Lexium P Robot

Hardware Guide

Original instructions

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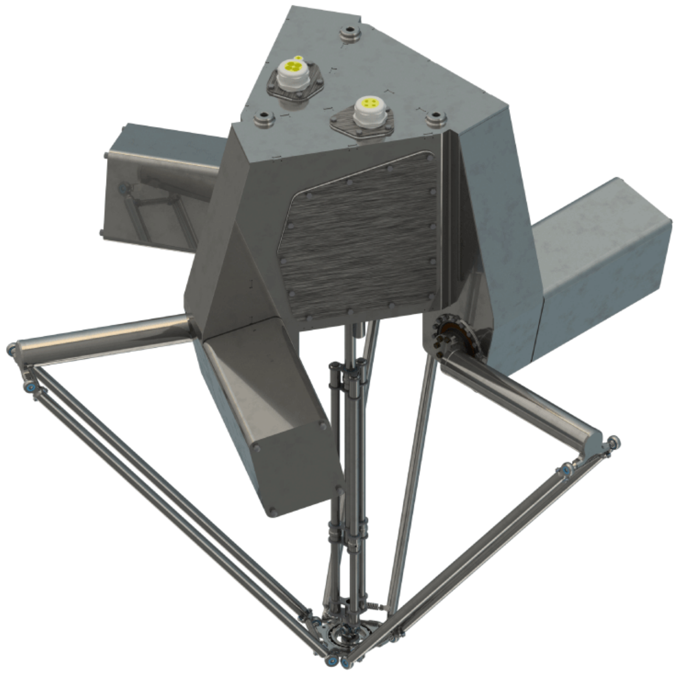

Legal Information

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Safety Information

Important Information

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

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

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

DANGER

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

WARNING

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

CAUTION

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

NOTICE

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

Please Note

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

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

About the Book

Document Scope

This manual is to help you use the capabilities of the 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 EcoStruxureTM Machine Expert V2.2.

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

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

Available Languages of this Document

This document is available in these languages:

- English (EIO0000002173)

Related Documents

Title of Documentation	Reference Number
Lexium P Robot Instruction Sheet	PKR43194
MH3 Servo motor Motor Manual	0198441114042 (EN) 0198441114041 (DE)
SH3 Servo Motor User Guide	0198441113987 (EN)
Lexium 52 Hardware Guide	EIO0000001347 (EN) EIO0000001348 (DE)
Lexium 62 ILD Hardware Guide	EIO0000002443 (EN) EIO0000002444 (DE)
Lexium 62 ILM Hardware Guide	EIO0000001351 (EN) EIO0000001352 (DE)
Lexium 62 Hardware Guide	EIO0000001349 (EN) EIO0000001350 (DE)
SchneiderElectricRobotics Library Guide (only available in the online help)	EIO0000002236 (EN)
RoboticModule Library Guide (only available in the online help)	EIO0000002234 (EN)

Title of Documentation	Reference Number
Cybersecurity Guidelines for EcoStruxure Machine Expert, Modicon and PacDrive Controllers and Associated Equipment, User Guide	EIO0000004242 (EN)
Recommended Cybersecurity Best Practices	CS-Best-Practices-2019-340 (EN)

To find documents online, visit the Schneider Electric download center (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

ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

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

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

WARNING

UNINTENDED EQUIPMENT OPERATION

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

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

⚠ WARNING

LOSS OF CONTROL

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

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

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

Information on Non-Inclusive or Insensitive Terminology

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

Terminology Derived from Standards

The technical terms, terminology, symbols and the corresponding descriptions in 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.

Figures

Unless otherwise stated, the different robot types and variants of the Lexium P robots are represented in the figures by the robot type VRKP4 with standard housing.

Dual Dimensions

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

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

Hazard Information

Proper Use

Overview

This section contains information regarding the operation of the Lexium P robot. Qualified personnel, page 15, working with the robot must read and observe this information.

Installation

The robot is intended to be integrated into a machine or assembled with other components to build up a machine or system. The robot is an open type robot that is intended to be installed into an enclosure to provide access protection.

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*, page 32 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

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.

⚠WARNING
UNINTENDED EQUIPMENT OPERATION
Only use the components in accordance with the installation and operating conditions described in this documentation and other supporting documentation and standards.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

Qualification of Personnel

Target Audience for This Manual

This documentation is intended for users having the following knowledge:

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

Qualified Person

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

Residual Risks

Overview

Risks arising from the robot have been reduced. However a residual risk remains since the robot is moved and operated with electrical voltage and electrical currents.

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

Electrical Parts

DANGER

ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

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

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

Emergency Stop

The robot mechanics, apart from the motor, are not supplied with external brakes nor an emergency stop switch to engage 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 motor holding 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.

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.

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.

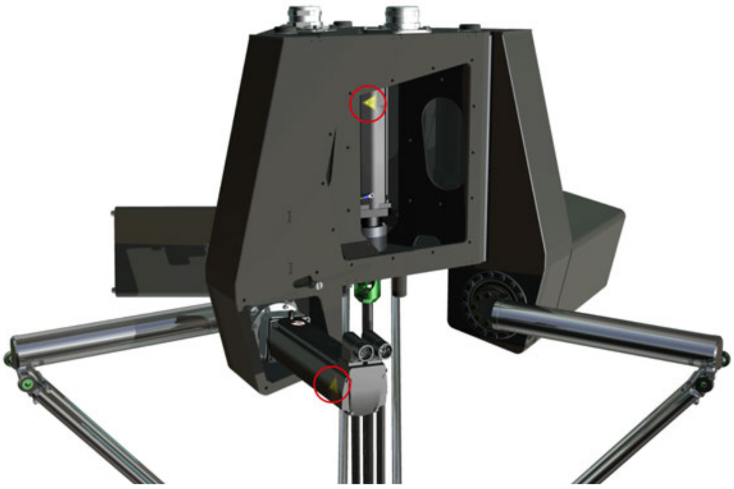
Failure to follow these instructions can result in death, serious injury, or equipment damage.

For detailed information about travel path and power loss, refer to *Run-On Motions of the Robot for Risk Analysis*, page 110.

Hot Surfaces

The metal surfaces of the robot may exceed 70 °C (158 °F) during operation.

The following figure presents the hot surface labels on the robot.



⚠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.

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 lubricant emissions are to be expected over time. However, excessive 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.

NOTE: To prevent any lubricant emissions, see chapter *Gearbox Leakage Protection*, page 171.

Hanging Loads

The robot is capable of suspending heavy loads.

⚠ WARNING

FALLING LOADS

Do not stand under hanging loads.

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 flange. In doing so, ensure that the articulation movement is not restricted and/or that no motion errors can result from the modifications. Attachments and rebuilds must not influence the operation of the protective devices in any way and all EMERGENCY STOP buttons must be accessible and operational at all times.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Do not drill into or modify the articulated arms.
- Do not modify the cable set.
- Do not modify the housing.
- Do not modify the components of movable mechanics.

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

The robot housing is part of the heat dissipation concept of the system. For this reason, the housing must be kept clean and free of any coating or paint.

NOTICE

INOPERABLE EQUIPMENT

- Keep the housing clean.
- Do not apply coating or painting to the housing nor anything that would affect the heat dissipation properties of the housing surface.

Failure to follow these instructions can result in equipment damage.

Options for Moving the Robot Without Drive Energy

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

NOTE: Take appropriate 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 the equipment is with power, perform the following steps:

Step	Action
1	Switch the robot into a torque-free state.
2	Manually hold the robot in position.
3	Release the motor brakes. **NOTE:** The function for releasing 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	Engage the brakes.

If you have to move the upper arms manually, proceed as follows:

Step	Action
1	Pull the lower arms off the ball pins.
2	In case, the lower arms cannot be pulled off the ball pins, grip in the middle of the lower arms and apply pressure to bend the lower arms to release the ball pins.

