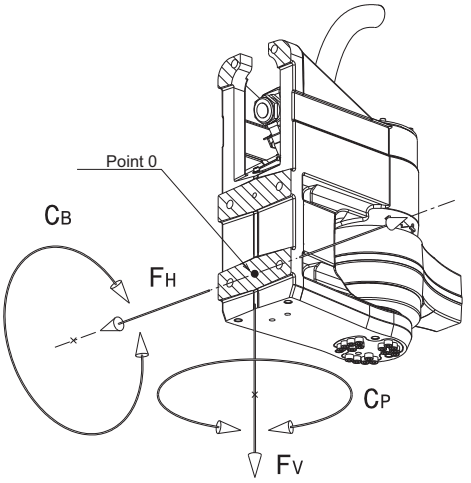
Load on holder	Unit	Version	
		Floor-mounted base	Wall-mounted console
F_V	N (lbf)	1455 (327)	
F_H	N (lbf)	1750 (393)	
C_B	Nm (lbf-in)	820 (7258)	1100 (9736)
C_P	Nm (lbf-in)	550 (4868)	

Representation of Forces and Torques

Floor-mounted base version



Wall-mounted console version



Section 3.6
Run-On Motions of the Robot for Risk Analysis

Run-On Motions of the Robot for Risk Analysis

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 machine actuators (for example, an uncontrolled stop).	An uncontrolled stop (stopping of machine motion by removing electrical power to the machine actuators).
1	A controlled stop with power available to the machine actuators to achieve the stop and then removal of power when the stop is achieved.	A controlled stop (stopping of machine motion with power to the machine actuators maintained during the stopping process).

Category 0 Stop

Mains power outages and envelope errors are some of the typical common errors.

The stopping times and angles are about the same order of magnitude as category 1 stops, but the stops are made axis by axis and not on a trajectory.

Category 1 Stop

These are stops on a trajectory that do not depend on the load.

The stopping times and angles change with the deceleration parameter for the movement descriptor (refer to `setMotionParameter` / `setEmergencyParameter` in the EcoStruxure Machine Expert online help).

Exceptional Error Stop

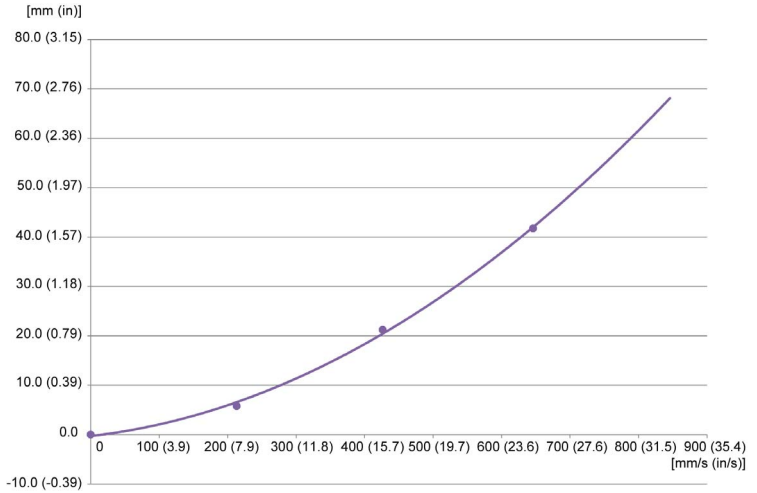
In the event of a detected exceptional error (such as certain amplifier anomalies), the respective axis is only stopped by the brakes. The other axes then apply a category 0 stop.

As there are no brakes on axes 1 and 2, in some cases, in the event of a detected exceptional error, the axes can come up against the mechanical range limiters or the mechanical limit stop.

Run-On Paths Robot STS40

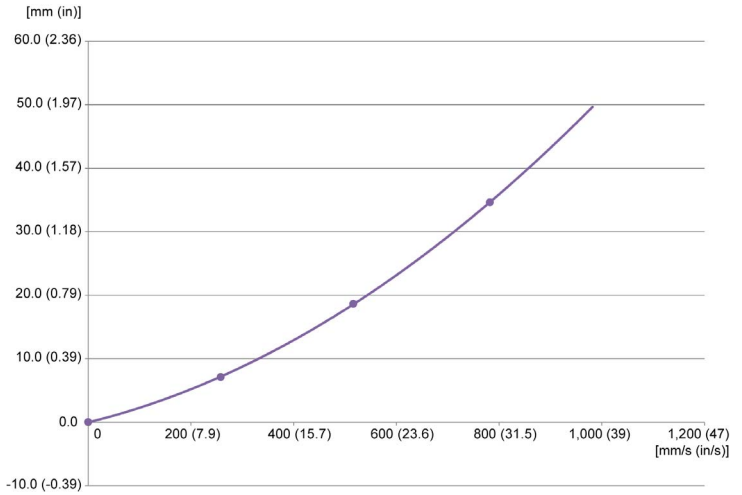
These are stops on a trajectory that do not depend on the load.

Run-on path of robot STS40 arm 1 for stop category 1:



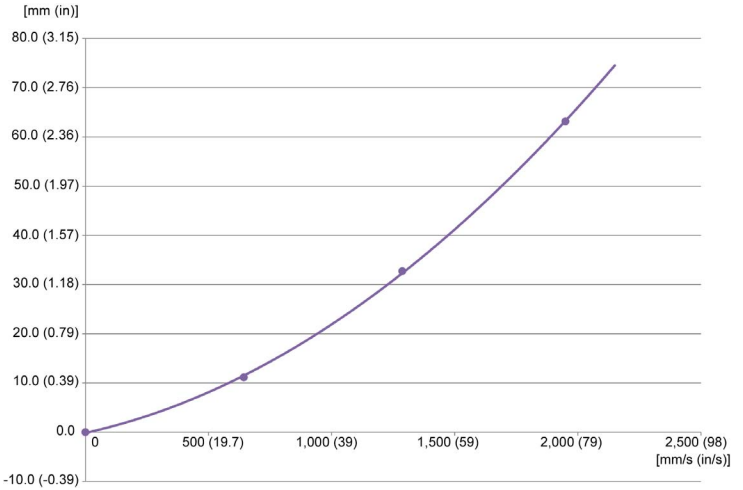
Dots Any load
Curve Polynomial (any load)

Run-on path of robot STS40 arm 2 for stop category 1:



Dots Any load
Curve Polynomial (any load)

Run-on path of robot STS40 arm 3 for stop category 1:

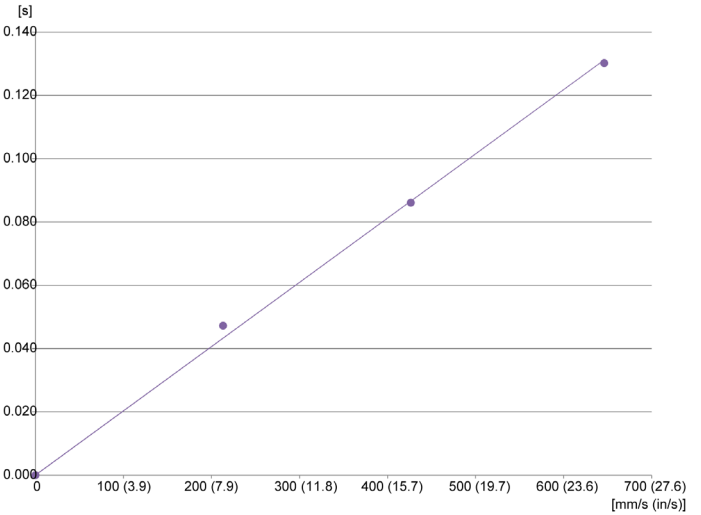


Dots Any load
Curve Polynomial (any load)

Stopping Time Robot STS40

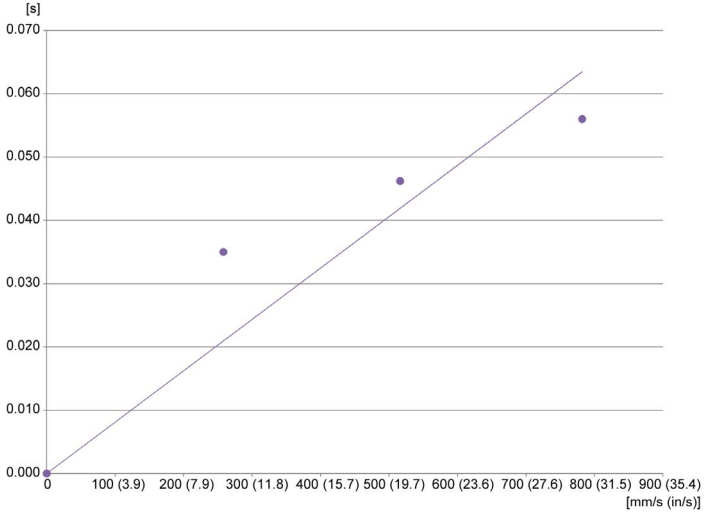
These are stops on a trajectory that do not depend on the load.

Stopping time of robot STS40 arm 1 for stop category 1:



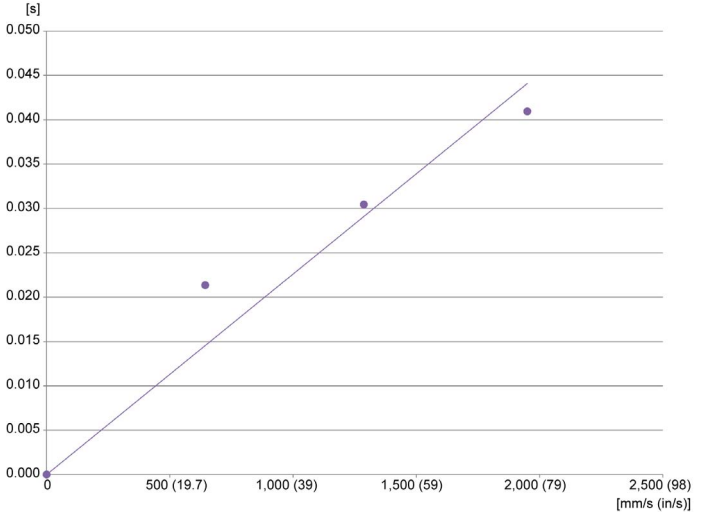
Dots Any load
Line Linear (any load)

Stopping time of robot STS40 arm 2 for stop category 1:



Dots Any load
Line Linear (any load)

Stopping time of robot STS40 arm 3 for stop category 1:

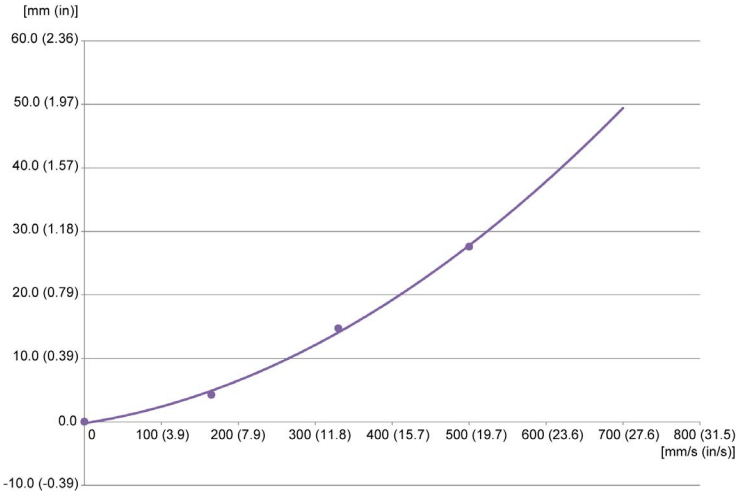


Dots Any load
Line Linear (any load)

Run-On Paths Robot STS60

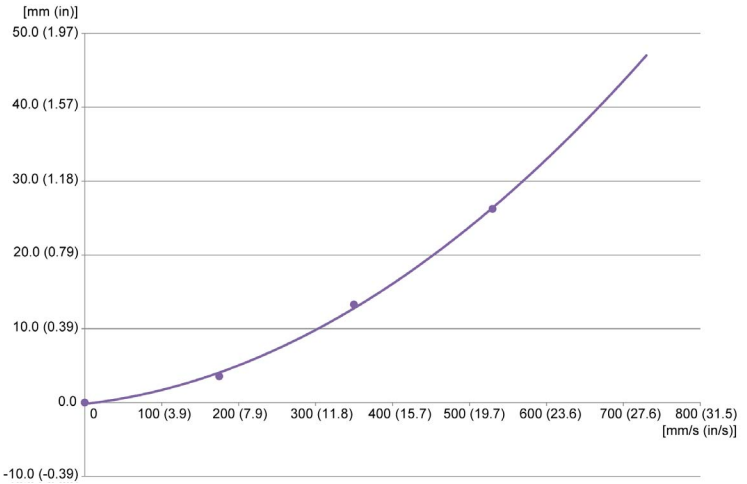
These are stops on a trajectory that do not depend on the load.

Run-on path of robot STS60 arm 1 for stop category 1:



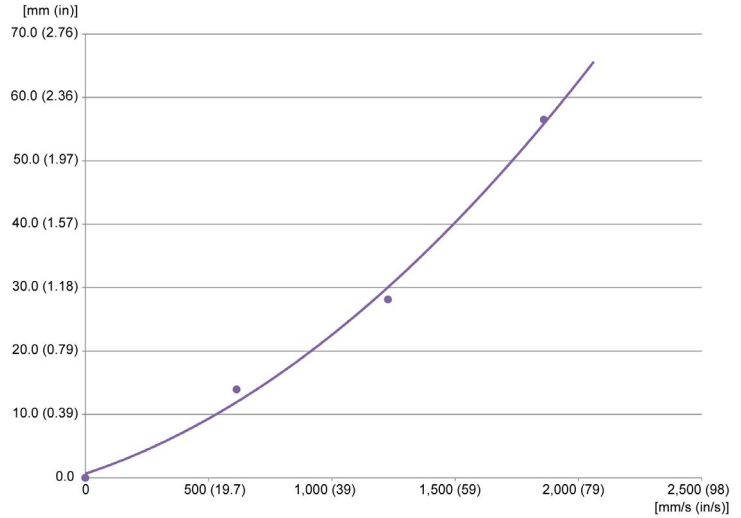
Dots Any load
Curve Polynomial (any load)

Run-on path of robot STS60 arm 2 for stop category 1:



Dots Any load
Curve Polynomial (any load)

Run-on path of robot STS60 arm 3 for stop category 1:

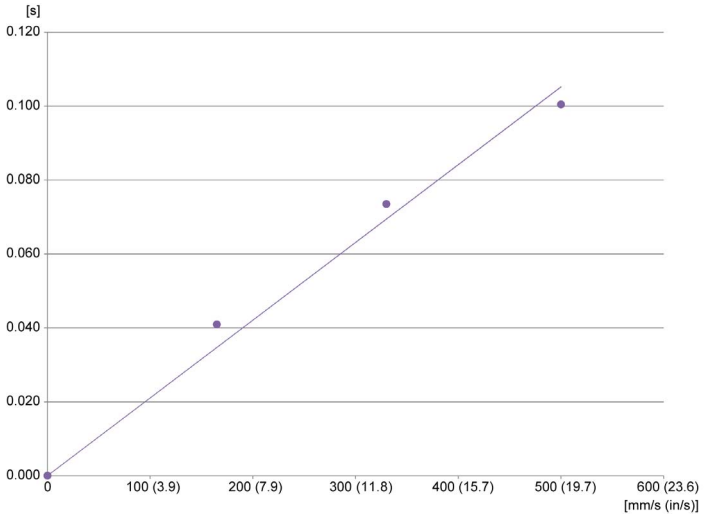


Dots Any load
Curve Polynomial (any load)

Stopping Time Robot STS60

These are stops on a trajectory that do not depend on the load.

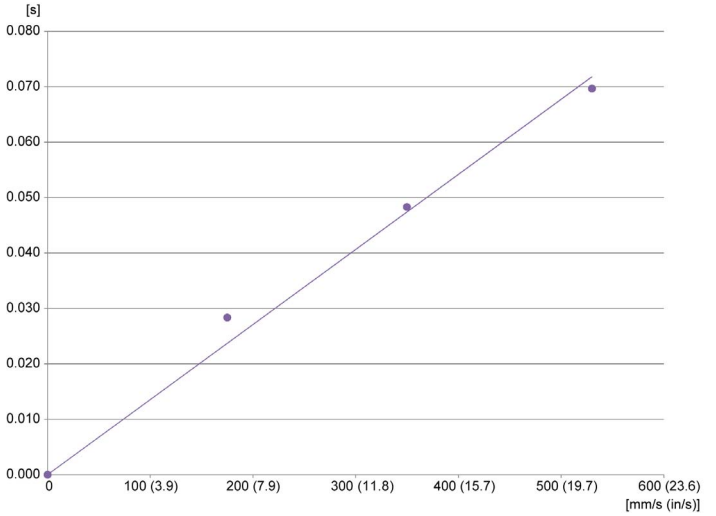
Stopping time of robot STS60 arm 1 for stop category 1:



Dots Any load

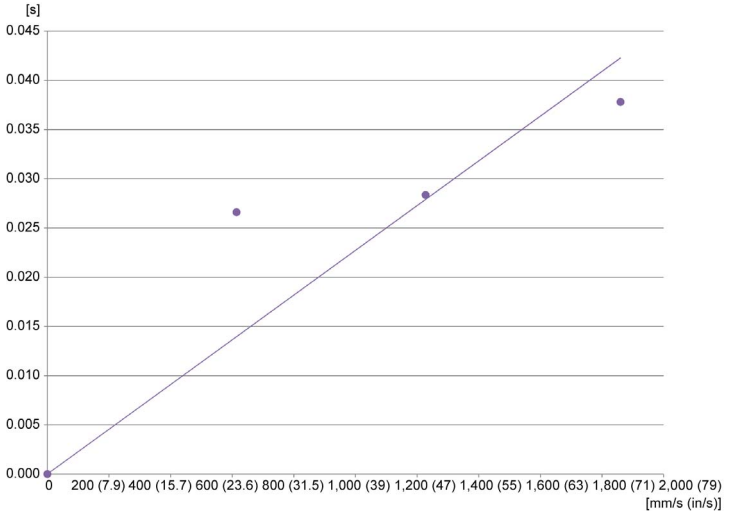
Line Linear (any load)

Stopping time of robot STS60 arm 2 for stop category 1:



Dots Any load
Line Linear (any load)

Stopping time of robot STS60 arm 3 for stop category 1:

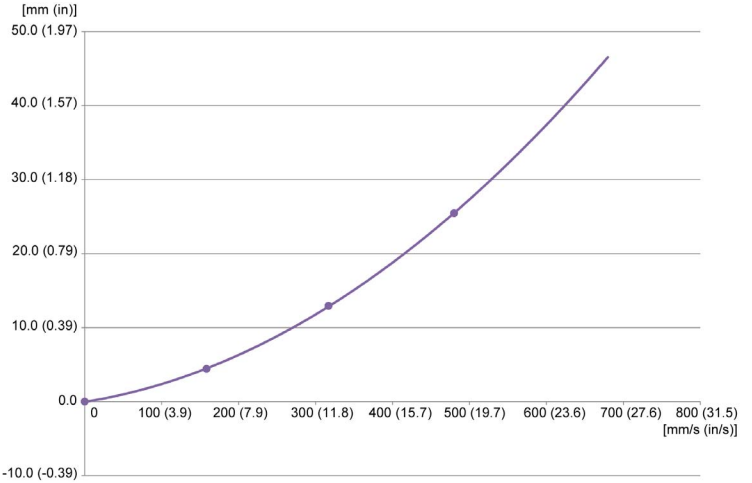


Dots Any load
Line Linear (any load)

Run-On Paths Robot STS80

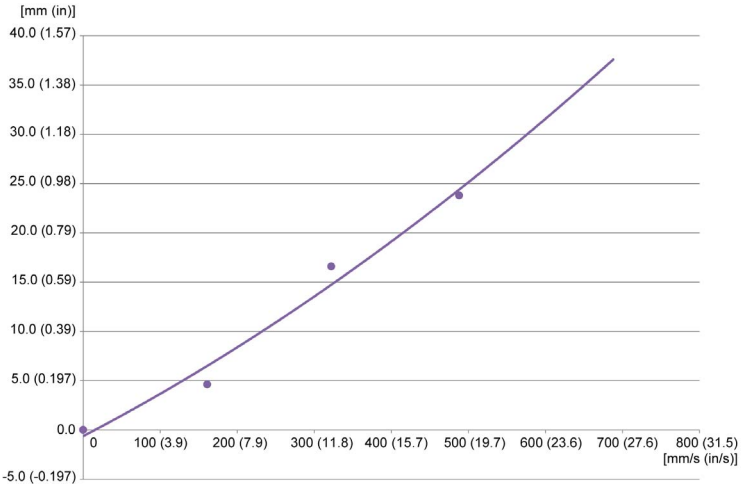
These are stops on a trajectory that do not depend on the load.

Run-on path of robot STS80 arm 1 for stop category 1:



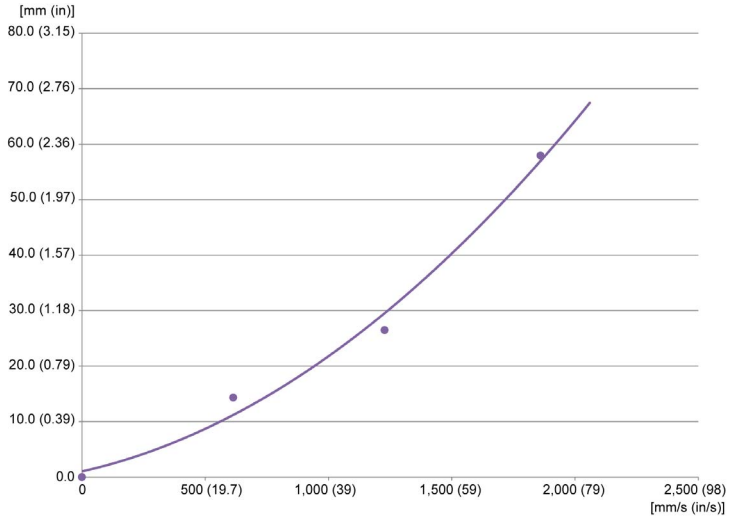
Dots Any load
Curve Polynomial (any load)

Run-on path of robot STS80 arm 2 for stop category 1:



Dots Any load
Curve Polynomial (any load)

Run-on path of robot STS80 arm 3 for stop category 1:

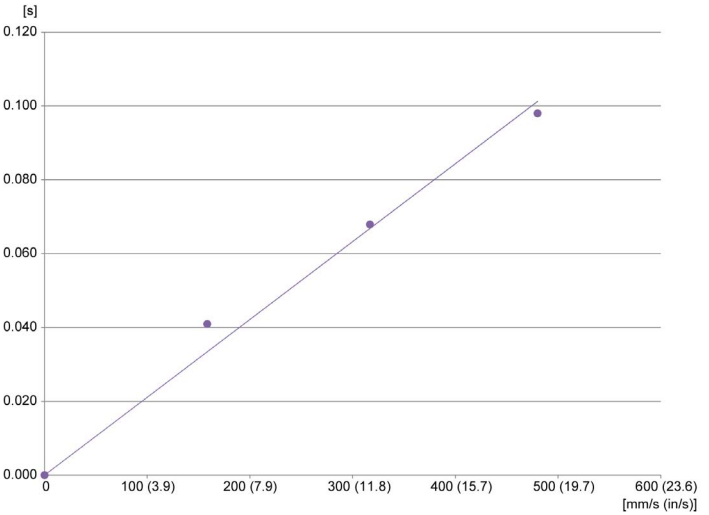


Dots Any load
Curve Polynomial (any load)

Stopping Time Robot STS80

These are stops on a trajectory that do not depend on the load.

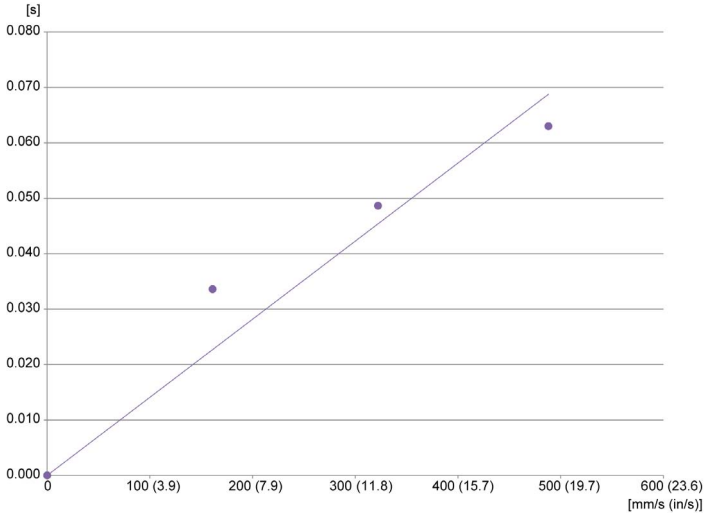
Stopping time of robot STS80 arm 1 for stop category 1:



Dots Any load

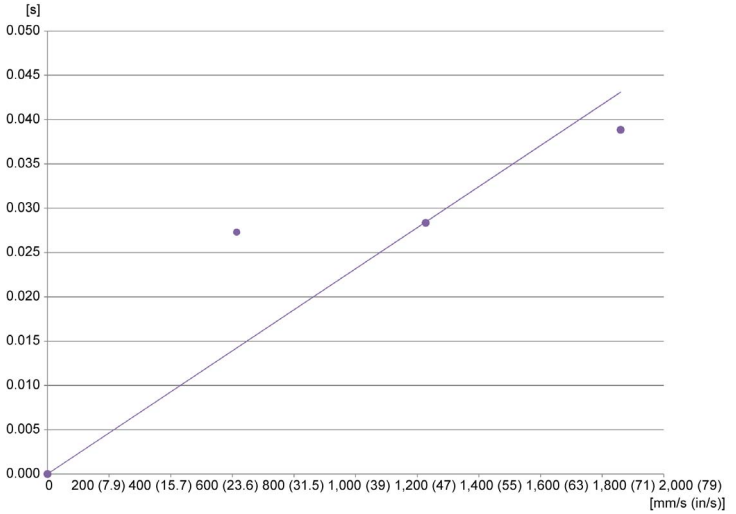
Line Linear (any load)

Stopping time of robot STS80 arm 2 for stop category 1:



Dots Any load
Line Linear (any load)

Stopping time of robot STS80 arm 3 for stop category 1:



Dots Any load
Line Linear (any load)

Chapter 4
Transport and Commissioning

What Is in This Chapter?

This chapter contains the following sections:

Section 4.1
Transport and Unpacking

What Is in This Section?

This section contains the following topics:

Transport and Storage

Transport Conditions

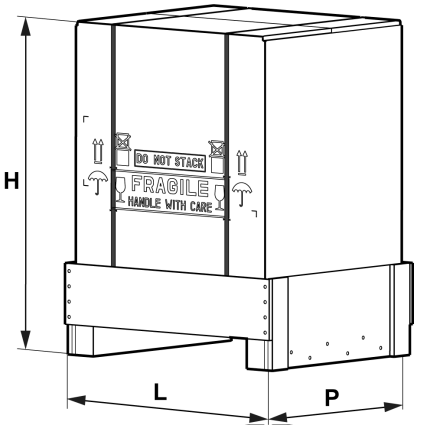
The Lexium S robot must be handled with care. Shocks and impacts may damage the robot. Damage may lead to reduced running accuracy, reduced service life, or to inoperable equipment.

The robot is preassembled before transport.

NOTE: Before unpacking and installing the robot, make sure that the lifting capacity of the lifting devices (forklift truck and crane) is sufficient to lift the robot.

For detailed information about transport conditions, refer to *Ambient Conditions* *(see page 44)*.

Packaging of the Lexium S Robot



Size and weight of the packaging:

Parameter	STS40	STS60/80
Packing case L x H x W	870 x 1100 x 710 mm (34 x 43 x 28 in)	
Gross weight	65 +/- 5 kg (143 +/- 11 lb)	70 +/- 5 kg (154 +/- 11 lb)

Storage

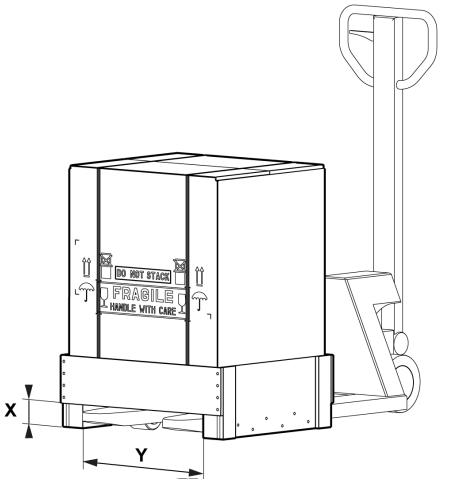
The Lexium S robot can be stored inside the packaging or unpacked. In both cases, ensure that it is stored in a sheltered and dry place. Avoid humidity which can have corrosive effects on the robot.

Unpacking

Handling of Packaging

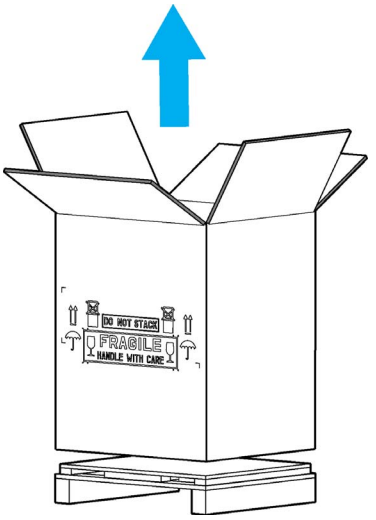
By pallet truck under base:

- X = 100 mm (3.9 in)
- Y = 650 mm (25.6 in)



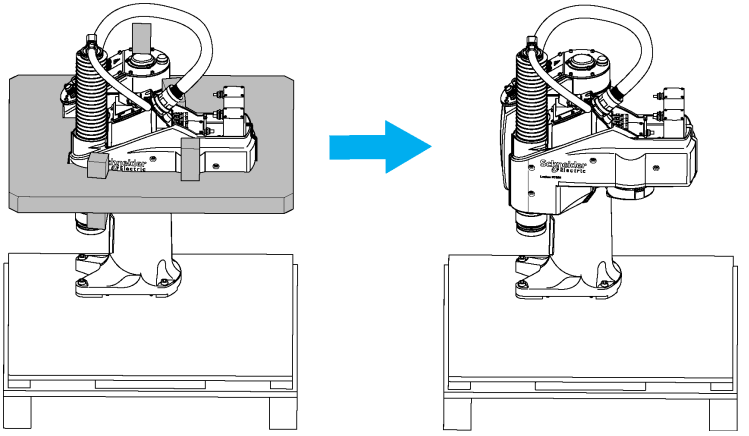
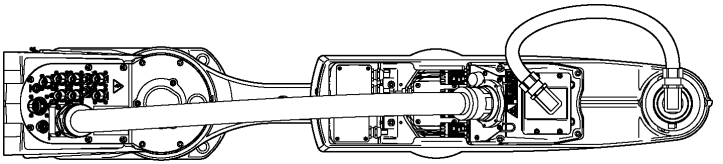
Unpacking

Step	Action
1	Place the packing crate as close as possible to the installation location.

Step	Action
2	Remove the cardboard casing by pulling it upwards. 

Preparing the Robot for Installation

In the following steps, the preparation for installation is shown with a floor-mounted version as an example.

Step	Action
1	Remove the packing elements protecting the robot during transport. 
2	Verify the robot for transport damage.
3	Line the robot up in its extended position. 

Section 4.2
Mechanical Installation

What Is in This Section?

This section contains the following topics:

Information About Installation

Overview

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

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

For further Information, refer to *Specific Safety Information* *(see page 15)*.

Quality of the Installation Interface

You must ensure that the mechanical characteristics of the floor and the means of fixtures support the maximum forces caused by the moving robot.

NOTE: The height of the wall-mounted robot support can experience greater forces acting upon it than those of the floor-mounted robot.

Mounting the Robot

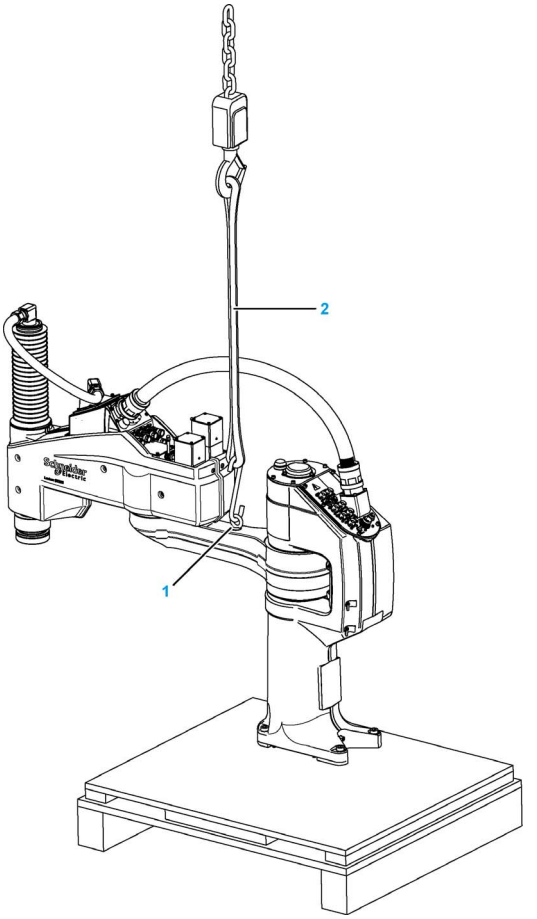
Procedure Overview

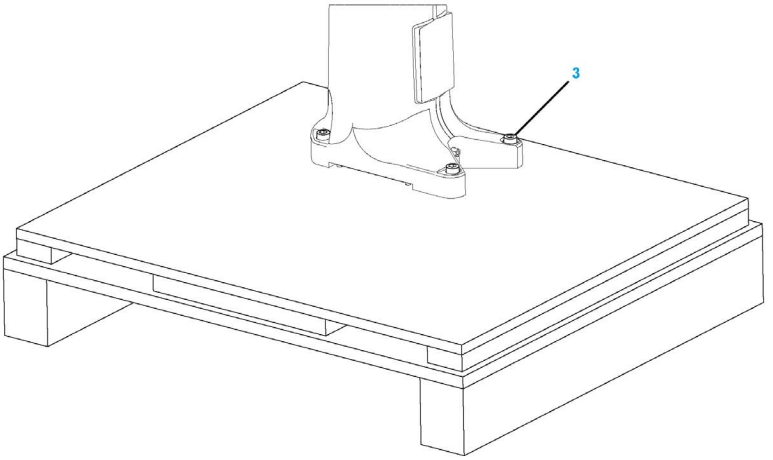
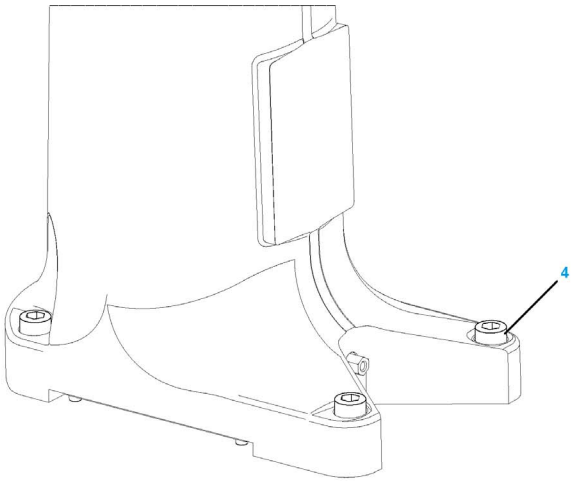
To mount the robot, perform the procedure that is applicable for your robot type:

- Mounting the Robot LXMSTS••F on the floor *(see page 118)* or
- Mounting the Robot LXMSTS••W to the wall *(see page 120)*

NOTE: Only with the use of mechanical limit stops for range limitation allow for conformance with the safety requirements specified by the ISO 10218-1 standard. For further information, refer to *Mechanical Limit Stops* *(see page 167)*.

Mounting the Robot LXMSTS••F on the Floor

Step	Action
1	Screw the lifting eye bolt (1) (M8 DIN 580 included in the set) into the robot and fit a sling (2). 

Step	Action
2	Remove the four fastening screws (3) from the base. 
3	Lift the robot unit.
4	Fasten the base in place using four screws (4). For further information about appropriate screws, refer to *Floor Mounting (see page 50)* 

⚠ WARNING

FALLING LOADS

Keep the sling slightly taut until the robot is mounted on the floor.

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

Take into account that the robot swings when raised and moved.

⚠ WARNING

SWINGING ROBOT

Move the robot with a slow and steady force and allow the suspended robot to come to a stand still before changing direction, either vertically or horizontally.

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

⚠ WARNING

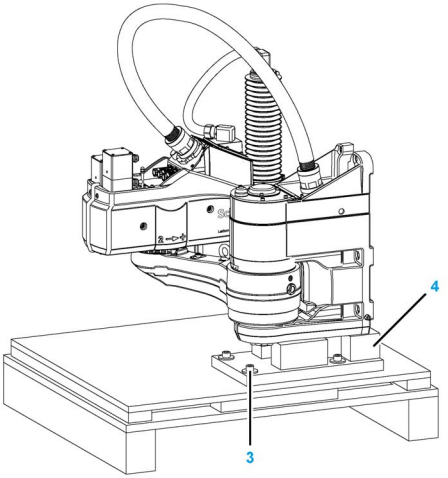
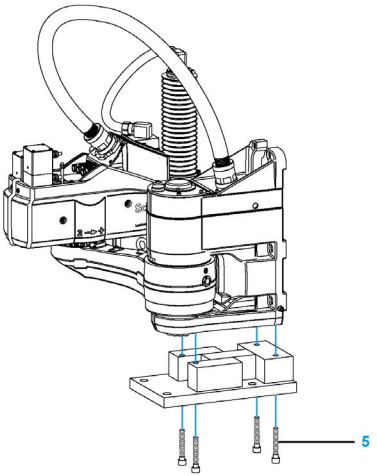
COLLISION OF COMPONENTS

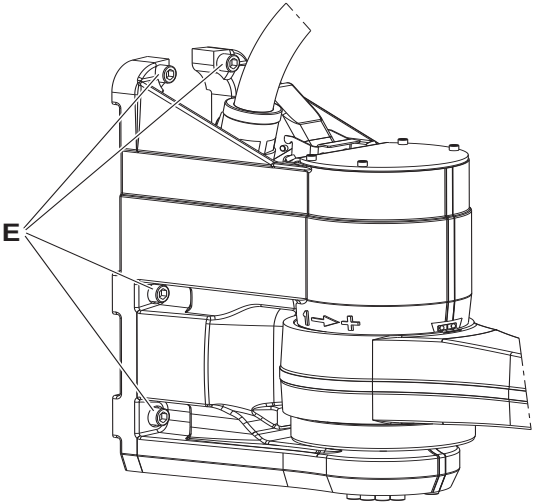
Remove the lifting eye bolts before using the robot.

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

Mounting the Robot LXMSTS••W on the Wall

Step	Action
1	Screw the lifting eye bolt (1) (M8 DIN 580 included in the set) into the robot and fit a sling (2).

Step	Action
2	Remove the four screws (3) on the upside of the holder (4). 
3	Remove the screws (5) at the underside of the holder. 
4	Lift the robot unit.

Step	Action
5	Attach the console in place using six screws (6). 

⚠ WARNING

FALLING LOADS

Keep the sling slightly taut until the robot is mounted on the floor.

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

Take into account that the robot swings when raised and moved.

⚠ WARNING

SWINGING ROBOT

Move the robot with a slow and steady force and allow the suspended robot to come to a stand still before changing direction, either vertically or horizontally.

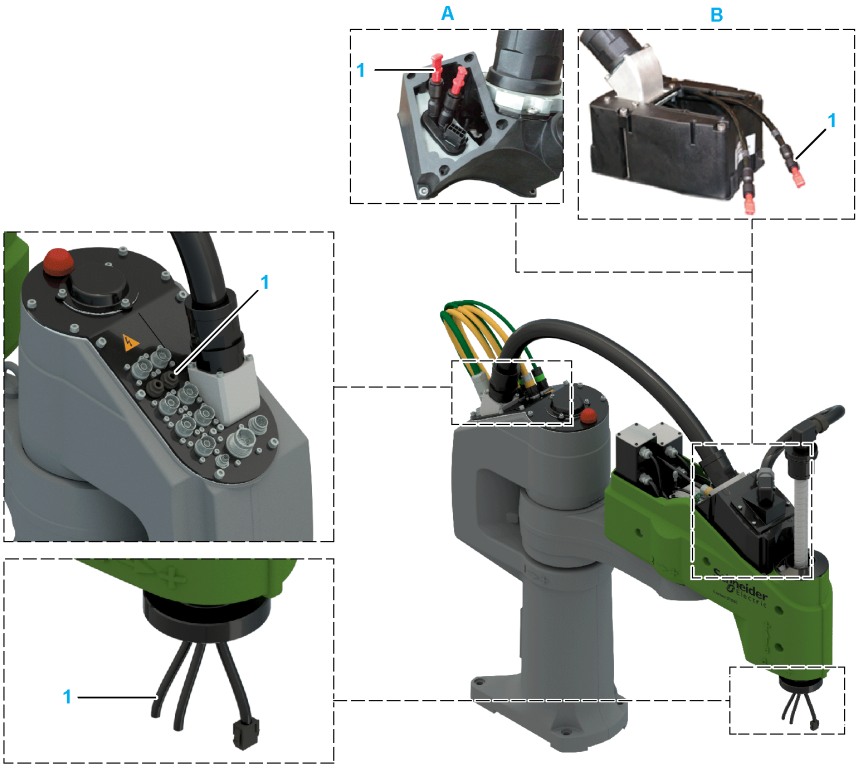
Failure to follow these instructions can result in death, serious injury, or equipment damage.

⚠ WARNING
COLLISION OF COMPONENTS Remove the lifting eye bolts before using the robot. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

Section 4.3
Pneumatic Installation

Pneumatic Installation

Connection on the Level of the Arm 2



A STS40
B STS60/80
1 Hoses

Two hoses (1) link the base directly to the arm 2.

Maximum pressure: 6 bar (87 psi)

The connections are made using press-on fittings for polyurethane tubing with an internal diameter of 4 mm (0.157 in) (external diameter 6 mm (0.236 in)).

User interface STS40/60/80	Available under the harness cover on the arm 2		Available on the tool flange		
	Standard	With ARMIO board	Standard	With ARMIO board	With ARMIO board and tool connection (TC)
Pneumatic hoses	2x 4 mm (0.157 in) internal diameter		2x 4 mm (0.157 in) internal diameter		2x 4 mm (0.157 in) internal diameter or solenoid valves(1)
(1) See *Tool Connector (see page 178)*.					

⚠ WARNING

FALLING HEAVY LOAD

Verify in the application that the gripper is designed to hold the load with the accelerations programmed, as well as in the event of an electrical power outage or an inoperative air supply.

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

Section 4.4
Electrical Installation

What Is in This Section?

This section contains the following topics:

Connecting the Power Supply

Overview

The Lexium 62 Power Supply has to be connected in 1- or 3-phase with 230 Vac mode providing 320 Vdc DC nominal bus voltage. Voltages less than the nominal voltage may degrade the performance of the system significantly. Greater voltages may render the equipment inoperable. For further information, contact your local Schneider Electric service representative.

⚠ WARNING
INSUFFICIENT OPERATING VOLTAGE
Verify that the voltage on the DC bus is providing a nominal voltage of 320 Vdc.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

Depending on the line voltage, you may need to install step-up or step-down transformers on the phase inputs to maintain the nominal voltage of 320 Vdc.

For more information, see the *Lexium 62 Hardware Guide*.

Standard Installation

Overview

An incorrect installation of the cables may damage the insulation. Broken conductors in the cable or improperly connected connectors may promote arcing within the cable.

⚠ ⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Disconnect all power from all equipment including connected devices prior to connecting any cables.
- Verify the correct pin assignment of the connectors before connecting any cables.
- Verify that the cable connectors are properly inserted and locked before applying power to the equipment.
- Do not apply force to the cables.

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

For further information about the assignment of the connectors, refer to *Connection for 24 V Voltage* *(see page 74)*.

Cabling the STS40/60/80

NOTICE

INCORRECT PAIRING OF MOTOR AND ENCODER CABLES

Label the motor and associated encoder cables according to their pairing.

Failure to follow these instructions can result in equipment damage.

Step	Action
1	Feed the four power and encoder cables directly to the connections at the level of the base. Verify for a correct routing and fixing of the cables to prevent any collision of cables and moving parts.
2	Connect the female connector of the motor supply cables to the connection plate connectors and tighten the union nut. **NOTE:** When tightening the union nut, ensure that the connection cables are not twisted.
3	Connect the motor supply cables to the drive according to the wiring diagram of the Lexium 62 Cabinet Drive as described in the *Lexium 62 Hardware Guide* (refer to the connection details of the drive).

Step	Action
4	Feed the cables for connection reference X1202 and reference X1210 directly to the connections at the level of the base. Verify for a correct routing and fixing of the cables to prevent any collision of cables and moving parts.
5	Connect the cables to the connection reference X1202 and to the connection reference X1210 and tighten the union nut.
6	Connect the 24 V cable of reference X1210 to the 24 V, 0 V, and the Lexium 62 Cabinet Drive at the control cabinet. For further information, refer to *Connection for 24 V Voltage* *(see page 74)*.
7	Connect the connection cable of reference X1202 to the control cabinet according to the robot configuration: ● For standard configuration: connect the cable (part number VW3E4002R•••) to provide digital or analog input/output at the tool flange ● For configuration with ARMIO board: connect the cable (part number VW3E3067R•••) to the CAN bus connection at the Logic Motion Controller. For further information, refer to the *Lexium 62 Hardware Guide*.
8	Connect the connectors to the connection cables at the tool flanges for the electrical connection according to the robot configuration: ● *Setting Up the Tool Interface Connection for the Standard Configuration* *(see page 81)* or ● *Setting Up the Tool Interface Connection for the Configuration with ARMIO Board* *(see page 87)*
9	If necessary, connect user cables at the level of the arm 2. Fur further information: ● For STS40: refer to *Connecting User Cables at STS40* *(see page 139)*. ● For STS60/80: refer to *Connecting User Cables at STS60/80* *(see page 142)*.