If an object is blocked by the upper arm of the robot and the equipment is without power, proceed as follows:

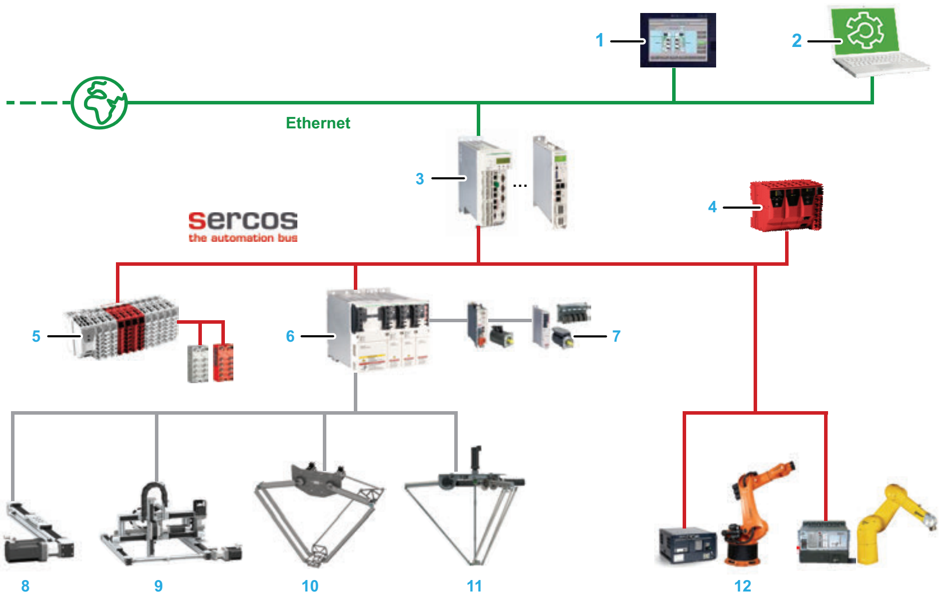
Step	Action
1	Pull the lower arm off the ball pins.
2	Perform one of the following actions: • Manually move the upper arm against the closed brake. **NOTE:** This requires a high degree of force. • Remove the bolts on the upper arm and remove the upper arm.

System Overview

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)

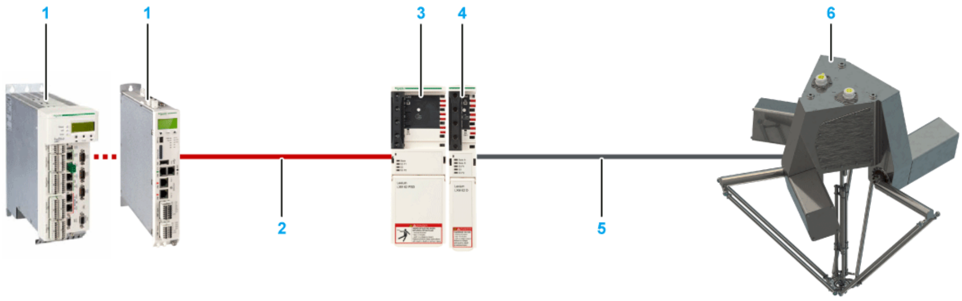
12 Articulated Robots

NOTE: To help keep your Schneider Electric products secure and protected, refer to the *Cybersecurity Best Practices* and *Cybersecurity Guidelines* provided on the Schneider Electric website. See Related Documents, page 8.

Product Overview

System Setup

The following figure presents an example of a system setup for one Lexium P robot with SH3 motors. At a minimum, this is the equipment required to achieve performances described in this guide.



Number	Device name	Quantity	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 controller and cabinet.
3	Power supply	1	LXM62PD84A11000	Lexium 62 Power Supply(1)
4	Double drive	2	Double drive: LXM62DD15•21000(2)	Lexium 62 Drive Module
	Single drive	3 or 4(3)	Single drive: LXM62DD15•21000(2)	Lexium 62 Drive Module(1)
5	Motor cable for connection of drive and motor	3 or 4(3)	VW3E1143R•••	PacDrive 3 motor cable; the cable length depends on the distance between cabinet and robot.
	Feedback cable for connection of drive and motor	3 or 4(3)	VW3E2094R•••	
6	Lexium P robot with SH3 motors	1	(4)	

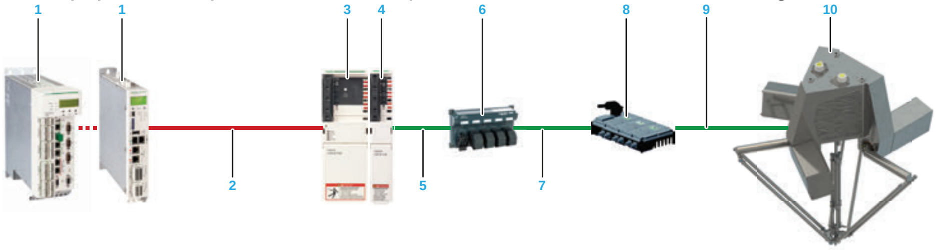
(1) Alternatively, use the Lexium LXM52, Stand-Alone Servo Drive. Quantity: 3 or 4. Device type: LXM52DD18C.

(2) The specific variant of the drive depends on the safety requirements.

(3) The quantity depends on whether the robot has a rotational axis or not.

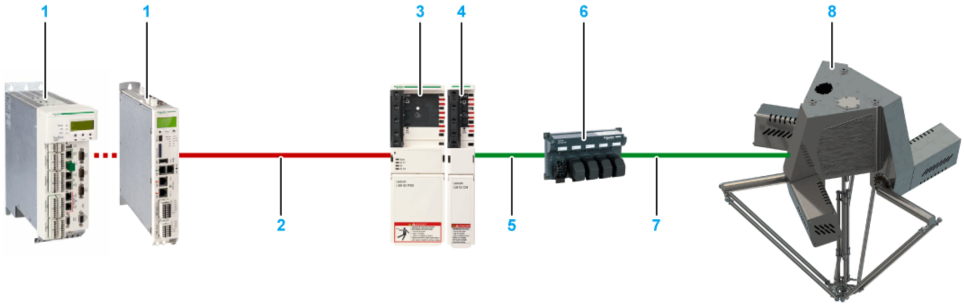
(4) The device type depends on the robot reference and its characteristics. For further information, refer to *Type Code*, page 28.

The following figure presents an example of a system setup for one Lexium P robot with SH3 motors and Lexium 62 ILD Detached Drive. At a minimum, this is the equipment required to achieve performances described in this guide.



Number	Device name	Quantity	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 controller and cabinet.
3	Power supply	1	LXM62PD84A11000	Lexium 62 Power Supply
4	Connection module	1	ILM62CMD20A000	Lexium 62 Connection Module
5	Cable for connection of connection module and distribution box	1	VW3E1•••R•••	Hybrid cable; the cable length depends on the distance between the cabinet and the robot. Various connectors are available.
6	Distribution box	1	ILM62DB4A000	Lexium 62 Distribution Box; already included in the housing of Lexium P robots VRKP4•••WD / VRKP4•••NO (not included in other Lexium P robots).
7	Cable for connection of distribution box and Lexium 62 ILD Detached Drive	3 or 4(1)	VW3E1•••R•••	Hybrid cable; the cable length depends on the distance between the distribution box and the Lexium 62 ILD Detached Drive. Various connectors are available.
8	Lexium 62 ILD Detached Drive	1	Triple Drive: ILM62DDD24D1000 Additionally for robots with a rotational axis: Single Drive: ILM62DDD24C1000	Lexium 62 ILD Detached Drive
9	Motor cable for connection of Lexium 62 ILD Detached Drive and motor	3 or 4(1)	FCE310•••A200	Motor cable and feedback cable; the cable length depends on the distance between the Lexium 62 ILD Detached Drive and the robot
	Feedback cable for connection of Lexium 62 ILD Detached Drive and motor	3 or 4(1)	FCE311•••A200	
10	Lexium P robot with SH3 motors	1	(2)	
(1) The quantity depends on whether the robot has a rotational axis or not. (2) The device type depends on the robot reference and its characteristics. For further information refer to *Type Code*, page 28.				