⚠⚠ DANGER

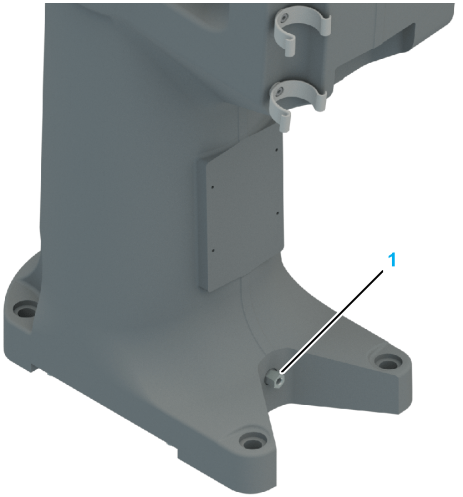
LOOSE WIRING OR CABLING CAUSES ELECTRIC SHOCK

Verify wiring or cabling connections for correct connections.

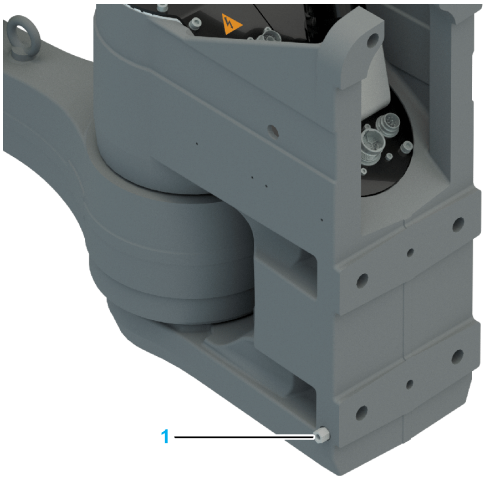
Failure to follow these instructions will result in death or serious injury.

Grounding the STS40/60/80

NOTE: When grounding the robot, use cables that comply with the applicable local standards, for example, cables that conform to NEC 70 / NFPA 79 in the USA.



1 Ground connection at floor-mounted robot



1 Ground connection at wall-mounted robot

⚠ ⚠ 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.
- Verify that the motors are connected to the central ground.

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.

Configuration with ARMIO Board

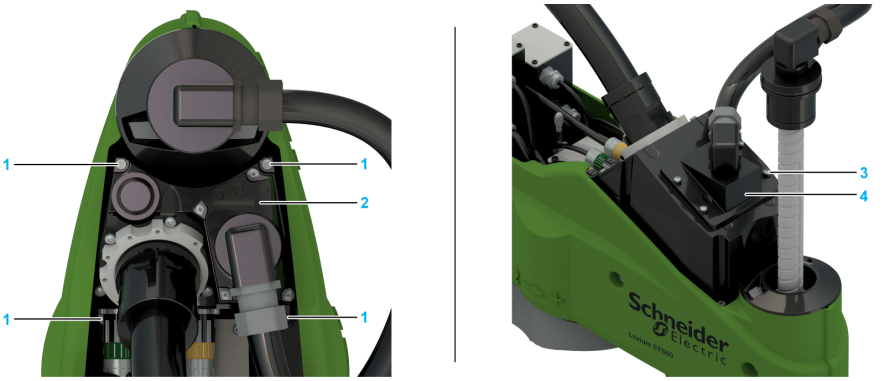
Connection on Level of the Arm 2

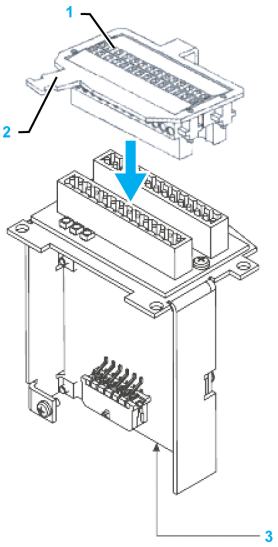
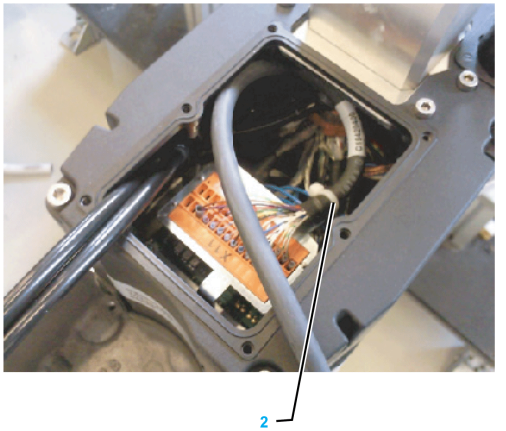
⚠ ⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Disconnect all power from all equipment including connected devices prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires.
- Place a "Do Not Turn On" or equivalent hazard label on all power switches and lock them in the non-energized position.
- Wait 15 minutes to allow the residual energy of the DC bus capacitors to discharge.
- Measure the voltage on the DC bus with a properly rated voltage sensing device and verify that the voltage is less than 42.4 Vdc.
- Do not assume that the DC bus is voltage-free when the DC bus LED is off.
- Block the motor shaft to prevent rotation prior to performing any type of work on the drive system.
- Do not create a short-circuit across the DC bus terminals or the DC bus capacitors.
- 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.

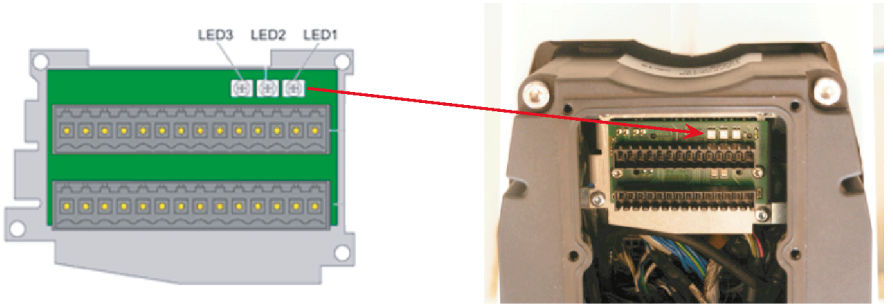
Failure to follow these instructions will result in death or serious injury.

Step	Action
1	• For STS40: Remove the four screws (1) at the user cable cover (2). • For STS60 / STS80: Remove the four screws (3) at the connection cover (4) 
2	• For STS40: Remove the user cable cover and the protective connector. • For STS60 / STS80: Remove the connection cover and the protective connector. 

Step	Action
3	Fit the connector of the user cable (1) on the ARMIO board (3).   **NOTE:** Number (2) presents the cable attachment point.

NOTICE
INOPERABLE EQUIPMENT DUE TO INCORRECT HARNESS FIXING OR SEALING
Verify that the harness is correctly fixed and sealed.
Failure to follow these instructions can result in equipment damage.

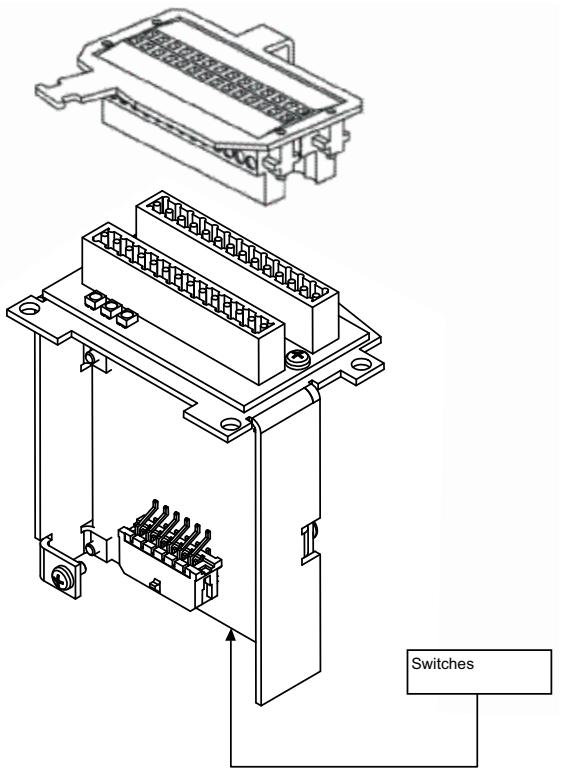
Configuration and Diagnostic for an ARMIO Board



Light emitting diodes LED Display		Meaning
LED1 (DL1)	Off	No power supply connected
	Green	Logic power supply OK
	Red	Overload on logic power supply
LED2 (DL2)	Off	No power supply connected
	Green	Power supply OK
	Red	Overload on outputs
LED3 (DL3)	Red	CAN bus not operational (not connected or incorrect cable)
	Flashing red	ID node not valid
	Fast flashing red	Module in passive error status (communication interruption)
	Green	Module in operational status
	Flashing green	Module in pre-operational status (not connected or incorrect cable)

The switches of the ARMIO board are configured by default as follows:

- 1, 7, 8 = on
- 2, 3, 4, 5, 6, 9, 10 = off (see the following graphic)
- Switches 1-5: node number
  The switches can be adjusted. For further information, refer to *Node ID* *(see page 136)*.
- Switches 6-7: baud rate, 500 k
  The switches can be adjusted. For further information, refer to *Baud Rate* *(see page 137)*.
- Switch 8: 120 ohm termination on
  The switch sets a terminating resistor for the bus connection. For further information, refer to *Configuration of Switch 8* *(see page 137)*.
  The switch configuration is mandatory for establishing a communication with the ARMIO board.
- Switch 9: CANopen
  The switch configuration is mandatory for establishing a communication with the ARMIO board.
- Switch 10: unused



Node ID

The node number at the ARMIO board can be set through a binary DIP switch combination (switches 1 to 5). This number must be unique and match the configured node ID in the added *Lexium_STS_Armio_Board* object in the project.

Node ID	DIP switch 1	DIP switch 2	DIP switch 3	DIP switch 4	DIP switch 5
1	1	0	0	0	0
2	0	1	0	0	0
…	…	…	…	…	…
30	0	1	1	1	1
31	1	1	1	1	1

Baud Rate

When selecting a baud rate, the following criteria must be fulfilled:

- All network devices must be set to operate on the same baud rate
- The bus length must be taken into consideration

The ARMIO board supports the following baud rates:

Baud rate (bits/s)	Max. bus length (m)	DIP switch 6	DIP switch 7
20,000	2,500	0	0
125,000	500	1	0
500,000	100	0	1
1,000,000	20	1	1

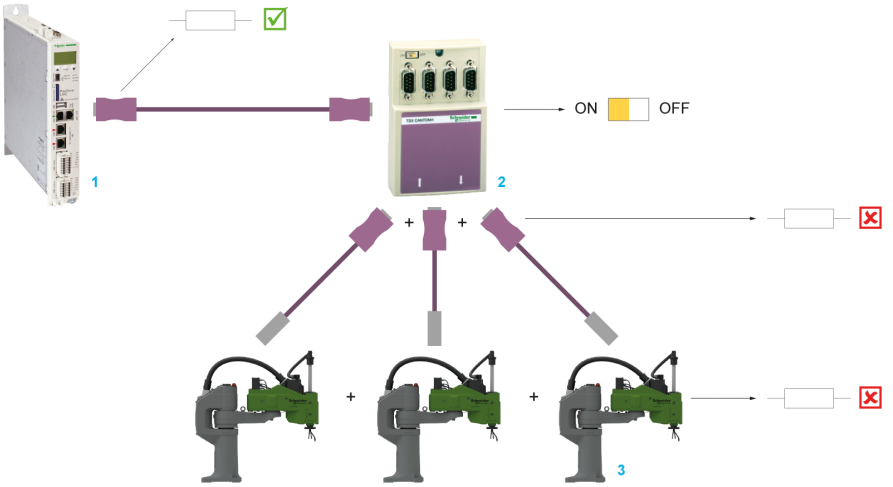
Configuration of Switch 8

The switch sets a terminating resistor for the bus connection.

To help establish a stable communication on the CANopen bus, implement a termination resistor at the beginning and at the end of the bus line.

- 1:1 setup
  Within an architecture containing one controller and one robot with an ARMIO board as the CANopen device, the correct setup can be achieved by setting the switch on the SUB-D 9 connector of cable (VW3E3067R•••) and the dip switch 8 on the ARMIO board to ON.
- 1:N setup
  If the architecture consists of one controller and multiple robots with ARMIO boards connected via a CANopen tap (TSX CAN TDM4), the same principle needs to be applied. Set a termination resistor at the beginning of the bus line, right after the controller, by either using a cable with a fix resistor inside the connector or by using a cable with a switchable resistor and engaging the resistor. The correct termination resistor at the end of the line can be established by setting the switch on the CANopen tap to ON. It is important to remove all other resistors within the bus line by setting the dip switch 8 of each ARMIO board to OFF as well as setting the switch on each SUB-D 9 connector of cable (VW3E3067R•••) that connects the robots to the CANopen tap to OFF.

The following figure presents the 1:N setup as an example.



1 LMC
2 CANopen tap
3 Robots with ARMIO board

NOTE: If the setup is correct, a total impedance of 60Ω can be measured between CANhigh and CANlow at the SUB-D 9 connector which will be connected to the controller.

Connecting User Cables

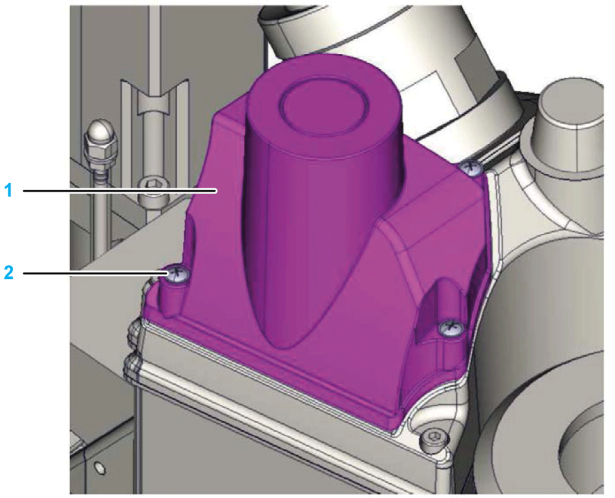
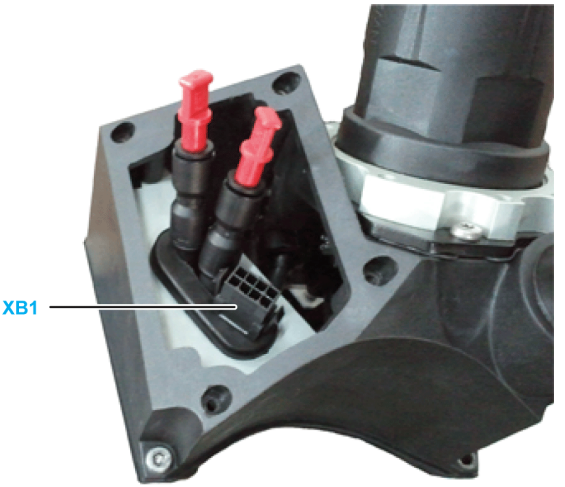
Connecting User Cables at Robot STS40

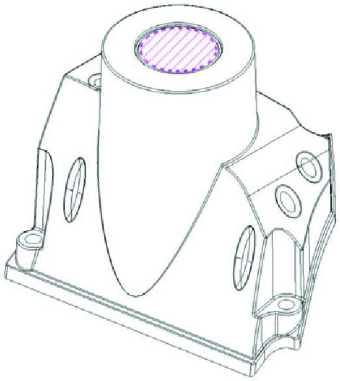
⚠ ⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Disconnect all power from all equipment including connected devices prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires.
- Place a "Do Not Turn On" or equivalent hazard label on all power switches and lock them in the non-energized position.
- Wait 15 minutes to allow the residual energy of the DC bus capacitors to discharge.
- Measure the voltage on the DC bus with a properly rated voltage sensing device and verify that the voltage is less than 42.4 Vdc.
- Do not assume that the DC bus is voltage-free when the DC bus LED is off.
- Block the motor shaft to prevent rotation prior to performing any type of work on the drive system.
- Do not create a short-circuit across the DC bus terminals or the DC bus capacitors.
- 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.

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

Step	Action
1	Remove the four screws (2) and the cable cover (1). 
2	Insert the XB1 user cable connector to the XB1 connector on the harness. 

Step	Action
3	It is necessary to modify the cover to bring out the input/output harness: **1.** Make an opening in the user cable cover. **2.** Insert the harness in the connector. **3.** Fasten the harness in place to avoid strain on the connector. **4.** Seal the harness outlet. 
4	Put the user cable cover back in place and tighten the four fastening screws.

NOTICE
INOPERABLE EQUIPMENT DUE TO INCORRECT HARNESS FIXING OR SEALING
Verify that the harness is correctly fixed and sealed.
Failure to follow these instructions can result in equipment damage.

Connecting User Cables at Robot STS60/80

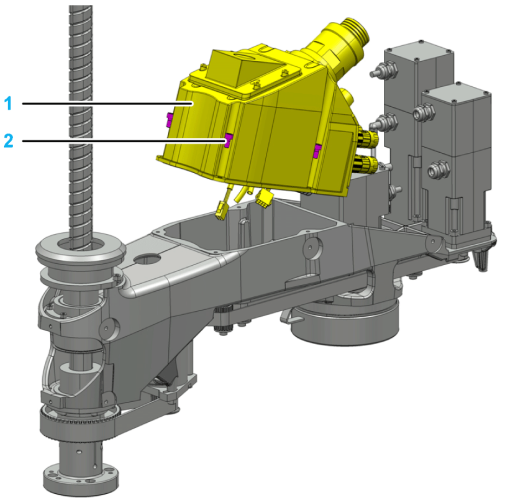
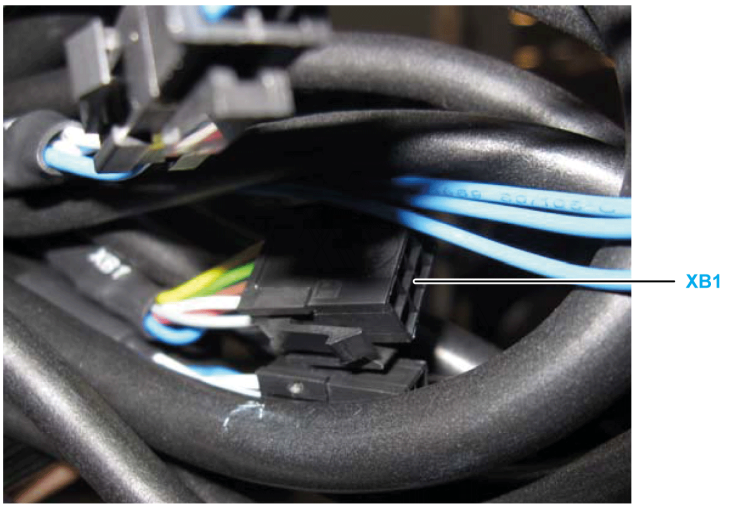
⚠ ⚠ DANGER

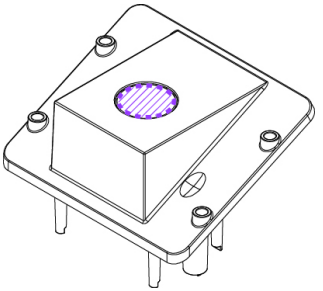
HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Disconnect all power from all equipment including connected devices prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires.
- Place a "Do Not Turn On" or equivalent hazard label on all power switches and lock them in the non-energized position.
- Wait 15 minutes to allow the residual energy of the DC bus capacitors to discharge.
- Measure the voltage on the DC bus with a properly rated voltage sensing device and verify that the voltage is less than 42.4 Vdc.
- Do not assume that the DC bus is voltage-free when the DC bus LED is off.
- Block the motor shaft to prevent rotation prior to performing any type of work on the drive system.
- Do not create a short-circuit across the DC bus terminals or the DC bus capacitors.
- 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.

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

NOTE: The actual shapes of the parts may differ slightly from one robot to another.

Step	Action
1	Remove the four screws (2) holding the harness cover (1) in place and take that cover off the arm 2. 
2	Insert the XB1 user cable connector to the XB1 connector on the harness. 

Step	Action
3	It is necessary to modify the cover to bring out the input/output harness. **1.** Make an opening in the user cable cover. **2.** Insert the harness in the connector. **3.** Fasten the harness in place to avoid strain on the connector. **4.** Seal the harness outlet. 
4	Put the user cable cover back in place and tighten the four fastening screws.
5	Put the harness cover back in place and tighten the four fastening screws.

NOTICE
INOPERABLE EQUIPMENT DUE TO INCORRECT HARNESS FIXING OR SEALING
Verify that the harness is correctly fixed and sealed.
Failure to follow these instructions can result in equipment damage.

Changing the Orientation of the Input/Output User Cable

Overview

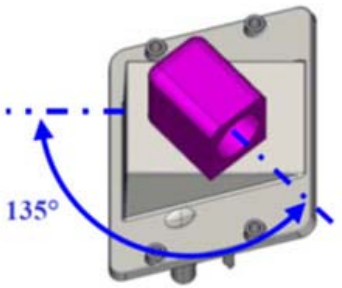
The input/output user cables on arm 2 are mounted by default at the following angles:

- Robot STS40 – 180°
- Robot STS60 – 135°
- Robot STS80 – 45°

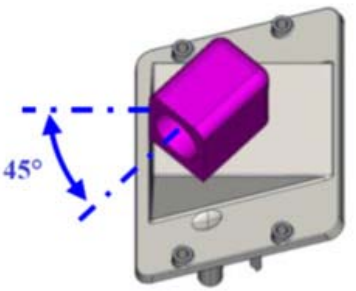
The following graphics present the orientation for STS60 and STS80 for example.

View from above.

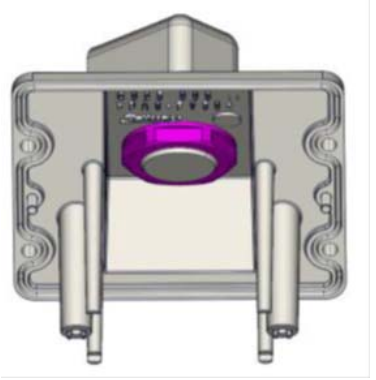
STS60



STS80



View from below



Changing the Orientation of the Input/Output User Cable

To change the orientation towards the right-hand side of the robot STS60/80 (not valid for robot STS40), proceed as follows:

Step	Action
1	Unscrew and remove the four screws from the cover.
2	Remove the cover.
3	Adjust the angle symmetrically as compared with the central axis alignment. The angle is set in the factory, and it may differ depending on the version.
4	Put the cover back in place.
5	Insert and tighten the four screws.

Section 4.5
Initial Start-Up

What Is in This Section?

This section contains the following topics:

Parametrization of the Robot Mechanics

Parametrization of the Robot Mechanics by Means of the `SchneiderElectricRobotics` Library

Use the `SchneiderElectricRobotics` library for operating the Lexium S robot. The `SchneiderElectricRobotics` library facilitates the parametrization and increases the possible payload, the accuracy, and the performance of the system.