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

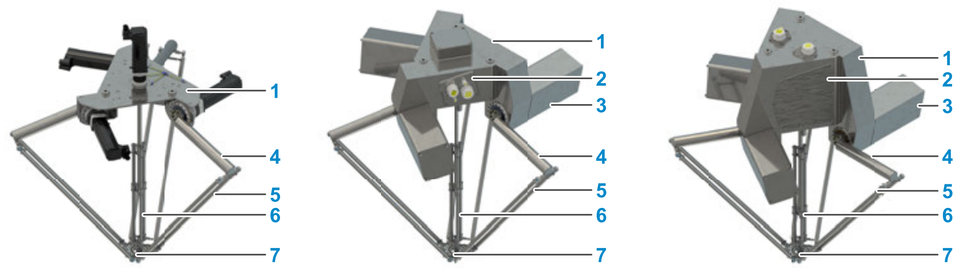


Number	Device name	Quantity	Device type	Comment
1	Controller	1	LMC•00C…LMC•01C	Logic Motion Controller
2	Sercos cable	3	VW3E5001R	Sercos cable; the cable length depends on the distance between controller and cabinet.
3	Power supply	1	LXM62PD84A11000	Lexium 62 Power Supply
4	Connection module	1	ILM62CMD20A000	Lexium 62 Connection Module
5	Cable for connection of connection module and distribution box	1	VW3E1•••R•••	Hybrid cable; the cable length depends on the distance between the cabinet and the robot. Various connectors are available.
6	Distribution box	1	ILM62DB4A000	Lexium 62 Distribution Box; already included in the housing of Lexium P robots VRKP4•••WD / VRKP4•••NO (not included in other Lexium P robots).
7	Cable for connection of distribution box and motor	3 or 4(1)	VW3E1•••R•••	Hybrid cable; the cable length depends on the distance between the cabinet and the robot. Various connectors are available.
8	Lexium P robot with ILM motors	1	(2)	

(1) The quantity depends on whether the robot has a rotational axis or not.

(2) The device type depends on the robot reference and its characteristics. For further information refer to *Type Code*, page 28.

Components Overview



1 Main body / housing

2 Media cover / maintenance cover

3 Motor cover (covering motor and gearbox)

4 Upper arm

5 Lower arm

6 Telescopic axis

7 Parallel plate

Characteristics of the Lexium P Robot

The robot provides the following features:

- Stainless steel Delta 3 robot equipped by an automation platform
- Few references covering large performance
- Applicable in cleanrooms as well as in harsh environments
- Preassembled and ready to connect
- No calibration at customer site and automatic recalibration without tools
- Fast replacement of replacement equipment
- Available with or without a rotational axis (telescopic axis, ball bearing at the parallel plate, additional motor and gearbox)

Type Code

Example of a type code for the Lexium P robot:

Character	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Example	V	R	K	P	4	S	0	R	N	O	0	0	0	0	0

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

Character	Exam-ple	Item	Meaning
1…3	VRK	Robot kinematics	–
4…5	P4	Robot/product type	P0 = 3-4 axis Delta 400 mm (15.8 in) P1 = 3-4 axis Delta 600 mm (23.6 in) P2 = 3-4 axis Delta 800 mm (31.5 in) P4 = 3-4 axis Delta 1200 mm (47 in) P5 = 3-4 axis Delta 1400 mm (55 in) P6 = 3-4 axis Delta 1600 mm (63 in) PX = parts for Lexium P robots. For example: replacement equipment.
6…7	S0	Subtype	S0 = SH3 motor (P0, P1, P2, P4, P5, P6)(1) I0 = iSH motors (P2, P4)(2) L0 = ILM motors (P2, P4, P5, P6) WM = without motors (P2, P4, P5, P6) YY = replacement equipment set
8	R	Option	R = rotational axis installed F = fixed, no rotational axis installed C = customized version Y = replacement equipment (replacement equipment for customized editions = C) M = module installed
9…10	NO	Variant	WD = standard housing, washdown (P2, P4) NF = flat housing, not washdown (P4) NO = standard housing, not washdown (P4) WF = flat housing, washdown (P0, P1, P2, P4, P5, P6) NC = normal, Compact (P0, P1, P2, P4, P5, P6) 01 = customized version 01 YY = replacement equipment
11…12	00	Revision	00 = S00 (P0, P1, P2, P4, P5, P6) 02 = S02 (flat P0, P1, P2, P4, P5, P6)
13	0	Working space	0 = without options E = extended working space (P0, P1, P6) • = replacement equipment

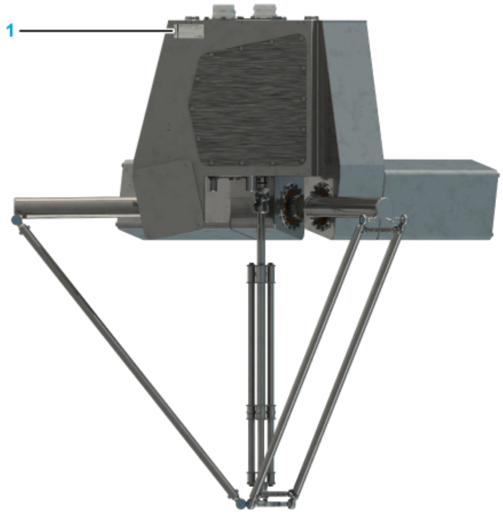
Character	Exam-ple	Item	Meaning
14…15	00	Miscellaneous	00 = without options 45 = motorized module (Rotational Module B) •• = replacement equipment
(1) The rotational axis of VRKP0 / VRKP1 / VRKP4•••WF / VRKP5•••WF / VRKP6•••WF is equipped with a MH3 motor. For further information, refer to *Mechanical and Electrical Data*, page 33. (2) This subtype is obsolete. Replacement equipment is available for this subtype, page 290.			

If you have questions concerning the type code, contact your local Schneider Electric service representative.

Type Plate

Position of the Type Plate

Representation for VRKP••••WD / VRKP••••NO / VRKP••••WF

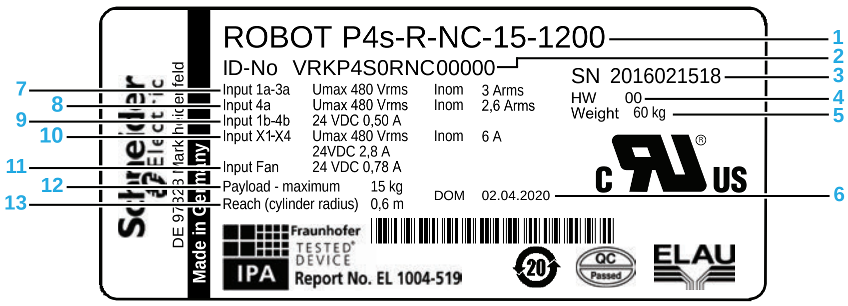


1 Type plate

Representation for VRKP••••NC

1 Type plate

Description of the Type Plate



1	Device name
2	Type code*
3	Serial number
4	Hardware code
5	Weight of the robot
6	Date of manufacture
7	Voltage and current of the main axis SH3-motors

8	Voltage and current of the rotational axis SH3-motor
9	Voltage and current of the SH3-motor brakes
10	Voltage and current of all ILM-motors and brakes
11	Voltage and current of the fans
12	Maximum Load
13	Radius of the working space

* For detailed information about the meaning of the particular digits, refer to *Type Code*, page 28.