For further information about using the `SchneiderElectricRobotics` library, refer to *SchneiderElectricRobotics Library Guide* in the EcoStruxure Machine Expert online help.

Manual Parametrization of the Robot Mechanics

Depending on the application, individual values may or must be adapted or optimized. This must be effected relative to the payload, path, permissible tracking deviation, and other relevant parameters.

Setting the Monitoring

Operating Library

Use the `SchneiderElectricRobotics` and `RoboticModule` library for operating the Lexium S robot.

Software Limits for Working Area

For the definition of application-specific software limits, refer to EcoStruxure Machine Expert online help.

Testing the Additional Protective Devices

- Verify the emergency stop, operator protective device, and device for releasing the brakes.
- Comply with the relevant standards, design the protective devices to stop the robot without leaving the path (Safe Stop 1 (SS1)).

For further information, refer to *Lexium 52 Hardware Guide* or *Lexium 62 Hardware Guide*.

Verifying the Monitoring

- Slowly move the robot beyond the limits of the preset working area in order to verify that this is prevented by the preset monitoring.
- Individually move the arms beyond the maximum/minimum angles in order to verify that this is prevented by the preset monitoring.

Start-Up

Overview

When the robot 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 robot is properly and firmly fastened.
- Take all necessary measures to ensure that the moving parts of the robot 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 motor power supply is disabled unintentionally, for example as a result of power outage, errors or functions, the motor 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.

The metal surfaces of the robot may exceed 80 °C (176 °F) during operation.

⚠ WARNING

HOT SURFACES

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

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

For further information, refer to *Hot Surfaces* *(see page 24)*.

NOTE: Perform a start-up for an already configured robot when using the robot under modified operating conditions. For further information, refer to *Specific Safety Information* *(see page 15)*.

Commissioning Procedure

Step	Action
1	Comply with the instructions provided in the manual of the motor used and in the manual of the drives used.
2	Verify that the load conforms to the specified payloads for the robot before operating the robot.
3	Limit the maximum torque of the motor in accordance with the maximum drive torque of the robot.
4	Perform initial tests at reduced velocity.
5	Verify that the ambient conditions *(see page 44)* conform to the appropriate specified environments for the robot.

Releasing the Joint Brake

Overview

The motors on the axes 3 and 4 are equipped with brakes. The opening of the brakes of axis 3 and 4 may lead to a sagging of the axes.

⚠ WARNING

SAGGING OF THE ROBOT

Ensure that release of the motor brakes of axis 3 and 4 pose no subsequent risks in the zone of operation.

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

To prevent a sagging of the axis, implement and use an additional circuit *(see page 152)*.

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

The load may fall under gravity when the brakes are released.

⚠ WARNING

FALLING HEAVY LOAD

Ensure that the robot and the load are independently supported when releasing the brakes.

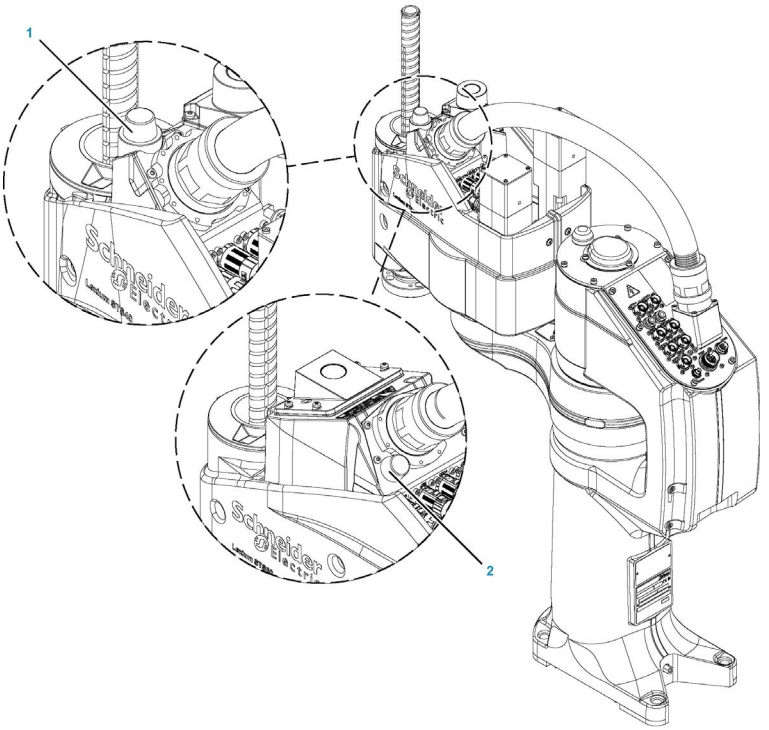
Failure to follow these instructions can result in death, serious injury, or equipment damage.

As precondition, the controller must be connected to the power supply and the application must be ready for use.

When the brake release push-button is pressed, the brakes on axes 3 and 4 are released simultaneously.

Brake release can be used whenever the application is ready for use and the robot has to be moved manually, for example to teach a point in the system.

NOTE: When the controller is not connected to the power supply and the application is not ready for use (for example during start-up phase of the controller) the brake release button is without any function.



1 Brake release push-button at STS40
2 Brake release push-button at STS60/80

Additional Circuit

When a brake is released, engaging the cross-circuit of the motor is the only way of limiting the fall speed.

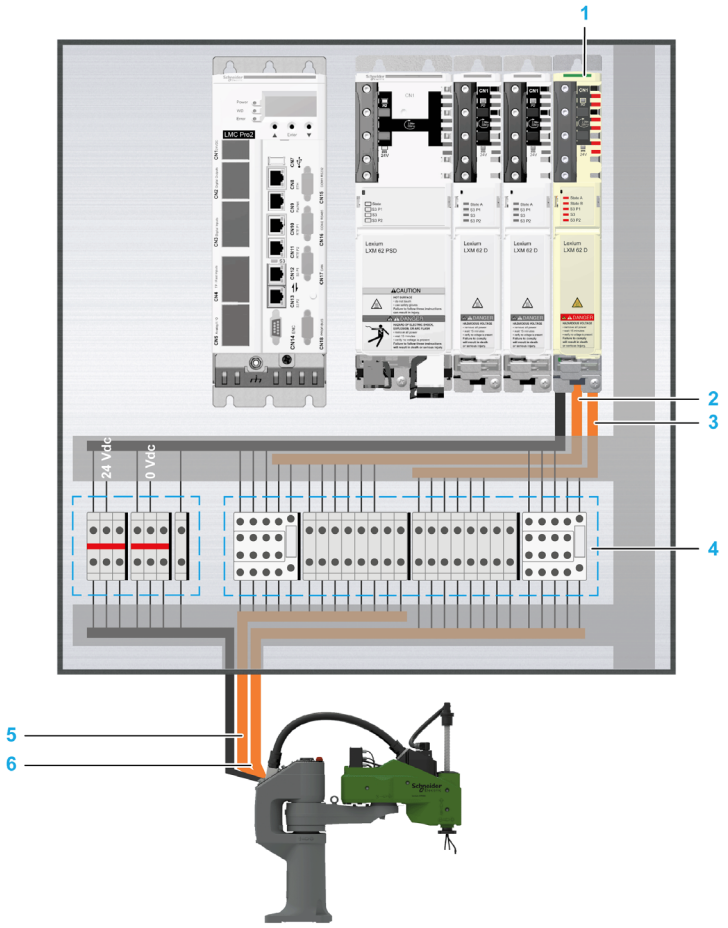
Preconditions:

- The controller must be connected to the power supply and the application must be ready for use.
- The software settings must be configured (for further information about configuring the brake release button, refer to the *Robotic Module Library Guide* in the *SoMachine Motion online help*.
- An additional circuit must be installed – similar to the example of the circuit diagram for short-circuiting axis 3 and axis 4 (see the circuit diagram below)

When the brake release push-button is pressed, the brakes on axes 3 and 4 are released simultaneously and the motors are cross-circuited to slow down the fall of the ball screw.

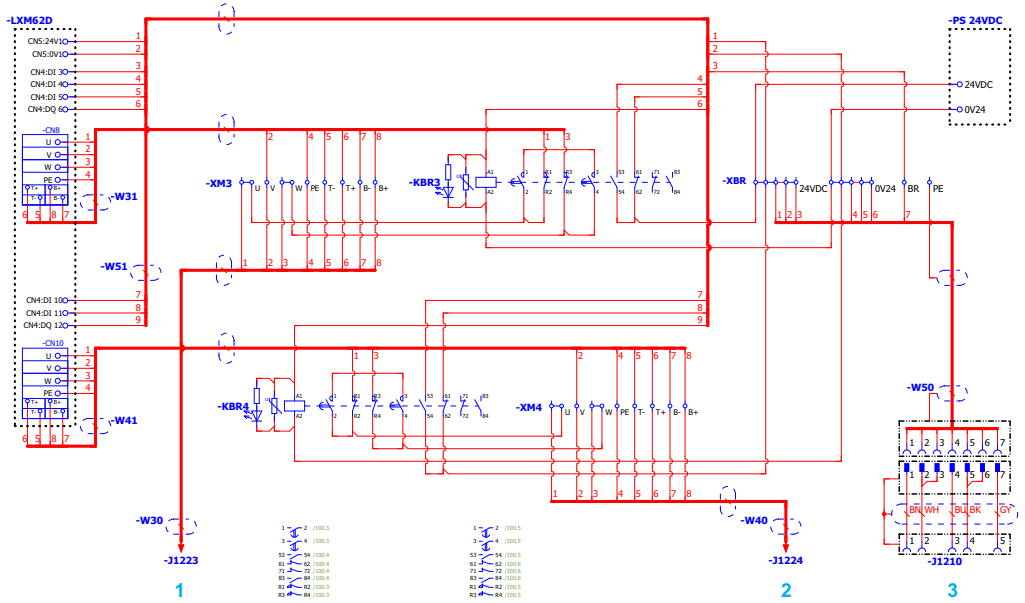
NOTE: In the event that the additional circuit is inoperable, the robot falling speed limitation created by the cross-circuitry may not be operational. In this case, the axis is completely free and may fall faster than expected.

The following figure presents an example of an additional circuit for releasing the joint brake:



1 Lexium 62 Drive Module for connection of motor axis 3 and 4
2 Motor cable (from additional circuit for releasing the joint brake of axis 3 to Lexium 62 Drive Module)
3 Motor cable (from additional circuit for releasing the joint brake of axis 4 to Lexium 62 Drive Module)
4 Additional circuit for releasing the joint brake
5 Motor cable axis 3 (FCE319•••A100)
6 Motor cable axis 4 (FCE320•••A100)

The following circuit diagram presents an example for cross-circuiting axis 3 and axis 4:



1 Motor axis 3 power connection
2 Motor axis 4 power connection
3 Cable adapter power connection

For more information on cross-circuiting the motor in a voltage free state, contact your local Schneider Electric service representative.

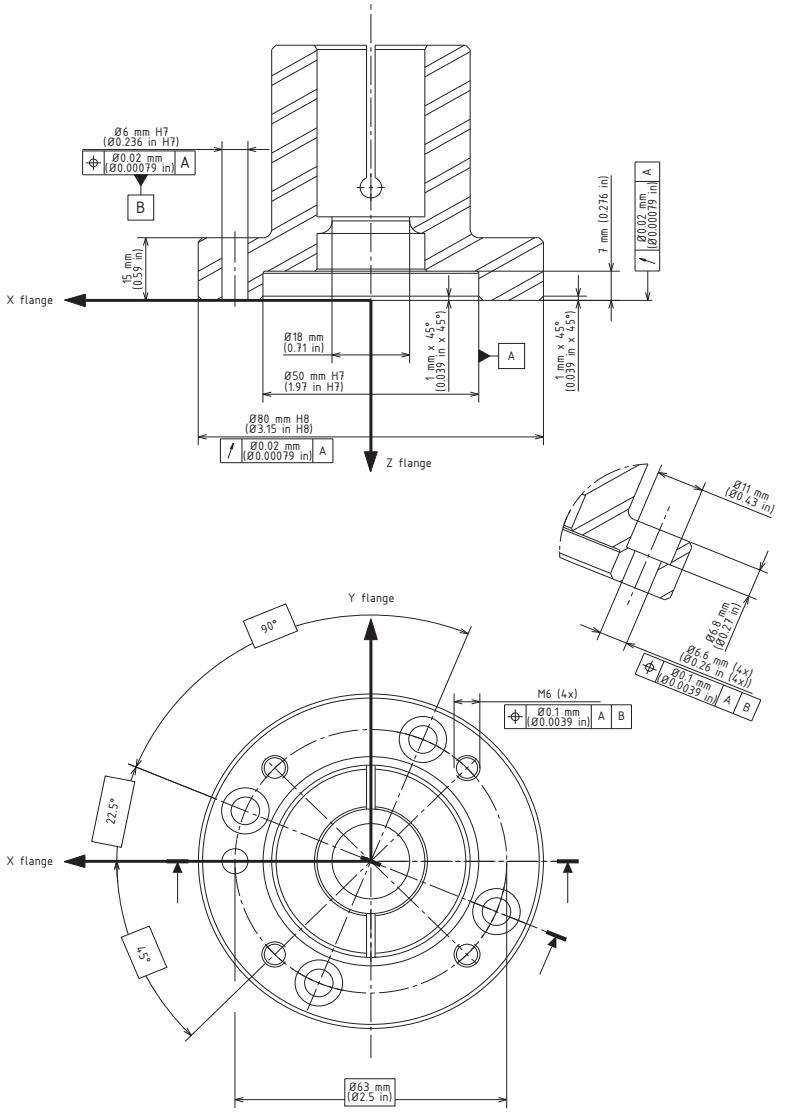
Section 4.6
Mounting the Payload

What Is in This Section?

This section contains the following topics:

Mounting the End-Effector

Flange Dimensions for Robot STS40/60/80



The end-effector is not supplied with the robot assembly: its design depends on the specific applications of the robot. Schneider Electric may be able to assist you with your application needs to obtain optimum performance without exceeding the robot assembly load limits. For assistance, contact your local Schneider Electric representative.

The end-effector is fitted on the mechanical interface of the tool flange, whose dimensions are shown in the dimensional drawing above.

Held in place by four M6 screws, property class 12-9, tightening torque 16.7 Nm +/- 1.2 Nm (148 lbf-in +/- 10.6 lbf-in).

Indexing via the 6 mm (0.236 in) diameter pin.

⚠ WARNING

FALLING PARTS

Tighten the screws in conformance with the torque specifications and index by pin.

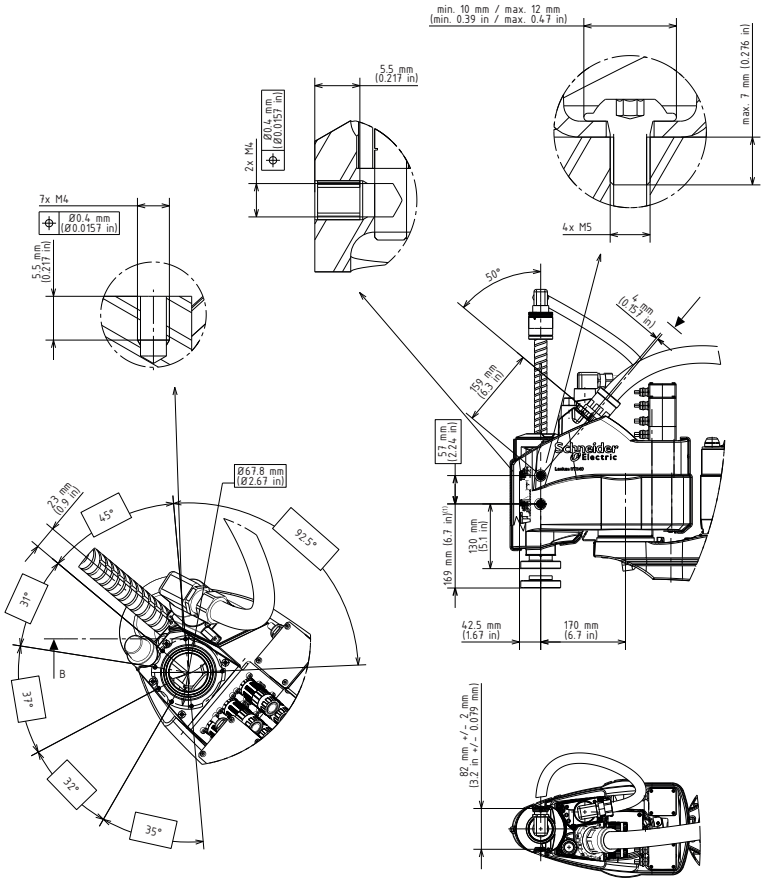
Failure to follow these instructions can result in death, serious injury, or equipment damage.

Attaching the Additional Load

Overview for STS40

An additional load (for example, vacuum pump, camera) can be fixed on the robot using:

- Four M5 holes located on the front of the arm 2 (two on the right, two on the left).
- Seven mounting points located on the upper part of the arm 2 (harness cover).
- Two M4 holes at the end of the arm 2 (robot casting 2).

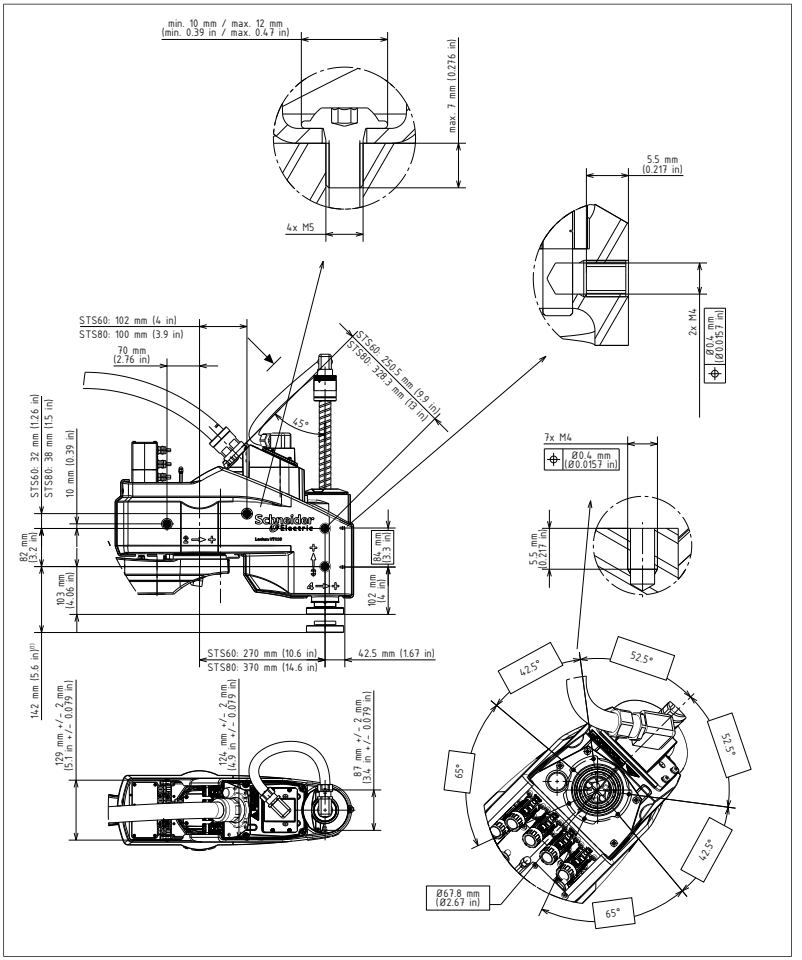


(1) With the 200 mm (7.9 in) bellows and travel option. 194 mm (7.6 in) for the 400 mm (15.7 in) bellows and travel options.

Overview for STS60/80

An additional load (for example, vacuum pump, camera) can be fixed on the robot using:

- Eight M5 holes located on the front of the arm 2 (two on the right, two on the left).
- Six M4 holes in the upper part of the arm 2 (harness cover).
- Two M4 holes at the end of the arm 2 (robot casting 2).



(1) With the 200 mm (7.9 in) bellows and travel option. 167 mm (6.6 in) for the 400 mm (15.7 in) bellows and travel options.

Attaching the Additional Load on the Front Section of the Arm 2

Step	Action
1	Remove the M5 screws holding the arm 2 covers in place.
2	Fit the extra elements in the M5 threaded holes (suggestion: hexagonal spacers with M5 interior and exterior threads). The bearing surface diameter on the covers must be between 10…12 mm (0.39…0.47 in). Maximum tightening torque is 1.7 Nm (15 lbf-in).

NOTICE

UNSUPPORTABLE MASS

Ensure that the total load of the robot and the added elements, including grippers and tools, does not exceed 8 kg (17.6 lb).

Failure to follow these instructions can result in equipment damage.

NOTICE

INOPERABLE EQUIPMENT

The additional linkage must be designed to avoid damaging the robot structure parts.

Failure to follow these instructions can result in equipment damage.

⚠ WARNING

COLLISION OF COMPONENTS

You must limit the working area at the software level to avoid collisions of the added elements during operations.

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

Attaching the Additional Load on the Upper Section of the Arm 2

There are M4 mounting holes on the metal base of the harness swivel joint (see the hole layouts in the figures above). Maximum tightening torque is 2.5 Nm (22 lbf-in).

Mounting the Additional Load on the End of the Arm 2

There are M4 mounting holes on the cast element of the arm 2 (see the hole layouts in the figures above).

It is necessary to cut away the covers to attach the additional load (changing the shape of the cutaway to suit that of the load). Maximum tightening torque is 3 Nm (26.6 lbf-in).

Chapter 5
Optional Equipment

What Is in This Chapter?

This chapter contains the following sections:

Section 5.1
Special Color for the Cover of Axis 2

Product Overview of the Special Color

Overview

Some applications require a specific color scheme. For such applications, you can select and apply a special color for the cover of axis 2.

Part number of the special color: LXMSTSYYYYC2000

NOTE: Specify the RAL number for the special color you require.

For further information, contact your local Schneider Electric service representative.

Section 5.2
Lubrication with H1 Oil and Grease

Product Overview of Lubrication with H1 Oil and Grease

Overview

Some applications require food-grade lubricated equipment. For such applications, you can use H1 oil and grease for lubricating the robot.

To have the robot pre-prepared with H1 oil and grease specify the reference: LXMSTSYYYYL1000

For further information, contact your local Schneider Electric service representative.

Section 5.3
Mechanical Limit Stops

What Is in This Section?

This section contains the following topics:

Product Overview of Mechanical Limit Stops

Overview

An mechanical limit stop system is able to stop the robot at nominal load and nominal speed. It is sized to absorb the kinetic energy of the axis.

The adjustable mechanical limit stops are available for axis 1 and axis 2. Apply the mechanical limit stop to both axes.

The mechanical limit stops are not included with the robot and must be ordered separately.

Part numbers of the mechanical limit stops:
- For axis 1: LXMSTSYYYYM1000
- For axis 2: LXMSTSYYYYM2000

Axis Range Limitation

The robot is mounted in a way that provides the maximum angular amplitudes defined in *Mechanical Data* *(see page 46)*.

Depending on the axes, the axis range can be limited by:
- Software settings
- Adjustable mechanical limit stops

Only the mechanical limit stops meet the safety requirements specified by the ISO 10218-1 standard to establish a restricted space around the robot. The range limitation system using software limits must only be used to protect the equipment and not to provide functional safety in the system.

⚠ WARNING

DEVIATION FROM THE SAFETY REQUIREMENTS

- Use the mechanical limit stops to comply with the safety requirements specified by the ISO 10218-1 standard.
- Do not use software-based range limitations for safety functions in the system.

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

The range limitation for moving the adjustable mechanical limit stops is set out in *Information About Modification of Ranges* *(see page 48)*.

Mounting the Mechanical Limit Stop to Axis 1

Overview

The system performance levels can only be realized when the equipment is assembled correctly with clean, degreased parts. Any failure to comply with the instructions can lead to incorrect operation of the range limiting system, with potential risks for people and equipment.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

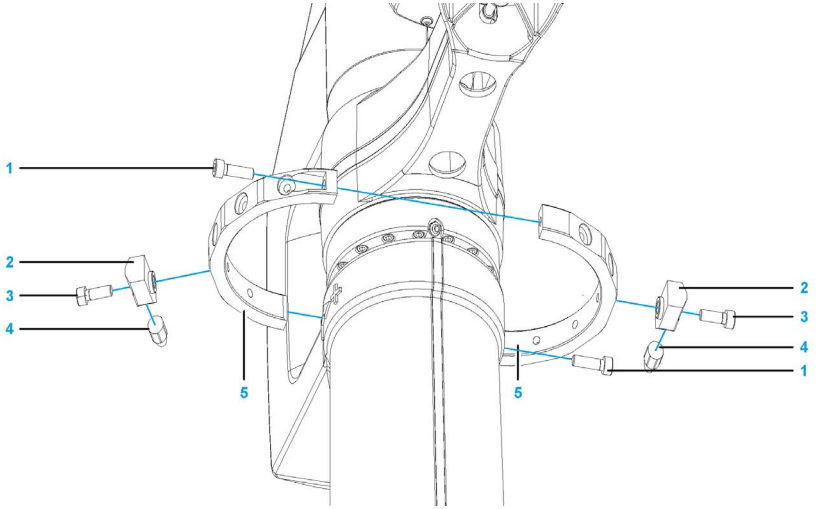
- Verify that the equipment is assembled as directed.
- Be sure that the parts and the equipment on which they are mounted are clean and free of grease or other foreign substance.
- Verify that all mounting screws and bolts are tightened according to the required torque values.
- Verify that the software range limits are valid.

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

NOTE: After changing a software range limit, verify by testing the axis at low speed so that it is able to move through the planned angular range and stops where and when required.

Assembly Overview of the Mechanical Limit Stop on Axis 1

The mechanical limit stop system is made up of a two-part ring (5) on which one or two adjustable limit stops (2) and (4) can be placed to limit the working range of axis 1. The ring is fixed on the robot by two screws (1).



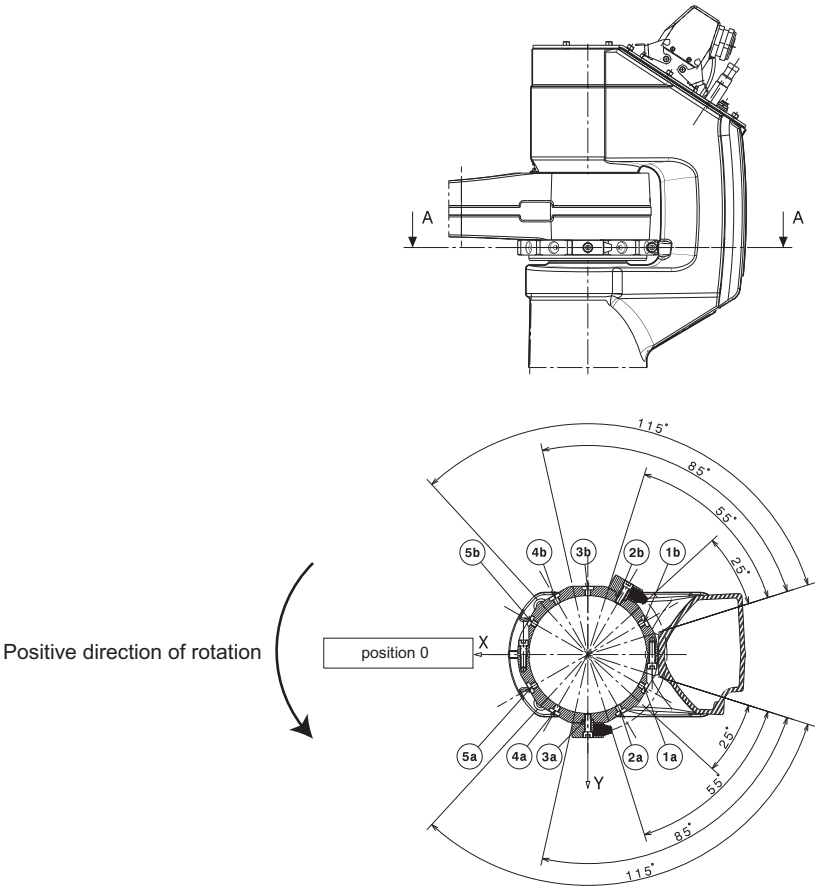
The new working range of the moving unit is limited by bosses placed on the cast iron elements of the base.

The working range can be changed by positioning one or two adjustable limit stops. For further information, refer to *Mechanical Limit Stop Array of Axis 1* *(see page 168)*.

Mechanical Limit Stop Array of Axis 1

The angular values in the following tables are shown for information only. However, taking into account the rotation margins provided by the clamping ring, you can to set a limit stop accurately at a given angle. Nonetheless, the increment between two adjustable limit stops is always a multiple of 30°.

Mechanical Limit Stop Array of Axis 1



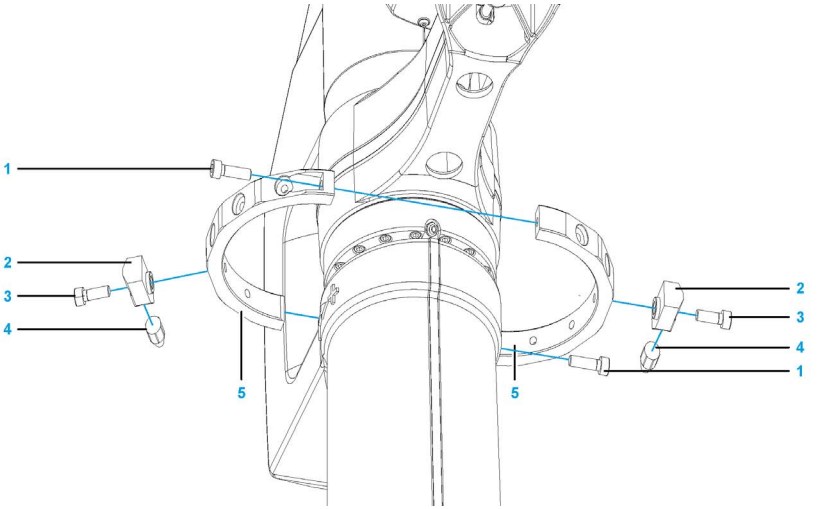
Arrays defining the ranges of the mechanical limit stop:

–	1a		2a		3a		4a		5a	
1b	0	0	25	0	55	0	85	0	115	0
2b	0	-25	25	-25	55	-25	85	-25	115	-25
3b	0	-55	25	-55	55	-55	85	-55	115	-55
4b	0	-85	25	-85	55	-85	85	-85	115	-85
5b	0	-115	25	-115	55	-115	85	-115	115	-115

Examples of positions for the adjustable limit stops:

- Mechanical stop in position 1a:
  - ❍ Mechanical limitation at 0° in the positive direction and nominal value in the negative direction.
- One limit stop in position 2a and another in position 2b:
  - ❍ Mechanical limitation at 25° in the positive and negative directions.
- Further reduction in steps of 30° if positions 2 to 5 are used.

Mounting the Mechanical Limit Stop to Axis 1

Step	Action
1	Fasten the clamping ring (5) on the robot at the level of axis 1. The part as assembled must be placed immediately below the robot. 
2	Tighten the screws (1) to the following torque: ● STS40: 10 Nm (89 Nm) ● STS60: 10 Nm (89 Nm) ● STS80: 10 Nm (89 Nm)
3	Fit a polyurethane limit stop (4) in the adjustable limit stop (2).
4	Position the assembly on the clamping ring to obtain the desired angular limit. Use the screw (3) to fix the limit stop in place. Tightening torque: 38.4 Nm (340 lbf-in)
5	Verify operation at low speed

The system performance levels can only be realized when the equipment is assembled correctly with clean, degreased parts. Any failure to comply with the instructions can lead to incorrect operation of the range limiting system, with potential risks for people and equipment.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Verify that the equipment is assembled as directed.
- Be sure that the parts and the equipment on which they are mounted are clean and free of grease or other foreign substance.
- Verify that all mounting screws and bolts are tightened according to the required torque values.
- Verify that the software range limits are valid.

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

NOTE: After changing a software range limit, verify by testing the axis at low speed so that it is able to move through the planned angular range and stops where and when required.

Mounting the Mechanical Limit Stop to Axis 2

Overview

The system performance levels can only be realized when the equipment is assembled correctly with clean, degreased parts. Any failure to comply with the instructions can lead to incorrect operation of the range limiting system, with potential risks for people and equipment.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

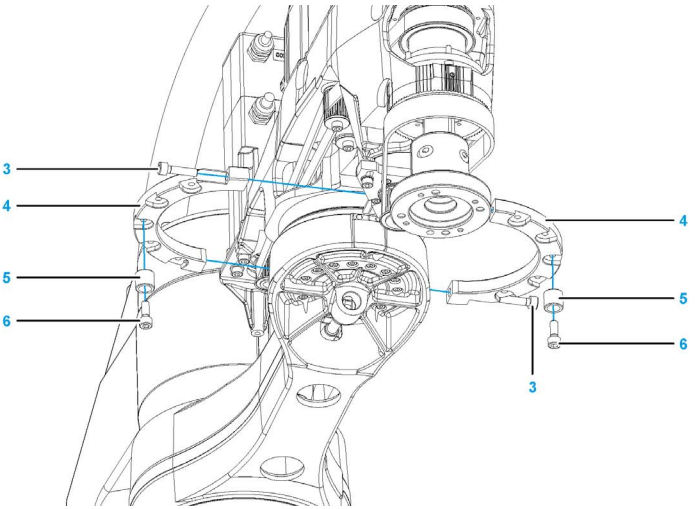
- Verify that the equipment is assembled as directed.
- Be sure that the parts and the equipment on which they are mounted are clean and free of grease or other foreign substance.
- Verify that all mounting screws and bolts are tightened according to the required torque values.
- Verify that the software range limits are valid.

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

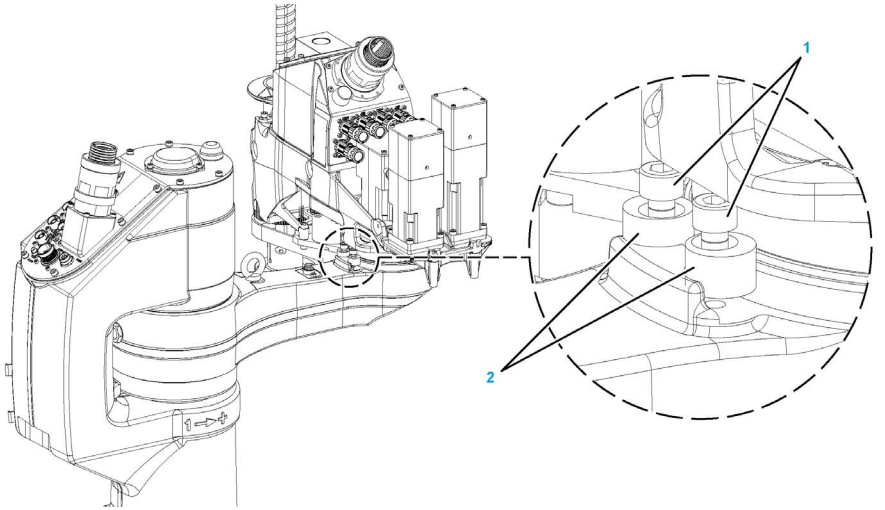
NOTE: After changing a software range limit, verify by testing the axis at low speed so that it is able to move through the planned angular range and stops where and when required.

Assembly Overview of the Mechanical Limit Stop on Axis 2

The mechanical limit stop system is made up of a two-part ring (4) on which one or two adjustable limit stops (5) can be placed to limit the working range of axis 2. The ring is fixed on the robot arm 2 by two screws (3).



The new working range of the unit in movement is limited by polyurethane limit stops (2) fixed on the robot casting by screws (1).

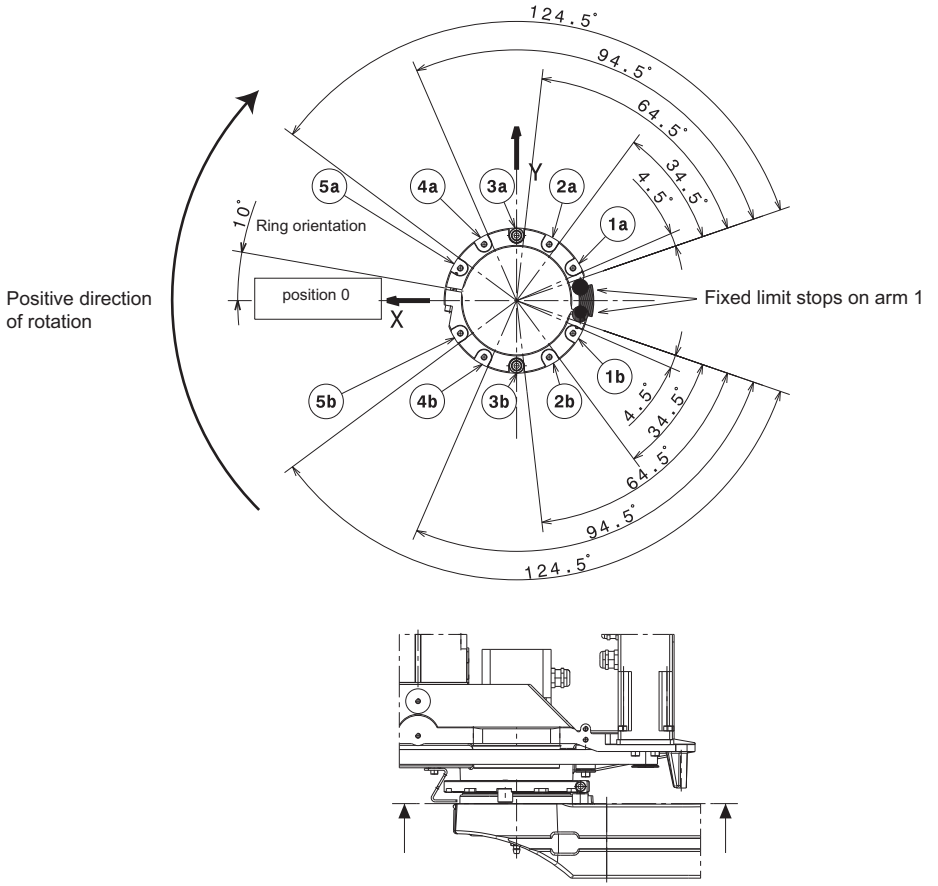


The working range can be changed by positioning one or two adjustable limit stops. For further information, refer to *Mechanical Limit Stop Array on Axis 2 (see page 174)*.

Mechanical Limit Stop Array on Axis 2

The angular values in the following tables are shown for information only. However, taking into account the rotation margins provided by the clamping ring, you can to set a limit stop accurately at a given angle. Nonetheless, the increment between two adjustable limit stops is always a multiple of 30°.

Mechanical Limit Stop Arrays of Axis 2



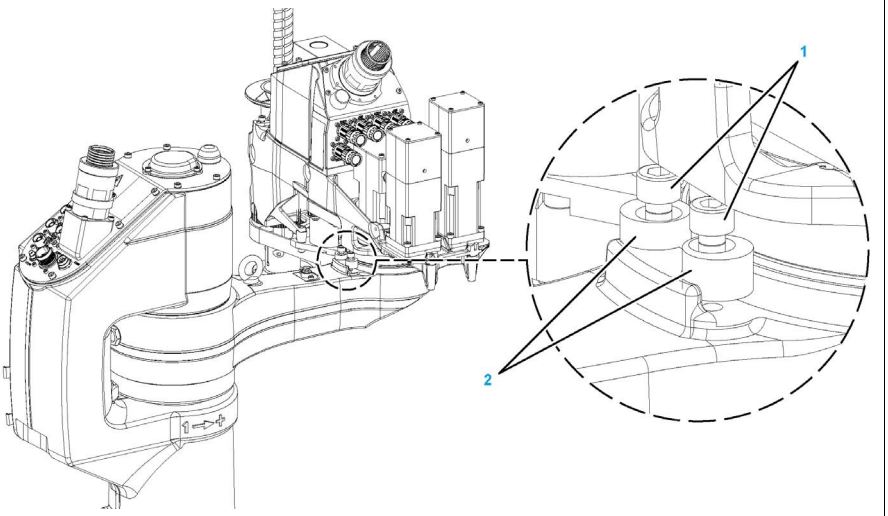
Arrays defining the ranges of the mechanical limit stop:

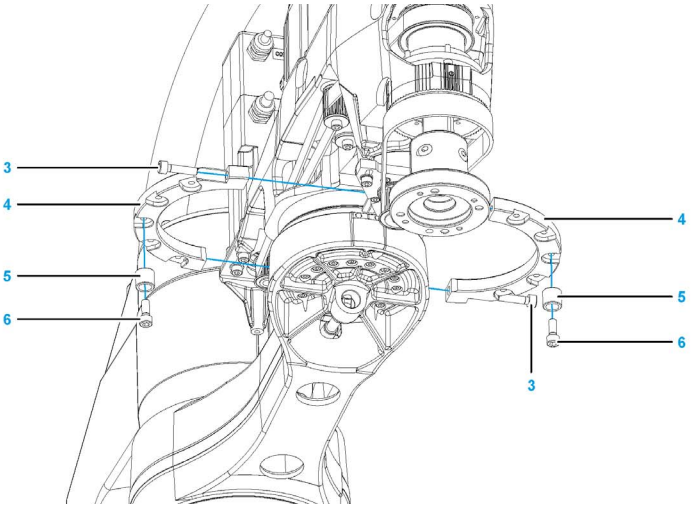
–	1a		2a		3a		4a		5a	
1b	4.5	-4.5	34.5	-4.5	64.5	-4.5	94.5	-4.5	124.5	-4.5
2b	4.5	-34.5	34.5	-34.5	64.5	-34.5	94.5	-34.5	124.5	-34.5
3b	4.5	-64.5	34.5	-64.5	64.5	-64.5	94.5	-64.5	124.5	-64.5
4b	4.5	-94.5	34.5	-94.5	64.5	-94.5	94.5	-94.5	124.5	-94.5
5b	4.5	-124.5	34.5	-124.5	64.5	-124.5	94.5	-124.5	124.5	-124.5

Examples of positions for the adjustable limit stops:

- Mechanical stop in position 1a:
  - Mechanical limitation at 4.5° in the positive direction and nominal value in the negative direction.
- One limit stop in position 1a and another in position 1b:
  - Mechanical limitation at 4.5° in the positive and negative directions.
- Further reduction in steps of 30° if positions 2 to 5 are used.

Mounting the Mechanical Limit Stop on Axis 2

Step	Action
1	Remove the covers to access the arm 2.
2	Fasten the two polyurethane limit stops (2) on robot axis 1, using the screws (1). 

Step	Action
3	Fasten the clamping ring (3) on the robot arm 2 at the level of axis 2. The assembled part must be placed immediately below the machined reinforcing strut. Tighten the screws (4) to the following torque: ● STS40: 5 Nm ● STS60: 5 Nm ● STS80: 5 Nm 
4	Place the adjustable limit stops (5) on the clamping ring to obtain the desired angular limit. Fasten the limit sFastentops using screws (6). Tightening torque = 16.7 Nm (148 lbf-in)).
5	Put the covers back in place.
6	Verify operation at low speed.

Section 5.4
Tool Connector

What Is in This Section?