Technical Data

Ambient Conditions

Ambient Conditions

Procedure	Parameter	Unit	Value
Operation[1]	**Classes 3K3**, **3Z12**, **3Z2**, **3B2**, **3C1**, **3M7** (according to IEC/EN 60721-3-3)		
	Ambient temperature	°C (°F)	+5…+40 (+41…+104)[2]
	Condensation	–	prohibited
	Formation of ice	–	prohibited
	Relative humidity	%	5…85
Transport	**Set of class combinations IE21** (according to IEC/EN 60721-3-2)[3]		
	Ambient temperature	°C (°F)	-20…+70 (-4…+158)
	Condensation	–	prohibited
	Precipitation	–	prohibited
	Formation of ice	–	prohibited
	Other liquid	–	prohibited
	Wetness	–	prohibited
	Relative humidity	%	< 75
Long-term storage in transport packaging	**Class 1K3** (according to IEC/EN 60721-3-1)[4]		
	Ambient temperature	°C (°F)	0…+40 °C (+32…+104 °F)
	Condensation	–	prohibited
	Precipitation	–	prohibited
	Formation of ice	–	prohibited
	Other liquid	–	prohibited
	Relative humidity	%	5…95
	Maximum storage period	years	2

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

(2) Power reduction for Lexium P Compact versions with ILM motors at ambient temperatures exceeding +25 °C (+77 °F). Power reduction depends on the application. If some severities of parameters deviate from the specified ambient conditions, contact your local Schneider Electric service representative for more information.

(3) All parameters conform to the specified class except for the ambient temperature and the relative humidity which is limited by other components of the system.

(4) All parameters conform to the specified class except for the ambient temperature which is limited by other components of the system.

For further information about storage conditions, refer to *Transport and Storage*, page 119.

Mechanical and Electrical Data of Lexium P Robots

Robot VRKP0•••WF

Mechanical and Electrical Data of VRKP0•••WF

Category	Parameter	Unit	VRKP0S0FWF VRKP0S0RWF
General data	Rated load	kg (lb)	1.5 (3.3)
	Maximum load(1)	kg (lb)	10 (22)
	Maximum velocity	m/s (ft/s)	6 (20)
	Maximum acceleration(2) for 1 kg (2.2 lb)	m/s² (ft/s²)	125 (410)
	Maximum acceleration(2) for 1.5 kg (3.3 lb)	m/s² (ft/s²)	120 (394)
	Maximum acceleration(2) for > 1.5 kg (3.3 lb)	m/s² (ft/s²)	(1)
	Number of axes	–	3 (fixed option) / 4 (rotational axis installed)
	Position repeatability (ISO 9283)	mm (in)	Position: 0.05 (0.0020)
		–	Angle: +/-0.3° (3)
	Maximum torque of the rotational axis(4)	Nm (lbf-in)	4.5 (40)(5)
Electrical data	Mains voltage - 3-phase	Vac	480(6)
	Control voltage (with brake)	Vdc	+24 (-10…+6%)
	Fan voltage	Vdc	+24 (-10…+6%)
	Motor main axes	–	SH30553P02F2000
	Motor rotational axis	–	MH30701P02F2200
	Power consumption for a typical pick & place cycle with 1.5 kg (3.3 lb)	kW (hp)	0.22 (0.295)
Mechanical data	Installation type	–	Ceiling installation
	Protection class for moving parts	–	IP69k
	Basic protection class	–	IP65
	Housing type	–	Compact
Working space	Height x diameter	mm (in)	100 x 400 (3.9 x 15.7) 120 x 300 (4.7 x 11.8)
	Rotation	–	Unlimited
Weight	–	kg (lb)	approximately 60 (132)
Noise level	–	dB(A)	< 70

Category	Parameter	Unit	VRKP0S0FWF VRKP0S0RWF
Material	External casing	–	Stainless steel 1.4301 aluminum, POM-C, FPM, TPE, PE, PEEK

(1) Loads above the maximum load are possible with restrictions. If required, contact your local Schneider Electric service representative.

(2) For a load mounted centrally underneath the flange and a distance of maximum 100 mm (3.9 in) between flange and mass center of gravity.

(3) +/-0.1° is possible with optional equipment. For further information, refer to *Rotational Module*, page 184, *Tilting Module*, page 194, *Double Rotational Module*, page 202 and *Rotational Tilting Module*, page 216.

(4) When designing the gripper, be aware of any appearance of mass moments of inertia as well as friction, which could lead to exceeding the maximum torque and consequential damage.

(5) Maximum torque of the rotational axis with the optional Telescopic Axis Double is 3 Nm (31 lbf-in). For further information, refer to *Mounting the Telescopic Axis Double*, page 182.

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

Robot VRKP0•••NC

Mechanical and Electrical Data of VRKP0•••NC

Category	Parameter	Unit	VRKP0S0FNC VRKP0S0RNC
General data	Rated load	kg (lb)	1.5 (3.3)
	Maximum load(1)	kg (lb)	10 (22)
	Maximum velocity	m/s (ft/s)	6 (20)
	Maximum acceleration(2) for 1 kg (2.2 lb)	m/s^2 (ft/s^2)	125 (410)
	Maximum acceleration(2) for 1.5 kg (3.3 lb)	m/s^2 (ft/s^2)	120 (394)
	Maximum acceleration(2) for > 1.5 kg (3.3 lb)	m/s^2 (ft/s^2)	(1)
	Number of axes	–	3 (fixed option) / 4 (rotational axis installed)
	Position repeatability (ISO 9283)	mm (in)	Position: 0.05 (0.0020)
		–	Angle: +/-0.3° (3)
	Maximum torque of the rotational axis(4)	Nm (lbf-in)	4.5 (40)(5)
Electrical data	Mains voltage - 3-phase	Vac	480(6)
	Control voltage (with brake)	Vdc	+24 (-10…+6%)
	Motor main axes	–	SH30553P02F2000
	Motor rotational axis	–	MH30701P02F2200
	Power consumption for a typical pick & place cycle with 1.5 kg (3.3 lb)	kW (hp)	0.22 (0.295)
Mechanical data	Installation type	–	Ceiling installation
	Protection class for moving parts	–	IP69k
	Basic protection class	–	IP65
	Housing type	–	Compact
Working space	Height x diameter	mm (in)	100 x 400 (3.9 x 15.7) 120 x 300 (4.7 x 11.8)
	Rotation	–	Unlimited
Weight	–	kg (lb)	approximately 27.6 (60.85)
Noise level	–	dB(A)	< 70

Category	Parameter	Unit	VRKP0S0FNC VRKP0S0RNC
Material	External casing	–	Stainless steel 1.4301 aluminum, POM-C, FPM, TPE, PE, PEEK

(1) Loads above the maximum load are possible with restrictions. If required, contact your local Schneider Electric service representative.

(2) For a load mounted centrally underneath the flange and a distance of maximum 100 mm (3.9 in) between flange and mass center of gravity.

(3) +/-0.1° is possible with optional equipment. For further information, refer to *Rotational Module*, page 184, *Tilting Module*, page 194, *Double Rotational Module*, page 202 and *Rotational Tilting Module*, page 216.

(4) When designing the gripper, be aware of any appearance of mass moments of inertia as well as friction, which could lead to exceeding the maximum torque and consequential damage.

(5) Maximum torque of the rotational axis with the optional Telescopic Axis Double is 3 Nm (31 lbf-in). For further information, refer to *Mounting the Telescopic Axis Double*, page 182.

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

Robot VRKP0•••WF••E00

Mechanical and Electrical Data of VRKP0•••WF••E00

Category	Parameter	Unit	VRKP0S0FWF••E00 VRKP0S0RWF••E00
General data	Rated load	kg (lb)	1.5 (3.3)
	Maximum load(1)	kg (lb)	10 (22)
	Maximum velocity	m/s (ft/s)	6 (20)
	Maximum acceleration(2) for 1 kg (2.2 lb)	m/s^2 (ft/s^2)	125 (410)
	Maximum acceleration(2) for 1.5 kg (3.3 lb)	m/s^2 (ft/s^2)	120 (394)
	Maximum acceleration(2) for > 1.5 kg (3.3 lb)	m/s^2 (ft/s^2)	(1)
	Number of axes	–	3 (fixed option) / 4 (rotational axis installed)
	Position repeatability (ISO 9283)	mm (in)	Position: 0.05 (0.0020)
		–	Angle: +/-0.3° (3)
	Maximum torque of the rotational axis(4)	Nm (lbf-in)	4.5 (40)(5)
Electrical data	Mains voltage - 3-phase	Vac	480(6)
	Control voltage (with brake)	Vdc	+24 (-10…+6%)
	Fan voltage	Vdc	+24 (-10…+6%)
	Motor main axes	–	SH30553P02F2000
	Motor rotational axis	–	MH30701P02F2200
	Power consumption for a typical pick & place cycle with 1.5 kg (3.3 lb)	kW (hp)	0.22 (0.295)
Mechanical data	Installation type	–	Ceiling installation
	Protection class for moving parts	–	IP69k
	Basic protection class	–	IP65
	Housing type	–	Compact
Working space	Height x diameter	mm (in)	160 x 400 (6.3 x 15.7) 180 x 292 (7.1 x 11.5)
	Rotation	–	Unlimited
Weight	–	kg (lb)	approximately 60.2 (133)
Noise level	–	dB(A)	< 70

Category	Parameter	Unit	VRKP0S0FWF••E00 VRKP0S0RWF••E00
Material	External casing	–	Stainless steel 1.4301 aluminum, POM-C, FPM, TPE, PE, PEEK

(1) Loads above the maximum load are possible with restrictions. If required, contact your local Schneider Electric service representative.

(2) For a load mounted centrally underneath the flange and a distance of maximum 100 mm (3.9 in) between flange and mass center of gravity.

(3) +/-0.1° is possible with optional equipment. For further information, refer to *Rotational Module*, page 184, *Tilting Module*, page 194, *Double Rotational Module*, page 202 and *Rotational Tilting Module*, page 216.

(4) When designing the gripper, be aware of any appearance of mass moments of inertia as well as friction, which could lead to exceeding the maximum torque and consequential damage.

(5) Maximum torque of the rotational axis with the optional Telescopic Axis Double is 3 Nm (31 lbf-in). For further information, refer to *Mounting the Telescopic Axis Double*, page 182.

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

Robot VRKP0•••NC••E00

Mechanical and Electrical Data of VRKP0•••NC••E00

Category	Parameter	Unit	VRKP0S0FNC00E00 VRKP0S0RNC00E00
General data	Rated load	kg (lb)	1.5 (3.3)
	Maximum load[(1)]	kg (lb)	10 (22)
	Maximum velocity	m/s (ft/s)	6 (20)
	Maximum acceleration[(2)] for 1 kg (2.2 lb)	m/s^2 (ft/s^2)	125 (410)
	Maximum acceleration[(2)] for 1.5 kg (3.3 lb)	m/s^2 (ft/s^2)	120 (394)
	Maximum acceleration[(2)] for > 1.5 kg (3.3 lb)	m/s^2 (ft/s^2)	[(1)]
	Number of axes	–	3 (fixed option) / 4 (rotational axis installed)
	Position repeatability (ISO 9283)	mm (in)	Position: 0.05 (0.0020)
		–	Angle: +/-0.3° [(3)]
	Maximum torque of the rotational axis[(4)]	Nm (lbf-in)	4.5 (40)[(5)]
Electrical data	Mains voltage - 3-phase	Vac	480[(6)]
	Control voltage (with brake)	Vdc	+24 (-10…+6%)
	Motor main axes	–	SH30553P02F2000
	Motor rotational axis	–	MH30701P02F2200
	Power consumption for a typical pick & place cycle with 1.5 kg (3.3 lb)	kW (hp)	0.22 (0.295)
Mechanical data	Installation type	–	Ceiling installation
	Protection class for moving parts	–	IP69k
	Basic protection class	–	IP65
	Housing type	–	Compact
Working space	Height x diameter	mm (in)	160 x 400 (6.3 x 15.7) 180 x 292 (7.1 x 11.5)
	Rotation	–	Unlimited
Weight	–	kg (lb)	approximately 27.8 (61.29)
Noise level	–	dB(A)	< 70

Category	Parameter	Unit	**VRKP0S0FNC00E00** **VRKP0S0RNC00E00**
Material	External casing	–	Stainless steel 1.4301 aluminum, POM-C, FPM, TPE, PE, PEEK
(1) Loads above the maximum load are possible with restrictions. If required, contact your local Schneider Electric service representative. (2) For a load mounted centrally underneath the flange and a distance of maximum 100 mm (3.9 in) between flange and mass center of gravity. (3) +/-0.1° is possible with optional equipment. For further information, refer to *Rotational Module*, page 184, *Tilting Module*, page 194, *Double Rotational Module*, page 202 and *Rotational Tilting Module*, page 216. (4) When designing the gripper, be aware of any appearance of mass moments of inertia as well as friction, which could lead to exceeding the maximum torque and consequential damage. (5) Maximum torque of the rotational axis with the optional Telescopic Axis Double is 3 Nm (31 lbf-in). For further information, refer to *Mounting the Telescopic Axis Double*, page 182. (6) For further information, refer to *Lexium 52 Hardware Guide* or *Lexium 62 Hardware Guide*.			

Robot VRKP1•••WF

Mechanical and Electrical Data of VRKP1•••WF

Category	Parameter	Unit	VRKP1S0FWF VRKP1S0RWF
General data	Rated load	kg (lb)	1.5 (3.3)
	Maximum load(1)	kg (lb)	10 (22)
	Maximum velocity	m/s (ft/s)	6 (20)
	Maximum acceleration(2) for 1 kg (2.2 lb)	m/s^2 (ft/s^2)	125 (410)
	Maximum acceleration(2) for 1.5 kg (3.3 lb)	m/s^2 (ft/s^2)	120 (394)
	Maximum acceleration(2) for > 1.5 kg (3.3 lb)	m/s^2 (ft/s^2)	(1)
	Number of axes	–	3 (fixed option) / 4 (rotational axis installed)
	Position repeatability (ISO 9283)	mm (in)	Position: 0.05 (0.0020)
		–	Angle: +/-0.3° (3)
	Maximum torque of the rotational axis(4)	Nm (lbf-in)	4.5 (40)(5)
Electrical data	Mains voltage - 3-phase	Vac	480(6)
	Control voltage (with brake)	Vdc	+24 (-10…+6%)
	Fan voltage	Vdc	+24 (-10…+6%)
	Motor main axes	–	SH30553P02F2000
	Motor rotational axis	–	MH30701P02F2200
	Power consumption for a typical pick & place cycle with 1.5 kg (3.3 lb)	kW (hp)	0.22 (0.295)
Mechanical data	Installation type	–	Ceiling installation
	Protection class for moving parts	–	IP69k
	Basic protection class	–	IP65
	Housing type	–	Compact
Working space	Height x diameter	mm (in)	125 x 600 (4.9 x 23.6) 160 x 462 (6.3 x 18.2)
	Rotation	–	Unlimited
Weight	–	kg (lb)	approximately 60.4 (133)
Noise level	–	dB(A)	< 70

Category	Parameter	Unit	VRKP1S0FWF VRKP1S0RWF
Material	External casing	–	Stainless steel 1.4301 aluminum, POM-C, FPM, TPE, PE, PEEK

(1) Loads above the maximum load are possible with restrictions. If required, contact your local Schneider Electric service representative.