This section contains the following topics:

Product Overview of the Tool Connector

Overview

The Tool Connector provides the following features:

- Anodized aluminum box with integrated valve
- Possibility of integrating up to four 5/2 solenoid valves and an input/output board
- Plastic cover with seals to provide IP54 protection level

Part numbers for the Tool Connector:

- For ball screw; stroke 200 mm (7.9 in): LXMSTSYYYYT2000
- For ball screw; stroke 400 mm (15.7 in): LXMSTSYYYYT4000

Technical Data of the Tool Connector

Overview

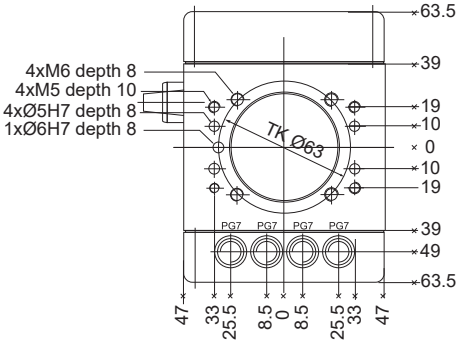
Here you will find the following information regarding the Tool Connector:

- Mechanical and electrical data of the *Tool Connector* *(see page 180)*
- Dimensional drawing of the *Tool Connector* *(see page 181)*
- Electrical diagram of the *Tool Connector* *(see page 182)*
- Pneumatic diagram of the *Tool Connector* *(see page 183)*

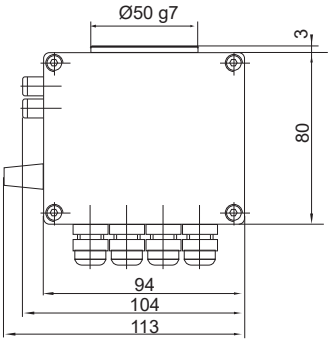
Mechanical and Electrical Data of the Tool Connector

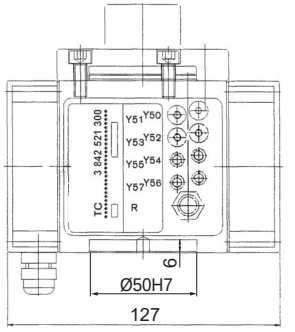
Category	Parameter	Unit	Value
Dimensions	Overall measurements L x H x D	mm (in)	94 x 127 x 80 (3.7 x 5 x 3.15)
	Inscribed diameter	mm (in)	155 (6.1)
Electrical data	Voltages	V	24 V, 0 V, protective ground (earth)
	Power supply tolerances	–	5%
	Electrical protection for the installation	A	6
	Maximum current	A	2
	Protection index	–	IP54
	Number of signals available	–	13
	Output signals	–	8
	Input signals	–	5
Weight	–	kg (lb)	0.85 (1.87)
Material	–	–	

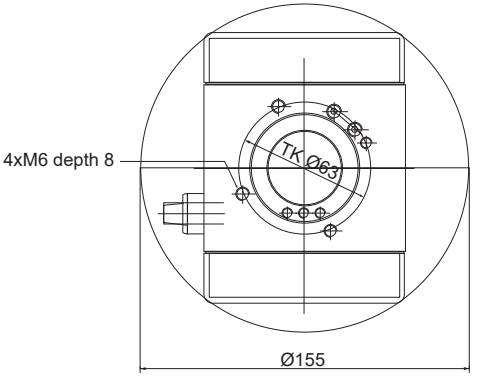
Dimensional Drawing of the Tool Connector



End-effector side



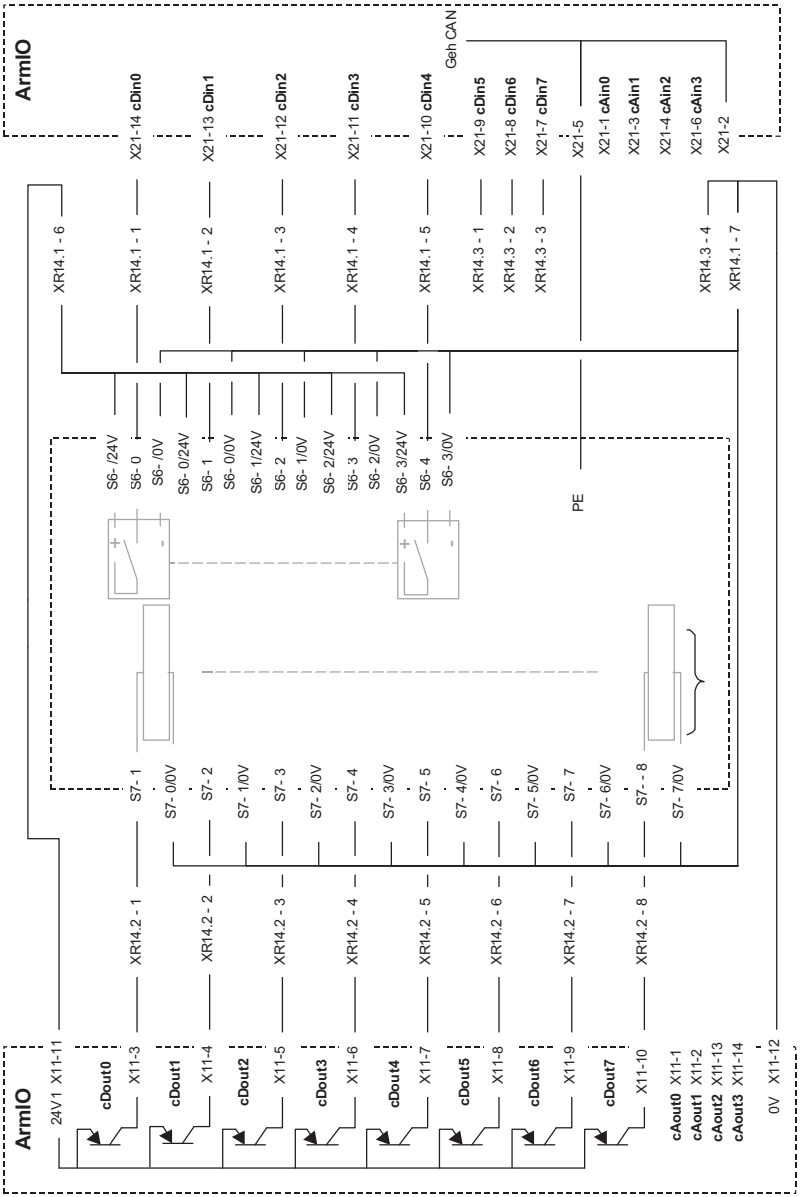




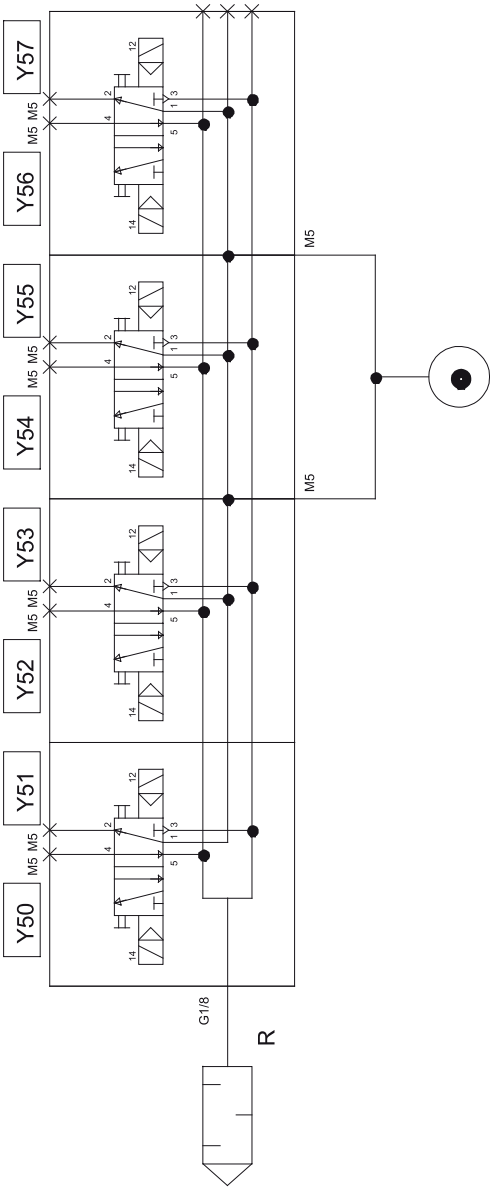
Tool flange side

Electrical Diagram of the Tool Connector

STS configuration



Pneumatic Diagram of the Tool Connector



Configuration with Tool Connector

Overview

For connections on the level of the base (or console) and for connections on the level of arm 2, refer to *Configuration with ARMIO Board* *(see page 82)*.

1 Tool Connector

Connection at the Tool Flange

For further information about the tool flange connection, refer to *Installing the Tool Connector* *(see page 180)*.

Storage and Unpacking of the Tool Connector

Storage of the Tool Connector

In the event of long storage periods for the Tool Connector, take the following precautions:

- Store in a dry place
- Protect from aggressive substances
- Avoid major temperature variations

Unpacking the Tool Connector

Unpack and verify the Tool Connector. Inform the manufacturer immediately if any damage is visible following delivery.

The accessories box must contain:

- Tool Connector (TC)
- Valve connection output board
- User input board
- Waterproof enclosure with seals
- Assembly set
- Instruction manual

Installing the Tool Connector

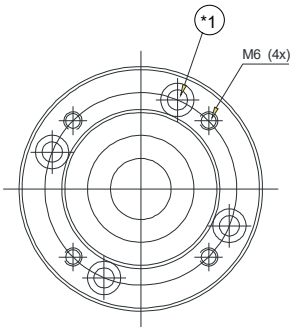
Overview

Here you will find the following information regarding the Tool Connector:

- Description of the tool flange and the assembly set *(see page 186)*
- Linking the Tool Connector to the tool flange *(see page 187)*
- Assembly set for the user installation *(see page 187)*
- Connecting the air hoses *(see page 188)*
- Fitting the Input/Output boards *(see page 190)*
- Description of the solenoid valves *(see page 191)*
- Mounting the solenoid valves *(see page 193)*
- Description of the tool interface and the user input connections *(see page 193)*
- Assembling the end-effector *(see page 194)*

Description of the Tool Flange and the Assembly Set

The Lexium S robots are fitted with a tool flange that can be used to hold the Tool Connector.



***1** Spot facing for DIN912-M6 screw

The Tool Connector is supplied with an assembly set containing the following elements:

- 4x screw CHc M6x16
- 4x safety washer
- 1x square bracket
- 2x screw CHc M3x12
- 2x washer DIN 125-A3,2

Linking the Tool Connector to the Tool Flange

Step	Action
1	Fasten the bracket to the main body of the Tool Connector (two screws M3x12 and two washers).
2	Fasten the main body of the Tool Connector to the tool flange (four screws M6x16 and four safety washers).
3	Tighten the screws in diagonal sequence. Tightening torque: 7.3 Nm (65 Nm))

NOTICE
LOSS OF IP54 DEGREE OF PROTECTION Add a sealing product on the tool flange before mounting it in place in order to comply with and maintain IP54 requirements. **Failure to follow these instructions can result in equipment damage.**

NOTE: The label on the main body of the Tool Connector must be opposite the robot.

Assembly Set for the User Installation

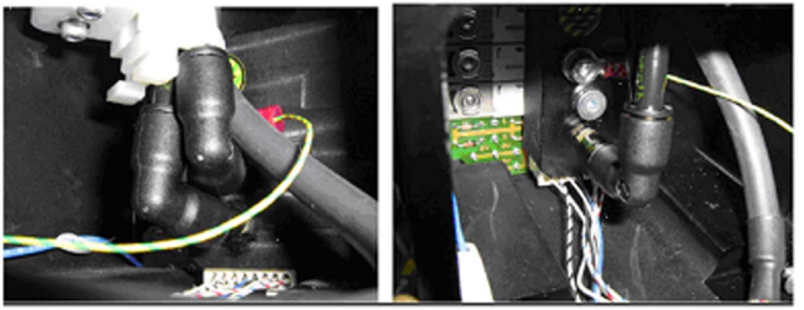
Parts in the assembly set supplied:

- 1x screw CHc M4x6
- 1x washer DIN 125-A4,3

- 1x lock washer DIN 6798-A4,3
- 1x plastic clamp
- 2x angle fittings for Ø 4/6 air hose

Connecting the Air Hoses

NOTICE
INCORRECT INSTALLATION Ensure that, when the robot is in its straight position, the rotation axis (axis 4) is positioned on 0° and that the cables and hoses running through the ball screw are not twisted. **Failure to follow these instructions can result in equipment damage.**

Step	Action
1	Cut off two pieces of air hose (lengths 10 mm (0.39 in) and 18 mm (0.71 in).
2	Connect the pieces of hose to the fluted fittings and the angle fittings supplied. 
3	Push the installation cable and the two air hoses 10…15 mm (0.39…0.59 in) into the ball screw and fix them to the bracket using the plastic clamp provided.

Step	Action
4	Cut off the excess length of the plastic clamp. 
5	Connect the two pneumatic hoses to the fittings.
6	Connect the green/yellow protective ground (earth) wire to the main body of the Tool Connector (one bolt supplied).
7	Put the lock washer underneath the cable hook and the washer above it.

⚠⚠ DANGER

ELECTRIC SHOCK DUE TO DAMAGED CABLES

Ensure that no cables have been bent or crushed during the connecting work.

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

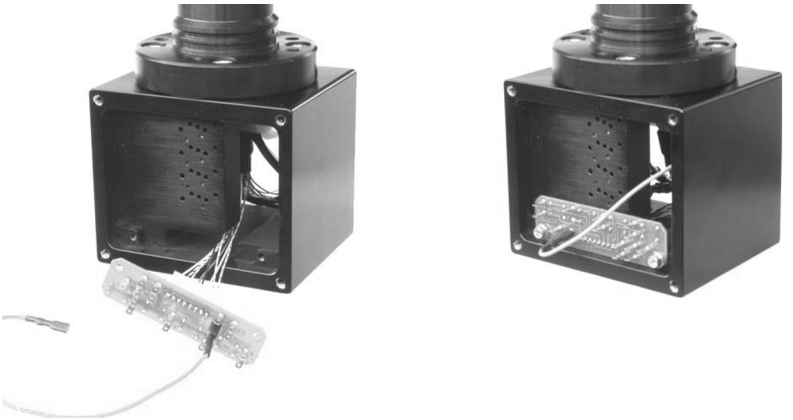
⚠ WARNING

COLLISIONS DUE TO UNLIMITED AXIS RANGE

Limit the range of axis 2 when the tool connector (TC) has been assembled.

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

Fitting the Input/Output Boards

Step	Action
1	Unpack the boards and the seal set. Verify all included parts for transport damage and completeness. It must contain: ● Output board ● Input board ● 0 V connecting wire ● 4x screws CHc M3x8 ● 4x washers DIN 125-A3.2 
2	Connect the 0 V connecting wire to the output board.
3	Take the X14-2 socket on the front of the solenoid valve out of the main body.
4	Connect the output board to the X14-2 socket.
5	Connect the input board to the X14-1 socket.
6	Pull the 0 V connecting wire through to the other side of the main housing.
7	Connect the input board to the 0 V connecting wire.
8	Fasten the input board to the main housing of the Tool Connector (four M3x8 screws).

Step	Action
9	Insert the input board in the slot inside the box to protect the upper part of the input board.  

⚠⚠ DANGER

ELECTRIC SHOCK DUE TO DAMAGED CABLES

Ensure that no cables have been bent or crushed during the connecting work.

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

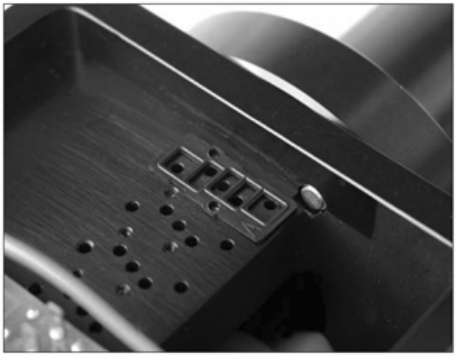
Description of the Solenoid Valves

The four solenoid valves and the covers are supplied with the Tool Connector.

Pneumatic equipment

Parameter	Unit	Value
Operating pressure	bar (psi)	1.5…6 (21.8…87)
Output at 6 bar (87 psi) from solenoid valve (Qn)	l/min	96
Solenoid valve opening time	ms	< 15
Operating frequency	Hz	
Attachment	–	8x M5
Muffler connection	–	1x R1/8"

You can remove the solenoid valves. The space not taken up by a solenoid valve must be covered by a plate.



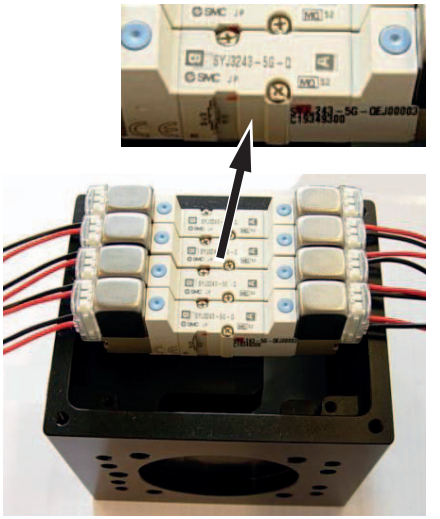
Parts in the assembly set supplied:

- 4x cover with seals and screws for installation.

NOTICE
INCREASED WEAR Filter the air with a 5 µm filter. **Failure to follow these instructions can result in equipment damage.**

⚠ WARNING
FALLING HEAVY LOAD Verify in the application that the gripper is designed to hold the load with the accelerations programmed, as well as in the event of an electrical power outage or an inoperative air supply. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

Mounting the Solenoid Valves

Step	Action
1	When fitting a solenoid valve, insert the screws through the solenoid valve body and then fit the sealing plate. Verify that the solenoid valve is correctly positioned. 
2	Screw the solenoid valve into the main body.
3	Pressurize the Tool Connector and examine the system to verify for leaks.
4	Make the electrical connections between the solenoid valves and the board *(see page 182)*.
5	Verify whether the wiring is connected correctly by activating the various output switches.

⚠ ⚠ DANGER

LOOSE WIRING OR CABLING CAUSES ELECTRIC SHOCK

Verify wiring or cabling connections for correct connections.

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

Description of the Tool Interface and the User Input Connections

The tool interface is on the underside of the *Tool Connector (see page 181)*.

NOTICE
MAXIMUM PAYLOAD EXCEEDED Do not exceed the payload as defined in *Mechanical Data (see page 45)*, taking into account the additional load of the tool connector (TC), the end-effector and all the associated parts. **Failure to follow these instructions can result in equipment damage.**

Equipment required:
- 1x box cover
- 2x box seals
- 8x head screws (DIN 7984-M4x30)
- 8x safety washers
- 8x cable glands

You can connect up to five signals and the 0 V/24 V power supply required for the board. An additional set of 0 V/24 V power supply contacts is available.

The board has a connection dedicated to the power supply (connection terminal strip).

To connect up the power supply, remove the cable gland from the plastic cover and connect a PG7 cable. There are four passages available on the user panel.

Assembling the End-Effector

Step	Action
1	Put the cable in through the cover, and then through the box joint, and connect the cable to the board connector.
2	Pull the right-hand part of the cable into the box and fix and tighten it.

Step	Action
3	Fit the cover by putting four cylindrical screws and lock washers in the cover, insert the seals, and tighten the screws. 

Chapter 6
Maintenance and Repair

What Is in This Chapter?

This chapter contains the following sections:

Section 6.1
Maintenance, Repair, and Cleaning

What Is in This Section?

This section contains the following topics:

General Information About Maintenance, Repair, and Cleaning

Overview

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

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

⚠⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Disconnect all power from all equipment including connected devices prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires.
- Place a "Do Not Turn On" or equivalent hazard label on all power switches and lock them in the non-energized position.
- Wait 15 minutes to allow the residual energy of the DC bus capacitors to discharge.
- Measure the voltage on the DC bus with a properly rated voltage sensing device and verify that the voltage is less than 42.4 Vdc.
- Do not assume that the DC bus is voltage-free when the DC bus LED is off.
- Block the motor shaft to prevent rotation prior to performing any type of work on the drive system.
- Do not create a short-circuit across the DC bus terminals or the DC bus capacitors.
- 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.

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

Poor 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.

NOTICE
ELECTROSTATIC DISCHARGE Use an electrostatic wristband and an antistatic mat connected to the robot when handling any boards or electronic components, together with the electric harness to which it is connected. **Failure to follow these instructions can result in equipment damage.**

NOTE: Remove the part or the tool mounted to the robot during maintenance operations.

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

Levels of Intervention

Level 1: Operations that can be carried out by a maintenance technician without specific Schneider Electric training.

Level 2: Operations that can be carried out by a maintenance technician who has undergone specific Schneider Electric training.

Level 3: Operations that must be carried out by your local Schneider Electric service representative.

Failure to comply with the levels of intervention can lead to incorrect operation of the robot and entail risks for the user and the machine environment.

⚠ 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.

Maintenance Schedule

Action	Intervention Level	Month	Year	5 years	2500 hours	5000 hours	10000 hours	20000 hours	40000 hours
Safety									
Mechanical limit stops (option): visual inspection, modify if needed	1	A							
Mechanical limit stops (option): visual inspection for damage			A						

A Suggested periodicity: To be adapted in the light of the risk analysis for the application.
B Typical cleaning periodicity (standard maintenance level from OptimizeLab).
C Suggested typical periodicity for heavy-duty applications (adapted maintenance level from OptimizeLab). Contact your local Schneider Electric service representative.
D Suggested typical periodicity for applications in harsh environments (such as damp environments) or clean environments (such as CRs). Contact your local Schneider Electric service representative.
E Typical periodicity for robot lubricated with H1 oil. Contact your local Schneider Electric service representative.

Action	Inter-vention Level	Month	Year	5 years	2500 hours	5000 hours	10000 hours	20000 hours	40000 hours
Mechanical limit stops (option): verify the tightening torques for the screws holding the clamping ring are in place; for axis 1 *(see page 168)* and axis 2 *(see page 173)*			A						
Mechanical limit stops (option): verify that there is no slippage for the ring			A						
Brake: verify brake operation	1		A						
Brake: replace if necessary	2								
Fastenings (base, tool interface flange, and so on): verify for tightness and corrosion	1	A							
Power light PWRL (option): verify, modify if needed	1	A							
Verify continuity of the protection circuit	2		A						
General state of the robot									
External: visual inspection for corrosion and collision damage	1	B							
Painted parts: visual inspection, touch up the paintwork if it has been damaged	1	D	B						
Gearboxes (axes 1, 2 and 4)									
Oil level: Verify	1		B						
Operation (backlash, hard spots)	2		B						
Oil change (axes 1 and 2)	2			B		C, E	B		
Replacement (axes 2 and 4)	2							C	B
Replacement (axis 1)	3							C	B
Ball screw									

A Suggested periodicity: To be adapted in the light of the risk analysis for the application.
B Typical cleaning periodicity (standard maintenance level from OptimizeLab).
C Suggested typical periodicity for heavy-duty applications (adapted maintenance level from OptimizeLab). Contact your local Schneider Electric service representative.
D Suggested typical periodicity for applications in harsh environments (such as damp environments) or clean environments (such as CRs). Contact your local Schneider Electric service representative.
E Typical periodicity for robot lubricated with H1 oil. Contact your local Schneider Electric service representative.

Action	Inter-vention Level	Month	Year	5 years	2500 hours	5000 hours	10000 hours	20000 hours	40000 hours
Cleaning the ball screw and then lubricating it	1				B				
Operation (backlash, hard spots)	2		B						
Replacement	2							C	B
Belt transmission									
Belt, pulleys, idler pulleys: Visual inspection	1		B			B			
Belt, idler pulleys: replacement	2						C	B	
Sealing									
Lip seals: visual inspection	1	D	B						
Lip seals: replacement	3							D	B
Cover seals: visual inspection	1	D	B						
Cover seals: replacement	1		D	B		D	B		
Bellows and bearings (option): verify	1		B			B			
Bellows and bearings (option): replacement	2		D	B		D	B		
Electrical and pneumatic harness									
Visual inspection of the harness and connectors, condition of the fixings (covers removed)	2		B			B			
Harness replacement	2						D	B	

A Suggested periodicity: To be adapted in the light of the risk analysis for the application.
B Typical cleaning periodicity (standard maintenance level from OptimizeLab).
C Suggested typical periodicity for heavy-duty applications (adapted maintenance level from OptimizeLab). Contact your local Schneider Electric service representative.
D Suggested typical periodicity for applications in harsh environments (such as damp environments) or clean environments (such as CRs). Contact your local Schneider Electric service representative.
E Typical periodicity for robot lubricated with H1 oil. Contact your local Schneider Electric service representative.

Removing the Covers

Prerequisites

Tools required:

- 3 mm (0.118 in) hex key

⚠ ⚠ DANGER

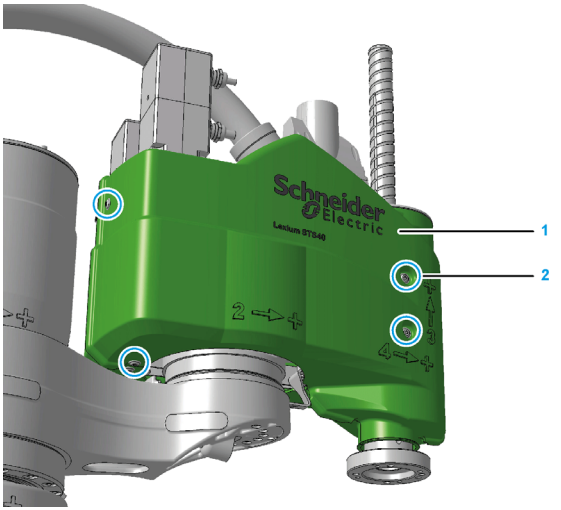
HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Disconnect all power from all equipment including connected devices prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires.
- Place a "Do Not Turn On" or equivalent hazard label on all power switches and lock them in the non-energized position.
- Wait 15 minutes to allow the residual energy of the DC bus capacitors to discharge.
- Measure the voltage on the DC bus with a properly rated voltage sensing device and verify that the voltage is less than 42.4 Vdc.
- Do not assume that the DC bus is voltage-free when the DC bus LED is off.
- Block the motor shaft to prevent rotation prior to performing any type of work on the drive system.
- Do not create a short-circuit across the DC bus terminals or the DC bus capacitors.
- 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.

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

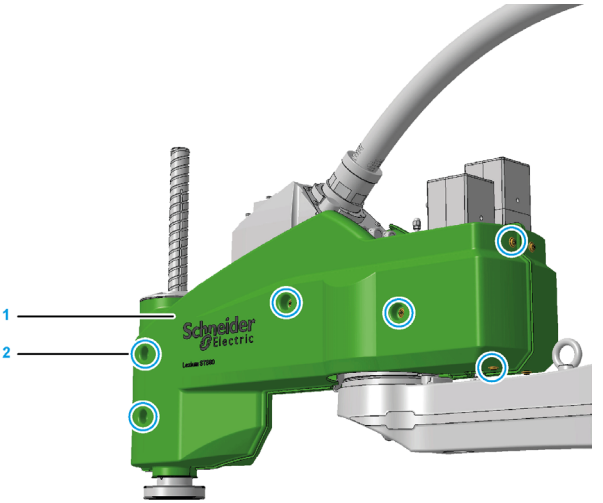
Removing the Covers of Robot STS40

Perform the following steps on either sides of the robot:

Step	Action
1	Remove the four screws (2) at the cover (1). 
2	Remove the cover.

Removing the Covers of Robot STS60/80

Perform the following steps on either sides of the robot:

Step	Action
1	Remove the six screws (2) at the cover (1). 
2	Remove the cover.

Removing the Protective Bellow

Prerequisites

Tools required:

- Flat-bladed screwdriver

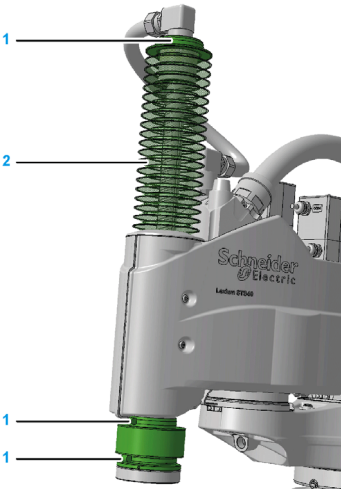
⚠ ⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Disconnect all power from all equipment including connected devices prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires.
- Place a "Do Not Turn On" or equivalent hazard label on all power switches and lock them in the non-energized position.
- Wait 15 minutes to allow the residual energy of the DC bus capacitors to discharge.
- Measure the voltage on the DC bus with a properly rated voltage sensing device and verify that the voltage is less than 42.4 Vdc.
- Do not assume that the DC bus is voltage-free when the DC bus LED is off.
- Block the motor shaft to prevent rotation prior to performing any type of work on the drive system.
- Do not create a short-circuit across the DC bus terminals or the DC bus capacitors.
- 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.

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

Removing the Protective Bellow

Step	Action
1	Undo the clamp screws (1). 
2	Remove the bellow (2).

NOTE: For reassembly, use a tightening torque of 20 Nm (177 lbf-in) to tighten the clamp screws.

Verifying the Oil Levels

Overview

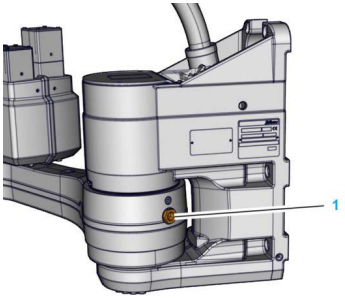
NOTICE
INOPERABLE EQUIPMENT Ensure that the oil level is at the appropriate level before operating the robot. **Failure to follow these instructions can result in equipment damage.**

Tools required:

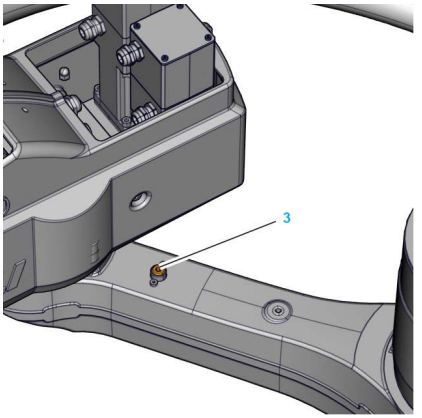
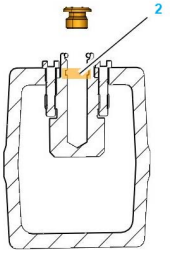
- Flat-bladed screwdriver

Verifying the Oil Level of Axis 1

The oil level is adequate when it is halfway up the sight glass (1). If the oil level is not halfway up the sight glass, change the oil of axis 1 *(see page 229)*.



Verifying the Oil Level of Axis 2

Step	Action
1	Remove the plug (3). 
2	Verify that the oil level is on the same level as the groove (2). Otherwise change the oil of axis 2 *(see page 232)*. 
3	Insert the plug (3) and tighten it to a torque of 6 Nm (53 lbf-in).

Verifying the Belts

Prerequisites

Initial position:

- Covers are removed *(see page 204)*

⚠ ⚠ DANGER

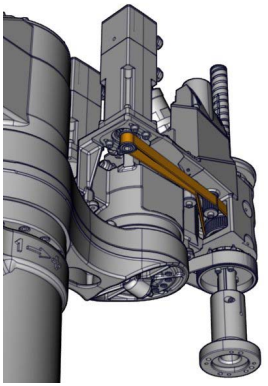
HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Disconnect all power from all equipment including connected devices prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires.
- Place a "Do Not Turn On" or equivalent hazard label on all power switches and lock them in the non-energized position.
- Wait 15 minutes to allow the residual energy of the DC bus capacitors to discharge.
- Measure the voltage on the DC bus with a properly rated voltage sensing device and verify that the voltage is less than 42.4 Vdc.
- Do not assume that the DC bus is voltage-free when the DC bus LED is off.
- Block the motor shaft to prevent rotation prior to performing any type of work on the drive system.
- Do not create a short-circuit across the DC bus terminals or the DC bus capacitors.
- 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.

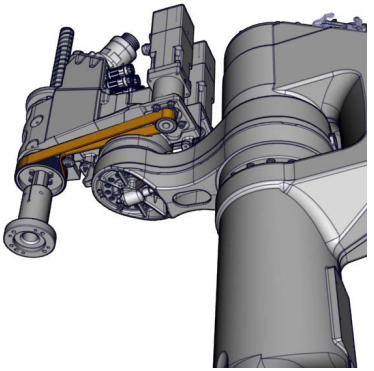
Failure to follow these instructions will result in death or serious injury.

Location of the Belts

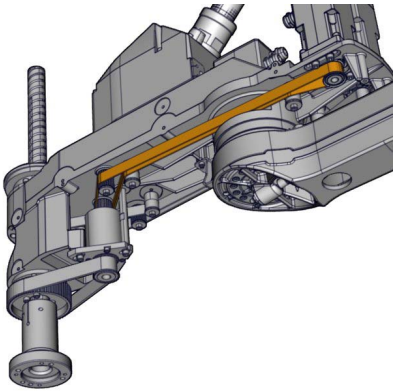
Position of the belt on axis 3



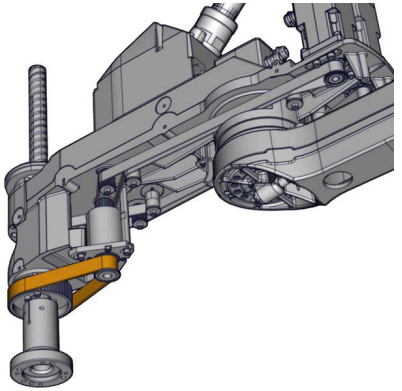
STS40: Position of the belt on axis 4



STS60/80: Position of the primary belt on axis 4



STS60/80: Position of the secondary belt on axis 4



Verifying the Belts

NOTICE
INOPERABLE EQUIPMENT Do not put the belts under pressure or twist them. **Failure to follow these instructions can result in equipment damage.**

Step	Action
1	Verify the belts for wear without removing them.

Cleaning

Overview

Only use wipes wetted with a cleaner with 70% Isopropyl alcohol (IPA70).

For painted parts, you can use the suggested cleaner if you wipe softly and without long application. Nevertheless, the repetitive mechanical action of wiping may damage the brightness of the paint.

Repairing After Collisions

Overview

If unusual sounds or vibrations are noted on the robot, especially following a shock or some other incident, it is necessary to inspect the tool and gripper fastenings carefully and make diagnostics at low speed.

If a collision of the robot occurs, all safety components involved in the safety have to be checked carefully to verify that they are still operating and not damaged: hard stop devices on the robot, electrical limit switches, calibration of the robot. Do not hesitate to call your local Schneider Electric service representative.

Repairing After a Mechanical Stop

If the robot is stopped by a mechanical limit stop, perform the following steps:

Step	Action
1	Verify that the robot has not suffered any visible damage.
2	Verify transmission by placing the arm on the axis reference mark. If there is an offset, contact your local Schneider Electric service representative.
3	Verify manually at slow speed whether there are no unusual noises or backlash on the various axes.
4	Put the ring back in place if it has slipped. Follow the points concerned in the installation procedure.
5	Replace the bumper that absorbed the impact. Reference for the bumper: ● Axis 1 bumper: LXMSTSYYYYYY038 ● Axis 2 bumper: LXMSTSYYYYYY039
6	Verify operation at low speed.

⚠ CAUTION

UNINTENDED EQUIPMENT OPERATION

Contact your local Schneider Electric service representative for a robot diagnostic if any ring damage or slippage is noted (or in the event of doubt following an impact or a suspected impact).

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

Other Repairs

In case of other repairs beyond those described in the present document, contact your local Schneider Electric service representative

Section 6.2
Replacing Parts

What Is in This Section?

This section contains the following topics:

Information About Replacing Parts

Overview

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

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

⚠⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Disconnect all power from all equipment including connected devices prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires.
- Place a "Do Not Turn On" or equivalent hazard label on all power switches and lock them in the non-energized position.
- Wait 15 minutes to allow the residual energy of the DC bus capacitors to discharge.
- Measure the voltage on the DC bus with a properly rated voltage sensing device and verify that the voltage is less than 42.4 Vdc.
- Do not assume that the DC bus is voltage-free when the DC bus LED is off.
- Block the motor shaft to prevent rotation prior to performing any type of work on the drive system.
- Do not create a short-circuit across the DC bus terminals or the DC bus capacitors.
- 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.

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

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

The metal surfaces of the robot may exceed 80 °C (176 °F) during operation.

⚠ WARNING

HOT SURFACES

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

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

For further information, refer to *Hot Surfaces* *(see page 24)*.

Replacing the Flat Seal

Overview

Tools required:

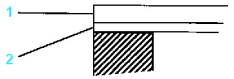
- 4 mm (0.157 in) hex key

Tools suggested:

- C fluid (ethyl acetate)

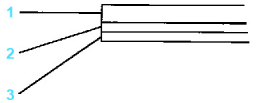
Components of a Flat Seal

The mounted flat seal is made up of two layers:



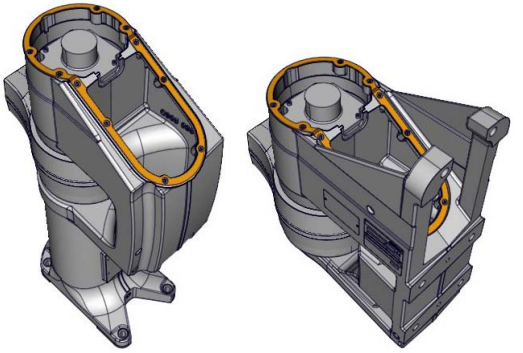
1 Foam
2 Adhesive

A new flat seal additionally has a protective paper covering the adhesive:



1 Foam
2 Adhesive
3 Protective paper

Removing the Seal

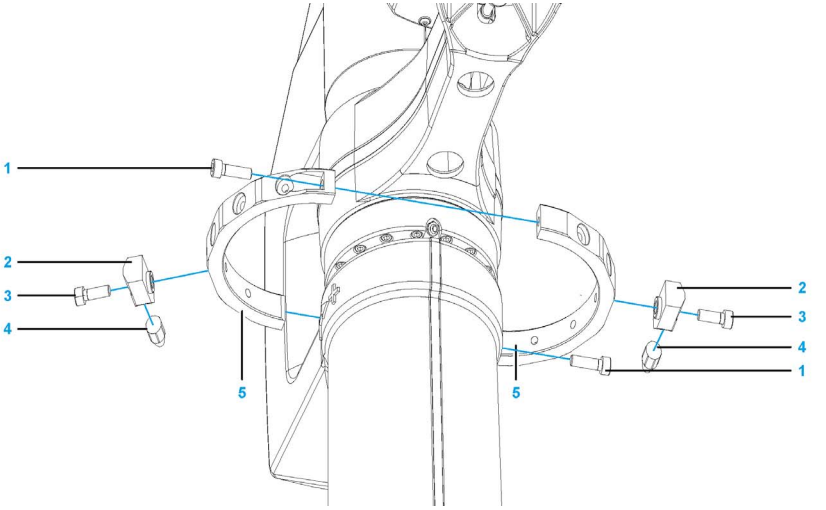
Step	Action
1	To remove the flat seal, peel off a corner of the seal and pull it towards you. If the adhesive section remains stuck to the cover, use C fluid (ethyl acetate) to remove it. 
2	Clean the surface, remove all paint and all other particles present on the surface, without scratching it.
3	Clean the whole surface using C fluid (ethyl acetate).

Mounting the New Seal

Step	Action
1	Remove the protective paper of the new seal. For details, refer to *Components of a Flat Seal (see page 219)*.
2	Remove the cut-out sections such as screw holes.
3	Present the seal. Line the contour of the seal up with that of the surface.
4	Apply the new seal to the surface.

Replacing the Mechanical Limit Stop on Axis 1

Replacing the Mechanical Limit Stop on Axis 1

Step	Action
1	Remove the screw (3) at the limit stop. 
2	Remove the adjustable limit stop (2).
3	Remove the polyurethane limit stop (4) from the limit stop (2).
4	Remove the screw (1) at the clamping ring.
5	Remove the clamping ring.
6	Remount the mechanical limit stop *(see page 168)* using appropriate new parts.

The system performance levels can only be realized when the equipment is assembled correctly with clean, degreased parts. Any failure to comply with the instructions can lead to incorrect operation of the range limiting system, with potential risks for people and equipment.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Verify that the equipment is assembled as directed.
- Be sure that the parts and the equipment on which they are mounted are clean and free of grease or other foreign substance.
- Verify that all mounting screws and bolts are tightened according to the required torque values.
- Verify that the software range limits are valid.

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

NOTE: After changing a software range limit, verify by testing the axis at low speed so that it is able to move through the planned angular range and stops where and when required.

⚠ CAUTION

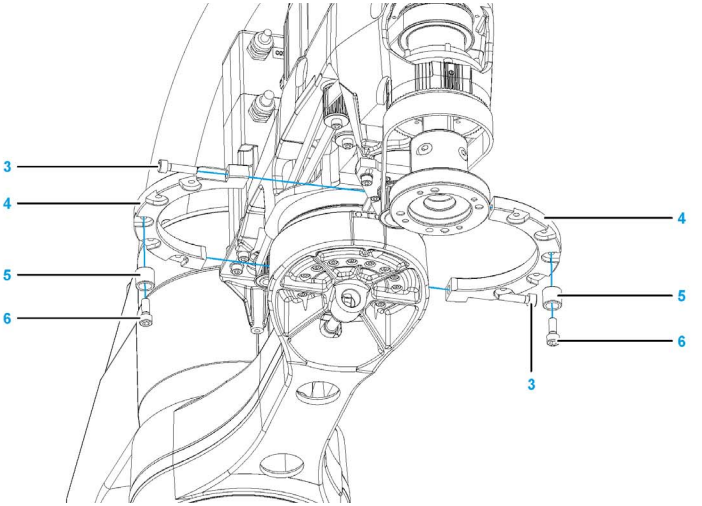
UNINTENDED EQUIPMENT OPERATION

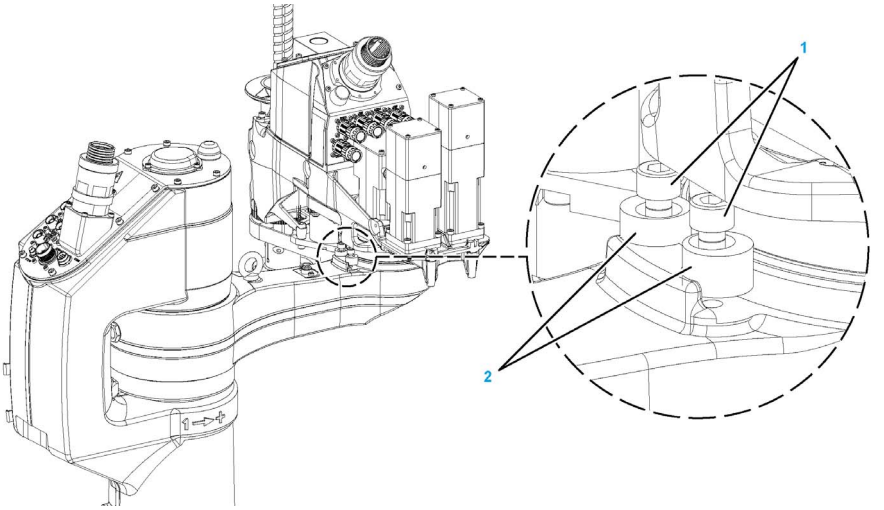
Contact your local Schneider Electric service representative for a robot diagnostic if any ring damage or slippage is noted (or in the event of doubt following an impact or a suspected impact).

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

Replacing the Mechanical Limit Stop on Axis 2

Replacing the Mechanical Limit Stop on Axis 2

Step	Action
1	Remove the covers to access the arm 2. For further information, refer to *Removing the Covers (see page 204)*.
2	Remove the screws (6) at the adjustable limit stops (5). 
3	Remove the adjustable limit stops from the clamping ring.
4	Remove the screws (3) at the clamping ring.

Step	Action
5	Remove the screws (1) at the polyurethane limit stops (2) 
6	Remount the mechanical limit stop *(see page 168)* using appropriate new parts.

The system performance levels can only be realized when the equipment is assembled correctly with clean, degreased parts. Any failure to comply with the instructions can lead to incorrect operation of the range limiting system, with potential risks for people and equipment.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Verify that the equipment is assembled as directed.
- Be sure that the parts and the equipment on which they are mounted are clean and free of grease or other foreign substance.
- Verify that all mounting screws and bolts are tightened according to the required torque values.
- Verify that the software range limits are valid.

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

NOTE: After changing a software range limit, verify by testing the axis at low speed so that it is able to move through the planned angular range and stops where and when required.

⚠ CAUTION
UNINTENDED EQUIPMENT OPERATION Contact your local Schneider Electric service representative for a robot diagnostic if any ring damage or slippage is noted (or in the event of doubt following an impact or a suspected impact). **Failure to follow these instructions can result in injury or equipment damage.**

Section 6.3
Lubrication

What Is in This Section?

This section contains the following topics:

Information About Lubrication

Overview

Due to the continuous consumption of lubricant during operation, the robot must be lubricated at regular intervals. For further information, refer to *Maintenance Plan* *(see page 201)*.

NOTE: On delivery, the robot is prelubricated and ready for use.

NOTICE
INOPERABLE AXIS Only use the specified type and amount of lubricant. **Failure to follow these instructions can result in equipment damage.**

Precautions for Using Lubricants

During assembly in the factory, the robot is filled up with lubricants that are free of substances harmful to health. However, in some cases, repeated and prolonged exposure to the product can cause skin irritation, or sickness if ingested.

⚠ CAUTION
EYE OR SKIN CONTACT WITH, OR INGESTION OF, LUBRICANTS ● In the event of contact with the eyes or the skin, wash the affected areas with plenty of water; if irritation persists, consult a doctor. ● In the event of swallowing, do not provoke vomiting or administer any products orally; consult a doctor as soon as possible. **Failure to follow these instructions can result in injury or equipment damage.**

Lubricants

The type and quantity of lubricant and the required frequency for each lubrication sequence are set out in the following table.

Type of lubricants and approximate quantity:

Item	Standard oil	H1 option	Quantity
Axis 1	CASTROL OPTIGEAR RO 150	ROBOLUB 100-H1	280 ml
Axis 2	ROBOLUB 68-S	ROBOLUB 100-H1	57 ml
Ball screw grease	KLÜBER TOPAS NB 52	KLÜBERSYNTH NH1 94-402	–

Item	Standard oil	H1 option	Quantity
Harness grease	MOBIL MOBILITH SHC PM 460	MOBIL MOBILITH SHC PM 460	–
Belts	LUPROTEC PTFE PROFLON	LUPROTEC PTFE PROFLON	–

NOTE: Use original equipment for a correct operation of the robot.

Changing the Oil of Axis 1

Overview

Tools required:
- 5 mm (0.197 in) hex key
- 10 mm (0.30 in) socket
- Torque wrench
- Oil *(see page 227)*

Tools suggested:
- Syringe and tube

⚠⚠ DANGER

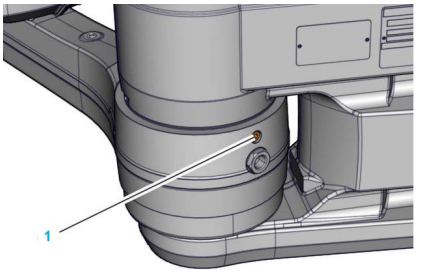
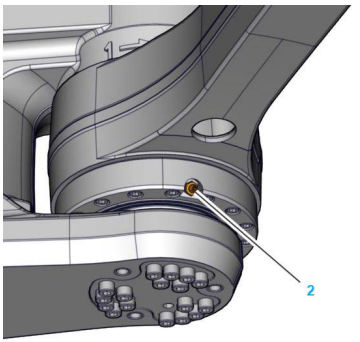
HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

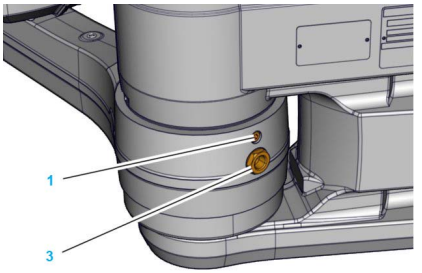
- Disconnect all power from all equipment including connected devices prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires.
- Place a "Do Not Turn On" or equivalent hazard label on all power switches and lock them in the non-energized position.
- Wait 15 minutes to allow the residual energy of the DC bus capacitors to discharge.
- Measure the voltage on the DC bus with a properly rated voltage sensing device and verify that the voltage is less than 42.4 Vdc.
- Do not assume that the DC bus is voltage-free when the DC bus LED is off.
- Block the motor shaft to prevent rotation prior to performing any type of work on the drive system.
- Do not create a short-circuit across the DC bus terminals or the DC bus capacitors.
- 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.

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

Initial position:
- Remove the ring holding the mechanical limit stops on axis 1 (if installed).

Changing the Oil of Axis 1

Step	Action
1	Remove the plug (1). 
2	Partially unscrew the drain screw (2). 
3	Suck out the used oil.