(2) For a load mounted centrally underneath the flange and a distance of maximum 100 mm (3.9 in) between flange and mass center of gravity.

(3) +/-0.1° is possible with optional equipment. For further information, refer to *Rotational Module*, page 184, *Tilting Module*, page 194, *Double Rotational Module*, page 202 and *Rotational Tilting Module*, page 216.

(4) When designing the gripper, be aware of any appearance of mass moments of inertia as well as friction, which could lead to exceeding the maximum torque and consequential damage.

(5) Maximum torque of the rotational axis with the optional Telescopic Axis Double is 3 Nm (31 lbf-in). For further information, refer to *Mounting the Telescopic Axis Double*, page 182.

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

Robot VRKP1•••NC

Mechanical and Electrical Data of VRKP1•••NC

Category	Parameter	Unit	VRKP1S0FNC VRKP1S0RNC
General data	Rated load	kg (lb)	1.5 (3.3)
	Maximum load(1)	kg (lb)	10 (22)
	Maximum velocity	m/s (ft/s)	6 (20)
	Maximum acceleration(2) for 1 kg (2.2 lb)	m/s^2 (ft/s^2)	125 (410)
	Maximum acceleration(2) for 1.5 kg (3.3 lb)	m/s^2 (ft/s^2)	120 (394)
	Maximum acceleration(2) for > 1.5 kg (3.3 lb)	m/s^2 (ft/s^2)	(1)
	Number of axes	–	3 (fixed option) / 4 (rotational axis installed)
	Position repeatability (ISO 9283)	mm (in)	Position: 0.05 (0.0020)
		–	Angle: +/-0.3° (3)
	Maximum torque of the rotational axis(4)	Nm (lbf-in)	4.5 (40)(5)
Electrical data	Mains voltage - 3-phase	Vac	480(6)
	Control voltage (with brake)	Vdc	+24 (-10…+6%)
	Motor main axes	–	SH30553P02F2000
	Motor rotational axis	–	MH30701P02F2200
	Power consumption for a typical pick & place cycle with 1.5 kg (3.3 lb)	kW (hp)	0.22 (0.295)
Mechanical data	Installation type	–	Ceiling installation
	Protection class for moving parts	–	IP69k
	Basic protection class	–	IP65
	Housing type	–	Compact
Working space	Height x diameter	mm (in)	125 x 600 (4.9 x 23.6) 160 x 462 (6.3 x 18.2)
	Rotation	–	Unlimited
Weight	–	kg (lb)	approximately 27.9 (61.51)
Noise level	–	dB(A)	< 70

Category	Parameter	Unit	VRKP1S0FNC VRKP1S0RNC
Material	External casing	–	Stainless steel 1.4301 aluminum, POM-C, FPM, TPE, PE, PEEK

(1) Loads above the maximum load are possible with restrictions. If required, contact your local Schneider Electric service representative.

(2) For a load mounted centrally underneath the flange and a distance of maximum 100 mm (3.9 in) between flange and mass center of gravity.

(3) +/-0.1° is possible with optional equipment. For further information, refer to *Rotational Module*, page 184, *Tilting Module*, page 194, *Double Rotational Module*, page 202 and *Rotational Tilting Module*, page 216.

(4) When designing the gripper, be aware of any appearance of mass moments of inertia as well as friction, which could lead to exceeding the maximum torque and consequential damage.

(5) Maximum torque of the rotational axis with the optional Telescopic Axis Double is 3 Nm (31 lbf-in). For further information, refer to *Mounting the Telescopic Axis Double*, page 182.

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

Robot VRKP1•••WF••E00

Mechanical and Electrical Data of VRKP1•••WF••E00

Category	Parameter	Unit	VRKP1S0FWF••E00 VRKP1S0RWF••E00
General data	Rated load	kg (lb)	1.5 (3.3)
	Maximum load(1)	kg (lb)	10 (22)
	Maximum velocity	m/s (ft/s)	6 (20)
	Maximum acceleration(2) for 1 kg (2.2 lb)	m/s^2 (ft/s^2)	125 (410)
	Maximum acceleration(2) for 1.5 kg (3.3 lb)	m/s^2 (ft/s^2)	120 (394)
	Maximum acceleration(2) for > 1.5 kg (3.3 lb)	m/s^2 (ft/s^2)	(1)
	Number of axes	–	3 (fixed option) / 4 (rotational axis installed)
	Position repeatability (ISO 9283)	mm (in)	Position: 0.05 (0.0020)
		–	Angle: +/-0.3° (3)
	Maximum torque of the rotational axis(4)	Nm (lbf-in)	4.5 (40)(5)
Electrical data	Mains voltage - 3-phase	Vac	480(6)
	Control voltage (with brake)	Vdc	+24 (-10…+6%)
	Fan voltage	Vdc	+24 (-10…+6%)
	Motor main axes	–	SH30553P02F2000
	Motor rotational axis	–	MH30701P02F2200
	Power consumption for a typical pick & place cycle with 1.5 kg (3.3 lb)	kW (hp)	0.22 (0.295)
Mechanical data	Installation type	–	Ceiling installation
	Protection class for moving parts	–	IP69k
	Basic protection class	–	IP65
	Housing type	–	Compact
Working space	Height x diameter	mm (in)	190 x 600 (7.5 x 23.6) 220 x 472 (8.7 x 18.6)
	Rotation	–	Unlimited
Weight	–	kg (lb)	approximately 60.8 (134)
Noise level	–	dB(A)	< 70

Category	Parameter	Unit	VRKP1S0FWF••E00 VRKP1S0RWF••E00
Material	External casing	–	Stainless steel 1.4301 aluminum, POM-C, FPM, TPE, PE, PEEK

(1) Loads above the maximum load are possible with restrictions. If required, contact your local Schneider Electric service representative.

(2) For a load mounted centrally underneath the flange and a distance of maximum 100 mm (3.9 in) between flange and mass center of gravity.

(3) +/-0.1° is possible with optional equipment. For further information, refer to *Rotational Module*, page 184, *Tilting Module*, page 194, *Double Rotational Module*, page 202 and *Rotational Tilting Module*, page 216.

(4) When designing the gripper, be aware of any appearance of mass moments of inertia as well as friction, which could lead to exceeding the maximum torque and consequential damage.

(5) Maximum torque of the rotational axis with the optional Telescopic Axis Double is 3 Nm (31 lbf-in). For further information, refer to *Mounting the Telescopic Axis Double*, page 182.

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

Robot VRKP1•••NC••E00

Mechanical and Electrical Data of VRKP1•••NC••E00

Category	Parameter	Unit	VRKP1S0FNC00E00 VRKP1S0RNC00E00
General data	Rated load	kg (lb)	1.5 (3.3)
	Maximum load(1)	kg (lb)	10 (22)
	Maximum velocity	m/s (ft/s)	6 (20)
	Maximum acceleration(2) for 1 kg (2.2 lb)	m/s^2 (ft/s^2)	125 (410)
	Maximum acceleration(2) for 1.5 kg (3.3 lb)	m/s^2 (ft/s^2)	120 (394)
	Maximum acceleration(2) for > 1.5 kg (3.3 lb)	m/s^2 (ft/s^2)	(1)
	Number of axes	–	3 (fixed option) / 4 (rotational axis installed)
	Position repeatability (ISO 9283)	mm (in)	Position: 0.05 (0.0020)
		–	Angle: +/-0.3° (3)
	Maximum torque of the rotational axis(4)	Nm (lbf-in)	4.5 (40)(5)
Electrical data	Mains voltage - 3-phase	Vac	480(6)
	Control voltage (with brake)	Vdc	+24 (-10…+6%)
	Motor main axes	–	SH30553P02F2000
	Motor rotational axis	–	MH30701P02F2200
	Power consumption for a typical pick & place cycle with 1.5 kg (3.3 lb)	kW (hp)	0.22 (0.295)
Mechanical data	Installation type	–	Ceiling installation
	Protection class for moving parts	–	IP69k
	Basic protection class	–	IP65
	Housing type	–	Compact
Working space	Height x diameter	mm (in)	190 x 600 (7.5 x 23.6) 220 x 472 (8.7 x 18.6)
	Rotation	–	Unlimited
Weight	–	kg (lb)	approximately 28.3 (62)
Noise level	–	dB(A)	< 70

Category	Parameter	Unit	VRKP1S0FNC00E00 VRKP1S0RNC00E00
Material	External casing	–	Stainless steel 1.4301 aluminum, POM-C, FPM, TPE, PE, PEEK

(1) Loads above the maximum load are possible with restrictions. If required, contact your local Schneider Electric service representative.