Step	Action
4	Inject the new oil until the oil level reaches the middle of the sight glass (3). 
5	Tighten the drain screw (2) to a torque level of 6 Nm (53 lbf-in).
6	Screw the plug (1) back in and tighten to a torque of 5 Nm (44 lbf-in).

Changing the Oil of Axis 2

Overview

Tools required:
- 5 mm (0.197 in) hex key
- 10 mm (0.39 in) socket
- 7 mm (0.276 in) open wrench
- Torque wrench
- Oil *(see page 227)*

Tools suggested:
- Syringe and tube

⚠ ⚠ DANGER

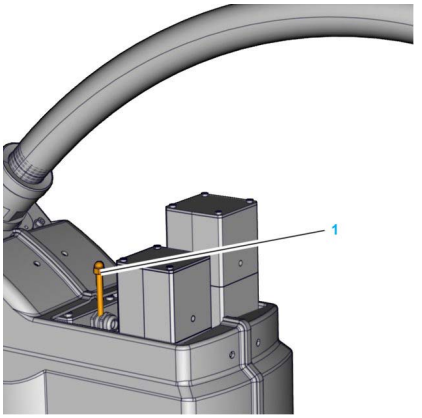
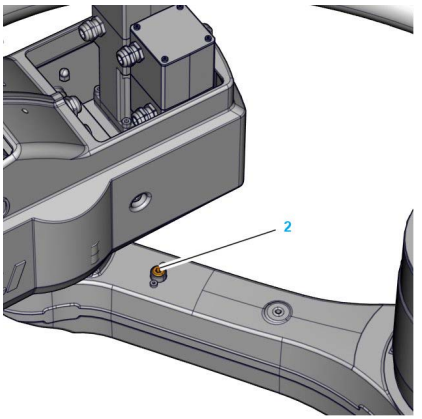
HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

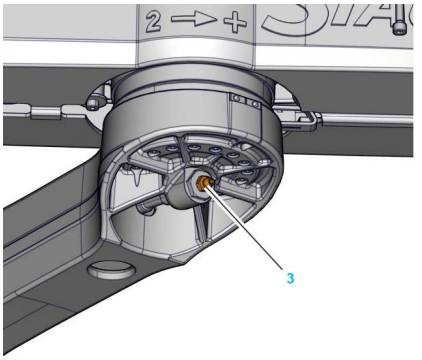
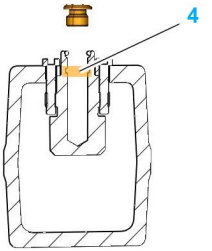
- Disconnect all power from all equipment including connected devices prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires.
- Place a "Do Not Turn On" or equivalent hazard label on all power switches and lock them in the non-energized position.
- Wait 15 minutes to allow the residual energy of the DC bus capacitors to discharge.
- Measure the voltage on the DC bus with a properly rated voltage sensing device and verify that the voltage is less than 42.4 Vdc.
- Do not assume that the DC bus is voltage-free when the DC bus LED is off.
- Block the motor shaft to prevent rotation prior to performing any type of work on the drive system.
- Do not create a short-circuit across the DC bus terminals or the DC bus capacitors.
- 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.

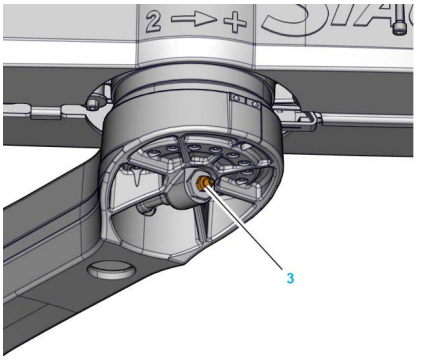
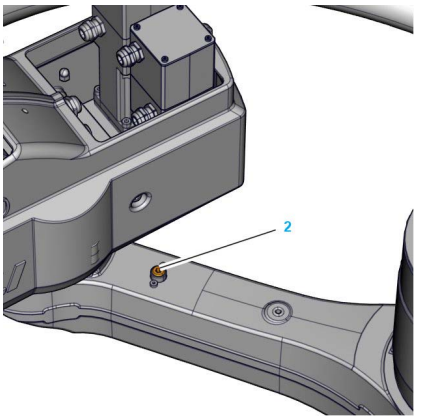
Failure to follow these instructions will result in death or serious injury.

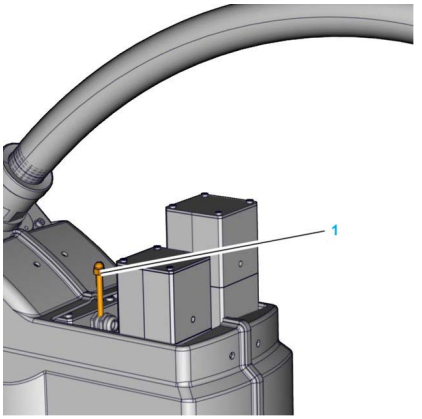
Initial position:
- Remove the ring holding the mechanical limit stops on axis 1 (if installed).

Changing the Oil of Axis 2

Step	Action
1	Loosen the breather (1). 
2	Remove the plug (2). 

Step	Action
3	Partially unscrew the drain screw (3). 
4	Suck out the used oil.
5	Inject new oil until the oil level reaches the middle of the groove (4). 

Step	Action
6	Tighten the drain screw (3) to a torque level of 6 Nm (53 Nm). 
7	Screw the plug (2) back in and tighten to a torque of 5 Nm (44 lbf-in). 

Step	Action
8	Tighten the breather (1). 
9	Verify the oil level of axis 2 again after a few rotations of the gearbox. For further information, refer to *Verifying the Oil Level of Axis 2 (see page 210)*.

Lubricating the Ball Screw

Overview

Tools required:

- Soft cloth
- Grease *(see page 227)*

⚠⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Disconnect all power from all equipment including connected devices prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires.
- Place a "Do Not Turn On" or equivalent hazard label on all power switches and lock them in the non-energized position.
- Wait 15 minutes to allow the residual energy of the DC bus capacitors to discharge.
- Measure the voltage on the DC bus with a properly rated voltage sensing device and verify that the voltage is less than 42.4 Vdc.
- Do not assume that the DC bus is voltage-free when the DC bus LED is off.
- Block the motor shaft to prevent rotation prior to performing any type of work on the drive system.
- Do not create a short-circuit across the DC bus terminals or the DC bus capacitors.
- 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.

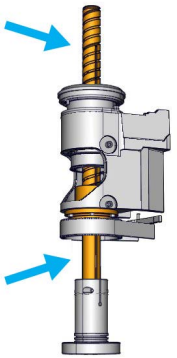
Failure to follow these instructions will result in death or serious injury.

Initial position:

- Bellows partially removed (if installed)

Lubricating the Ball Screw

Step	Action
1	Clean the ball screw with a soft cloth.

Step	Action
2	Apply the grease on the upper and lower parts with a soft cloth. 
3	Move the ball screw up and down several times to spread out the grease.

Chapter 7
Replacement Equipment and Accessories

What Is in This Chapter?

This chapter contains the following topics:

Replacement Equipment Inventory

Overview

Keeping a stock of important components helps ensure the availability of your machine. 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 logistic type plate *(see page 42)*:

Parameter	Example value	Position on type plate
Item name	STS40	Type
Item reference (type code)	LXMSTS40F200000	Last line
Machine type	F17/5CPXA1/A/01	Machine

Replacement Equipment Stock

When using the Lexium S robot in a production environment, consider keeping the following replacement equipment packages in stock:

Item reference	Item name	Quantity*		
		STS40	STS60	STS80
LXMSTSYYYYY001	Motor axis 1	(1)**	(1)**	(1)**
LXMSTSYYYYY002	Motor axis 2	(1)**	(1)**	(1)**
LXMSTSYYYYY003	Motor axis 3	(1)**	(1)**	(1)**
LXMSTSYYYYY004	Motor axis 4	(1)**	0	0
LXMSTSYYYYY005		0	(1)**	(1)**
LXMSTSYYYYY006	Gearbox axis 1	1	0	0
LXMSTSYYYYY007		0	1	1
LXMSTSYYYYY008	Gearbox axis 2	1	0	0
LXMSTSYYYYY009		0	1	1
LXMSTSYYYYY010	Gearbox axis 4	1	0	0
LXMSTSYYYYY011		0	1	1
LXMSTSYYYYY012	Toothed belt set	1	0	0
LXMSTSYYYYY013		0	1	0
LXMSTSYYYYY014		0	0	1

* When using more than one robot, increase the amount accordingly.
** Only if there are increased requirements on the availability of the machine.
*** Only for robots with optional lubrication with H1 oil and grease. To see which option your robot has, refer to the type code *(see page 40)*.
**** Only for robots with optional mechanical limit stop.

Item reference	Item name	Quantity*		
		STS40	STS60	STS80
LXMSTSYYYYY015	Oil and grease	1	1	1
LXMSTSYYYYY016		1***	1***	1***
LXMSTSYYYYY021	Pinion axis 3 quill	(1)**	(1)**	(1)**
LXMSTSYYYYY022	Pinion axis 4 quill	(1)**	0	0
LXMSTSYYYYY023		0	(1)**	(1)**
LXMSTSYYYYY038	Bumper axis 1	1****	1****	1****
LXMSTSYYYYY039	Bumper axis 2	1****		1****

***** When using more than one robot, increase the amount accordingly.
****** Only if there are increased requirements on the availability of the machine.
******* Only for robots with optional lubrication with H1 oil and grease. To see which option your robot has, refer to the type code *(see page 40)*.
******** Only for robots with optional mechanical limit stop.

Replacement Equipment of the Lexium S Robots

Replacement Equipment

Item description and content	Representation	Item reference	To be used for
Motor for axis 1: ● 1x motor		LXMSTSYYYYYY001	STS40/60/80
Motor for axis 2: ● 1x motor		LXMSTSYYYYYY002	STS40/60/80
Motor for axis 3: ● 1x motor		LXMSTSYYYYYY003	STS40/60/80
(1) The wildcards in the item reference represent the length of the cable in dm. State the cable length according to the following available lengths: 5 m (16.4 ft), 10 m (33 ft), 15 m (49 ft), 20 m (66 ft), 25 m (82 ft), 30 m (98 ft).			

Item description and content	Representation	Item reference	To be used for
Motor for axis 4: ● 1x motor		LXMSTSYYYYYY004	STS40
		LXMSTSYYYYYY005	STS60/80
Gearbox set for axis 1: ● 1x gearbox for axis 1 (STS40 or STS60/80) ● 2x shaft seal ring ● 1x O-ring axis 1 STS (bulky) ● 1x O-ring axis 1 STS (fine) ● 1x O-ring axis 1 STS ● 16x washer ● 16x screw M6 x 65 ● 1x O-ring motor axis 1 STS ● 18x screw M8 x 60		LXMSTSYYYYYY006	STS40
		LXMSTSYYYYYY007	STS60/80

(1) The wildcards in the item reference represent the length of the cable in dm. State the cable length according to the following available lengths: 5 m (16.4 ft), 10 m (33 ft), 15 m (49 ft), 20 m (66 ft), 25 m (82 ft), 30 m (98 ft).

Item description and content	Representation	Item reference	To be used for
Gearbox set for axis 2		LXMSTSYYYYYY008	STS40
		LXMSTSYYYYYY009	STS60/80
Intermediate gearbox axis 4		LXMSTSYYYYYY010	STS40
Gearbox axis 4		LXMSTSYYYYYY011	STS60/80
Toothed belt set: ● 1x toothed belt axis 4 STS40 ● 1x toothed belt axis 3 STS40 ● 1x deflection pulley ● 3x bearing sleeve ● 1x belt tightener ● 2x washer ● 3x screw M5 x 40 ● 1x deflection pulley STS40		LXMSTSYYYYYY012	STS40
(1) The wildcards in the item reference represent the length of the cable in dm. State the cable length according to the following available lengths: 5 m (16.4 ft), 10 m (33 ft), 15 m (49 ft), 20 m (66 ft), 25 m (82 ft), 30 m (98 ft).			

Item description and content	Representation	Item reference	To be used for
Toothed belt set: ● 1x toothed belt axis 4 - short ● 1x toothed belt axis 4 (STS60 or STS80) ● 1x toothed belt axis 3 (STS60 or STS80) ● 2x deflection pulley ● 6x bearing sleeve ● 4x belt tightener ● 6x washer ● 6x screw M5 x 40		LXMSTSYYYYYY013	STS60
		LXMSTSYYYYYY014	STS80
Oil and grease - standard: ● 1x oil CASTROL OPTIGEAR SYNTHETIC RO 150 1L (axis 1) ● 1x oil ROBOLUB 68-S 1L (axis 2) ● 1x grease for ball screw ● 1x spray for toothed belts		LXMSTSYYYYYY015	STS40/60/80
Oil and grease - H1 foodgrade: ● 1x oil H1 for axis 1 and axis 2 ● 1x grease H1 for ball screw, 1 kg (2.2 lb) ● 1x spray for toothed belts		LXMSTSYYYYYY016	STS40/60/80
Ball screw D25/H200		LXMSTSYYYYYY017	STS40/60/80
(1) The wildcards in the item reference represent the length of the cable in dm. State the cable length according to the following available lengths: 5 m (16.4 ft), 10 m (33 ft), 15 m (49 ft), 20 m (66 ft), 25 m (82 ft), 30 m (98 ft).			

Item description and content	Representation	Item reference	To be used for
Ball screw D25/H400		LXMSTSYYYYYY018	STS40/60/80
Bellow set H200/D25 STS robot		LXMSTSYYYYYY019	STS40/60/80
Bellow set H400/D25 STS robot		LXMSTSYYYYYY020	STS40/60/80
Pinion axis 3 quill		LXMSTSYYYYYY021	STS40/60/80
Pinion axis 4 quill		LXMSTSYYYYYY022	STS40
		LXMSTSYYYYYY023	STS60/80
ARMIO board - I/O-module		LXMSTSYYYYYY024	STS40/60/80

(1) The wildcards in the item reference represent the length of the cable in dm. State the cable length according to the following available lengths: 5 m (16.4 ft), 10 m (33 ft), 15 m (49 ft), 20 m (66 ft), 25 m (82 ft), 30 m (98 ft).

Item description and content	Representation	Item reference	To be used for
Tool Connector STS including valves		LXMSTSYYYYYY025	STS40/60/80
User input-/output cable, 200 mm (7.9 mm)		LXMSTSYYYYYY026	STS40
		LXMSTSYYYYYY028	STS60
		LXMSTSYYYYYY030	STS80
User input-/output cable, 400 mm (15.7 mm)		LXMSTSYYYYYY027	STS40
		LXMSTSYYYYYY029	STS60
		LXMSTSYYYYYY031	STS80
(1) The wildcards in the item reference represent the length of the cable in dm. State the cable length according to the following available lengths: 5 m (16.4 ft), 10 m (33 ft), 15 m (49 ft), 20 m (66 ft), 25 m (82 ft), 30 m (98 ft).			

Item description and content	Representation	Item reference	To be used for
Cover (RAL 6018)		LXMSTSYYYYYY032	STS40
		LXMSTSYYYYYY033	STS60
		LXMSTSYYYYYY034	STS80
Cable harness		LXMSTSYYYYYY035	STS40
		LXMSTSYYYYYY036	STS60
		LXMSTSYYYYYY037	STS80
Bumper for mechanical limit stop axis 1		LXMSTSYYYYYY038	STS40/60/80
(1) The wildcards in the item reference represent the length of the cable in dm. State the cable length according to the following available lengths: 5 m (16.4 ft), 10 m (33 ft), 15 m (49 ft), 20 m (66 ft), 25 m (82 ft), 30 m (98 ft).			

Item description and content	Representation	Item reference	To be used for
Bumper for mechanical limit stop axis 2		LXMSTSYYYYYY039	STS40/60/80
Replacement equipment set robot STS40: ● 1x gearbox set axis 1 STS40 (see LXMSTSYYYYYY006) ● 1x gearbox set for axis 2 STS40 ● 1x intermediate gearbox axis 4 STS40 ● 1x toothed belt set STS40 (see LXMSTSYYYYYY012) ● 1x oil and grease - standard (see LXMSTSYYYYYY015)		LXMSTSYYYYYY400	STS40
Replacement equipment set robot STS60: ● 1x gearbox set axis 1 STS60/80 (see LXMSTSYYYYYY007) ● 1x gearbox set for axis 2 STS60/80 ● 1x gearbox axis 4 STS60/80 ● 1x toothed belt set STS60 (see LXMSTSYYYYYY013) ● 1x oil and grease - standard (see LXMSTSYYYYYY015)		LXMSTSYYYYYY600	STS60
Replacement equipment set robot STS80: ● 1x gearbox set axis 1 STS60/80 (see LXMSTSYYYYYY007) ● 1x gearbox set for axis 2 STS60/80 ● 1x intermediate gearbox axis 4 STS60/80 ● 1x toothed belt set STS80 (see LXMSTSYYYYYY014) ● 1x oil and grease - standard (see LXMSTSYYYYYY015)		LXMSTSYYYYYY800	STS80
(1) The wildcards in the item reference represent the length of the cable in dm. State the cable length according to the following available lengths: 5 m (16.4 ft), 10 m (33 ft), 15 m (49 ft), 20 m (66 ft), 25 m (82 ft), 30 m (98 ft).			

Item description and content	Representation	Item reference	To be used for
Replacement equipment set motors: ● 1x motor for axis 1 ● 1x motor for axis 2 ● 1x motor for axis 3 ● 1x motor for axis 4 (STS40 or STS60/80) ● 1x pinion axis 3 quill ● 1x pinion axis 4 quill (STS40 or STS60/80)		LXMSTSYYYYYY100	STS40
		LXMSTSYYYYYY101	STS60/80
Motor cable for axis 1: ● 1x cable		VW3E1143R•••(1)	STS40/60/80
Motor cable for axis 2, 3, and 4: ● 1x cable		FCE319•••A100(1)	STS40/60/80
Encoder cable for axis 1, 2, 3, and 4: ● 1x cable		FCE320•••A100(1)	STS40/60/80
Cable for CAN bus connection X1202 (if ARMIO board is mounted): ● 1x CAN bus cable		VW3E3067R•••(1)	STS40/60/80

(1) The wildcards in the item reference represent the length of the cable in dm. State the cable length according to the following available lengths: 5 m (16.4 ft), 10 m (33 ft), 15 m (49 ft), 20 m (66 ft), 25 m (82 ft), 30 m (98 ft).

Item description and content	Representation	Item reference	To be used for
Cable for input/output connection X1202 (if no ARMIO board is mounted but it is necessary to have digital or analog inputs/outputs at the output flange): ● 1x I/O cable		VW3E4002R•••(1)	STS40/60/80
24 V cable – connection X1210 (for supplying the joint brake and the level of arm 2 (for example, ARMIO board) with 24 V voltage and for connecting the signal of the joint brake): ● 1x 24 V cable		VW3E1169R•••(1)	STS40/60/80

(1) The wildcards in the item reference represent the length of the cable in dm. State the cable length according to the following available lengths: 5 m (16.4 ft), 10 m (33 ft), 15 m (49 ft), 20 m (66 ft), 25 m (82 ft), 30 m (98 ft).

Appendices

What Is in This Appendix?

The appendix contains the following chapters:

Appendix A
Further Information About the Manufacturer

What Is in This Chapter?

This chapter contains the following topics:

Contact Addresses

Overview

The retailer of the robot is Schneider Electric Automation GmbH. In maintenance cases contact the Machine Solution Service of Schneider Electric (see below).

The manufacturer of the robot is Stäubli Faverges SCA.

Schneider Electric Automation GmbH

Schneiderplatz 1

97828 Marktheidenfeld, Germany

Phone: +49 (0) 9391 / 606 - 0

Fax: +49 (0) 9391 / 606 - 4000

Email: info-marktheidenfeld@schneider-electric.com

Internet: *www.schneider-electric.com*

Machine Solution Service

Schneiderplatz 1

97828 Marktheidenfeld, Germany

Phone: +49 (0) 9391 / 606 - 3265

Fax: +49 (0) 9391 / 606 - 3340

Email: automation.support.de@schneider-electric.com

Internet: *www.schneider-electric.com*

Stäubli Faverges SCA

Stäubli Faverges SCA

Place Robert Stäubli

74210 Faverges France

Additional Contact Addresses

See the homepage for additional contact addresses:

www.schneider-electric.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.schneider-electric.com*) for further information and the seminar schedule.

Appendix B
Disposal

Disposal

Information on the Disposal of Schneider Electric Products

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

NOTE: The components consist of different materials, which can be reused 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.

Appendix C
Declaration of Incorporation

Declaration of Incorporation

Overview

The following depicts an example of the Declaration of Incorporation that is delivered with each robot.

Declaration of Incorporation in accordance with Directive 2006/42/EC, annex II B (Machine Directive) and of Conformity

The manufacturer: **STÄUBLI FAVERGES**
Address: Place Robert Stäubli, 74210 FAVERGES, France

We hereafter declare that:

Serial number F1-/------/-/01 F1-/------/-/01

STÄUBLI ROBOT

☒ Is a partly completed machinery designed to be incorporated in a machine or to be assembled with other machines, in accordance with the specifications set out in the documentation, to constitute a machine covered by the "Machines" Directive 2006/42/EC whose essential requirements in annex 1 have deliberately been met within the limits of the contents of the delivery:
Chapter 1.1 except paragraphs 1.1.4, 1.1.7, 1.1.8
Chapter 1.2 except paragraphs 1.2.3, 1.2.4
Chapter 1.3 except paragraphs 1.3.5, 1.3.6, 1.3.7, 1.3.8
Chapter 1.5 except 1.5.12, 1.5.14, 1.5.15, 1.5.16
Chapter 1.6 except 1.6.5
Chapter 1.7 except 1.7.1.1, 1.7.1.2, 1.7.3, 1.7.4.
Deliberate compliance with these essential requirements at the level of the partly completed machinery does not imply that the corresponding requirements at the level of the machine are complied with

☒ Has a technical **file** drawn up in accordance with annex VII B, and that we undertake to forward to the competent authorities on receipt of a duly motivated request to that effect. The person authorized to draw up this **file** is the signatory of the present declaration

☒ Is designed for incorporation in an enclosure that complies with the standards in force for the application and the country concerned, and with the operating conditions as required in the documentation

The following harmonized European standards have been used:
EN ISO 10218-1:2011 - Robots and robotic devices - Safety requirements for industrial robots - Part 1.
EN 60204-1:2006 and EN 60204-1/A1:2009 - Safety of machinery – Electrical Equipment.

The manufacturer also declares that under the responsibility of the end user, this partly completed machinery must only be put into production once **the final** machine in which it is to be incorporated, or of which it forms a part, has been considered and declared as being in conformity with the requirements set out in the "Machines" Directive and in the national legislations transposing it.

DECLARATION D'INCORPORATION ET DE CONFORMITE			
Ce document est la propriété exclusive de STÄUBLI FAVERGES. Il est interdit d'en faire usage ou de le communiquer sans son autorisation écrite.	STÄUBLI FAVERGES	Fait par :L.GARDE	20.01.18
		Contrôlé par :P.PERILLAT	20.01.18
		D 390 498 30	A

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