(2) For a load mounted centrally underneath the flange and a distance of maximum 100 mm (3.9 in) between flange and mass center of gravity.

(3) +/-0.1° is possible with optional equipment. For further information, refer to *Rotational Module*, page 184, *Tilting Module*, page 194, *Double Rotational Module*, page 202 and *Rotational Tilting Module*, page 216.

(4) When designing the gripper, be aware of any appearance of mass moments of inertia as well as friction, which could lead to exceeding the maximum torque and consequential damage.

(5) Maximum torque of the rotational axis with the optional Telescopic Axis Double is 3 Nm (31 lbf-in). For further information, refer to *Mounting the Telescopic Axis Double*, page 182.

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

Robot VRKP2•••WD

Mechanical and Electrical Data of VRKP2•••WD

Category	Parameter	Unit	VRKP2S0FWD VRKP2S0RWD
General data	Rated load	kg (lb)	1.5 (3.3)
	Maximum load(1)	kg (lb)	15 (33)
	Maximum velocity	m/s (ft/s)	10 (33)
	Maximum acceleration(2) for 1 kg (2.2 lb)	m/s^2 (ft/s^2)	120 (394)
	Maximum acceleration(2) for 1.5 kg (3.3 lb)	m/s^2 (ft/s^2)	90 (295)
	Maximum acceleration(2) for > 1.5 kg (3.3 lb)	m/s^2 (ft/s^2)	(1)
	Number of axes	–	3 (fixed option) / 4 (rotational axis installed)
	Position repeatability (ISO 9283)	mm (in)	Position: 0.1 (0.0039)
		–	Angle: +/-0.3° (3)
	Maximum torque of the rotational axis(4)	Nm (lbf-in)	4.5 (40)(5)
Electrical data	Mains voltage - 3-phase	Vac	480(6)
	Control voltage (with brake)	Vdc	+24 (-10…+6%)
	Fan voltage	Vdc	+24 (-10…+6%)
	Motor main axes	–	SH30703P02F2000
	Motor rotational axis	–	SH30702P02F2000
	Power consumption for a typical pick & place cycle with 1.5 kg (3.3 lb)	kW (hp)	0.35 (0.47)
Mechanical data	Installation type	–	Ceiling installation
	Protection class for moving parts	–	IP69k
	Basic protection class	–	IP65
	Maximum permissible overpressure in the robot housing	bar (psi)	0.1 (1.45)
	Housing type	–	Wash-down standard
Working space	Height x diameter	mm (in)	155 x 800 (6.1 x 31.5) 230 x 500 (9 x 19.7)
	Rotation	–	Unlimited
Weight	–	kg (lb)	approximately 110 (243)
Noise level	–	dB(A)	< 70

Category	Parameter	Unit	VRKP2S0FWD VRKP2S0RWD
Material	External casing	–	Stainless steel 1.4301, POM-C, PTFE, FPM, EPDM, PVDF, TPE, PE, PEEK

(1) Loads above the maximum load are possible with restrictions. If required, contact your local Schneider Electric service representative.

(2) For a load mounted centrally underneath the flange and a distance of maximum 100 mm (3.9 in) between flange and mass center of gravity.

(3) +/-0.1° is possible with optional equipment. For further information, refer to *Rotational Module*, page 184, *Tilting Module*, page 194, *Double Rotational Module*, page 202 and *Rotational Tilting Module*, page 216.

(4) When designing the gripper, be aware of any appearance of mass moments of inertia as well as friction, which could lead to exceeding the maximum torque and consequential damage.

(5) Maximum torque of the rotational axis with the optional Telescopic Axis Double is 3 Nm (31 lbf-in). For further information, refer to *Mounting the Telescopic Axis Double*, page 182.

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

Robot VRKP2•••WF

Mechanical and Electrical Data of VRKP2•••WF

Category	Parameter	Unit	VRKP2S0FWF VRKP2S0RWF
General data	Rated load	kg (lb)	1.5 (3.3)
	Maximum load(1)	kg (lb)	15 (33)
	Maximum velocity	m/s (ft/s)	10 (33)
	Maximum acceleration(2) for 1 kg (2.2 lb)	m/s^2 (ft/s^2)	120 (394)
	Maximum acceleration(2) for 1.5 kg (3.3 lb)	m/s^2 (ft/s^2)	90 (295)
	Maximum acceleration(2) for > 1.5 kg (3.3 lb)	m/s^2 (ft/s^2)	(1)
	Number of axes	–	3 (fixed option) / 4 (rotational axis installed)
	Position repeatability (ISO 9283)	mm (in)	Position: 0.1 (0.0039)
		–	Angle: +/-0.3° (3)
	Maximum torque of the rotational axis(4)	Nm (lbf-in)	4.5 (40)(5)
Electrical data	Mains voltage - 3-phase	Vac	480(6)
	Control voltage (with brake)	Vdc	+24 (-10…+6%)
	Fan voltage	Vdc	+24 (-10…+6%)
	Motor main axes	–	SH30703P02F2000
	Motor rotational axis	–	MH30701P02F2200
	Power consumption for a typical pick & place cycle with 1.5 kg (3.3 lb)	kW (hp)	0.35 (0.47)
Mechanical data	Installation type	–	Ceiling installation
	Protection class for moving parts	–	IP69k
	Basic protection class	–	IP65
	Maximum permissible overpressure in the robot housing	bar (psi)	0.1 (1.45)
	Housing type	–	Wash-down flat
Working space	Height x diameter	mm (in)	155 x 800 (6.1 x 31.5) 230 x 500 (9 x 19.7)
	Rotation	–	Unlimited
Weight	–	kg (lb)	approximately 90 (199)
Noise level	–	dB(A)	< 70

Category	Parameter	Unit	VRKP2S0FWF VRKP2S0RWF
Material	External casing	–	Stainless steel 1.4301, POM-C, PTFE, FPM, EPDM, PVDF, TPE, PE, PEEK

(1) Loads above the maximum load are possible with restrictions. If required, contact your local Schneider Electric service representative.

(2) For a load mounted centrally underneath the flange and a distance of maximum 100 mm (3.9 in) between flange and mass center of gravity.

(3) +/-0.1° is possible with optional equipment. For further information, refer to *Rotational Module*, page 184, *Tilting Module*, page 194, *Double Rotational Module*, page 202 and *Rotational Tilting Module*, page 216.

(4) When designing the gripper, be aware of any appearance of mass moments of inertia as well as friction, which could lead to exceeding the maximum torque and consequential damage.

(5) Maximum torque of the rotational axis with the optional Telescopic Axis Double is 3 Nm (31 lbf-in). For further information, refer to *Mounting the Telescopic Axis Double*, page 182.

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

Robot VRKP2•••NC

Mechanical and Electrical Data of VRKP2•••NC

Category	Parameter	Unit	VRKP2S0FNC VRKP2S0RNC	VRKP2L0FNC VRKP2L0RNC
General data	Rated load	kg (lb)	1.5 (3.3)	
	Maximum load[(1)]	kg (lb)	15 (33)	
	Maximum velocity	m/s (ft/s)	10 (33)	
	Maximum acceleration[(2)] for 1 kg (2.2 lb)	m/s^2 (ft/s^2)	120 (394)	
	Maximum acceleration[(2)] for 1.5 kg (3.3 lb)	m/s^2 (ft/s^2)	90 (295)	
	Maximum acceleration[(2)] for > 1.5 kg (3.3 lb)	m/s^2 (ft/s^2)	[(1)]	
	Number of axes	–	3 (fixed option) / 4 (rotational axis installed)	
	Position repeatability (ISO 9283)	mm (in)	Position: 0.1 (0.0039)	
		–	Angle: +/-0.3° [(3)]	
	Maximum torque of the rotational axis[(4)]	Nm (lbf-in)	4.5 (40)[(5)]	
Electrical data	Mains voltage - 3-phase	Vac	480[(6)]	
	Control voltage (with brake)	Vdc	+24 (-10…+6%)	+24 (-20…+25%)
	Motor main axes	–	SH30703P02F2000	ILM0703P02F0000
	Motor rotational axis	–	SH30702P02F2000	ILM0702P02F0000
	Power consumption for a typical pick & place cycle with 1.5 kg (3.3 lb)	kW (hp)	0.35 (0.47)	
Mechanical data	Installation type	–	Ceiling installation	
	Protection class for moving parts	–	IP69k	
	Basic protection class	–	IP65	
	Housing type	–	Compact	
Working space	Height x diameter	mm (in)	155 x 800 (6.1 x 31.5) 230 x 500 (9 x 19.7)	
	Rotation	–	Unlimited	
Weight	–	kg (lb)	approximately 70 (154)	
Noise level	–	dB(A)	< 70	

Category	Parameter	Unit	VRKP2S0FNC VRKP2S0RNC	VRKP2L0FNC VRKP2L0RNC
Material	External casing	–	Stainless steel 1.4301, aluminum, POM-C, FPM, TPE, PE, PEEK	

(1) Loads above the maximum load are possible with restrictions. If required, contact your local Schneider Electric service representative.

(2) For a load mounted centrally underneath the flange and a distance of maximum 100 mm (3.9 in) between flange and mass center of gravity.

(3) +/-0.1° is possible with optional equipment. For further information, refer to *Rotational Module*, page 184, *Tilting Module*, page 194, *Double Rotational Module*, page 202 and *Rotational Tilting Module*, page 216.

(4) When designing the gripper, be aware of any appearance of mass moments of inertia as well as friction, which could lead to exceeding the maximum torque and consequential damage.

(5) Maximum torque of the rotational axis with the optional Telescopic Axis Double is 3 Nm (31 lbf-in). For further information, refer to *Mounting the Telescopic Axis Double*, page 182.

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

Robot VRKP4•••WD / VRKP4•••NO

Mechanical and Electrical Data of VRKP4•••WD / VRKP4•••NO

Category	**Parameter**	**Unit**	**VRKP4S0FWD** **VRKP4S0RWD**	**VRKP4L0FNO** **VRKP4L0RNO**
General data	Rated load	kg (lb)	1.5 (3.3)	
	Maximum load(1)	kg (lb)	15 (33)	
	Maximum velocity	m/s (ft/s)	10 (33)	
	Maximum acceleration(2) for 1 kg (2.2 lb)	m/s² (ft/s²)	100 (328)	
	Maximum acceleration(2) for 1.5 kg (3.3 lb)	m/s² (ft/s²)	75 (246)	
	Maximum acceleration(2) for > 1.5 kg (3.3 lb)	m/s² (ft/s²)	(1)	
	Number of axes	–	3 (fixed option) / 4 (rotational axis installed)	
	Position repeatability (ISO 9283)	mm (in)	Position: 0.1 (0.0039)	
		–	Angle: +/-0.3° (3)	
	Maximum torque of the rotational axis(4)	Nm (lbf-in)	4.5 (40)(5)	
Electrical data	Mains voltage - 3-phase	Vac	480(6)	
	Control voltage (with brake)	Vdc	+24 (-10…+6%)	+24 (-20…+25%)
	Fan voltage	Vdc	–	+24 (-10…+6%)
	Motor main axes	–	SH30703P02F2000	ILM0703P02F0000
	Motor rotational axis	–	SH30702P02F2000	ILM0702P02F0000
	Power consumption for a typical pick & place cycle with 1.5 kg (3.3 lb)	kW (hp)	0.35 (0.47)	
Mechanical data	Installation type	–	Ceiling installation	
	Protection class for moving parts	–	IP69k	
	Basic protection class	–	IP65	IP22
	Maximum permissible overpressure in the robot housing	bar (psi)	0.1 (1.45)	
	Housing type	–	Wash-down standard	Open standard
Working space	Height x diameter	mm (in)	225 x 1200 (8.9 x 47) 350 x 750 (13.8 x 29.5)	
	Rotation	–	Unlimited	
Weight	–	kg (lb)	approximately 120 (265)	
Noise level	–	dB(A)	< 70	

Category	**Parameter**	**Unit**	**VRKP4S0FWD** **VRKP4S0RWD**	**VRKP4L0FNO** **VRKP4L0RNO**
Material	External casing	–	Stainless steel 1.4301, POM-C, PTFE, FPM, EPDM, PVDF, TPE, PE, PEEK	

(1) Loads above the maximum load are possible with restrictions. If required, contact your local Schneider Electric service representative.

(2) For a load mounted centrally underneath the flange and a distance of maximum 100 mm (3.9 in) between flange and mass center of gravity.

(3) +/-0.1° is possible with optional equipment. For further information, refer to *Rotational Module*, page 184, *Tilting Module*, page 194, *Double Rotational Module*, page 202 and *Rotational Tilting Module*, page 216.

(4) When designing the gripper, be aware of any appearance of mass moments of inertia as well as friction, which could lead to exceeding the maximum torque and consequential damage.

(5) Maximum torque of the rotational axis with the optional Telescopic Axis Double is 3 Nm (31 lbf-in). For further information, refer to *Mounting the Telescopic Axis Double*, page 182.

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

Robot VRKP4•••WF

Mechanical and Electrical Data of VRKP4•••WF

Category	Parameter	Unit	VRKP4S0FWF VRKP4S0RWF
General data	Rated load	kg (lb)	1.5 (3.3)
	Maximum load(1)	kg (lb)	15 (33)
	Maximum velocity	m/s (ft/s)	10 (33)
	Maximum acceleration(2) for 1 kg (2.2 lb)	m/s^2 (ft/s^2)	100 (328)
	Maximum acceleration(2) for 1.5 kg (3.3 lb)	m/s^2 (ft/s^2)	75 (246)
	Maximum acceleration(2) for > 1.5 kg (3.3 lb)	m/s^2 (ft/s^2)	(1)
	Number of axes	–	3 (fixed option) / 4 (rotational axis installed)
	Position repeatability (ISO 9283)	mm (in)	Position: 0.1 (0.0039)
		–	Angle: +/-0.3° (3)
	Maximum torque of the rotational axis(4)	Nm (lbf-in)	4.5 (40)(5)
Electrical data	Mains voltage - 3-phase	Vac	480(6)
	Control voltage (with brake)	Vdc	+24 (-10…+6%)
	Fan voltage	Vdc	+24 (-10…+6%)
	Motor main axes	–	SH30703P02F2000
	Motor rotational axis	–	MH30701P02F2200
	Power consumption for a typical pick & place cycle with 1.5 kg (3.3 lb)	kW (hp)	0.35 (0.47)
Mechanical data	Installation type	–	Ceiling installation
	Protection class for moving parts	–	IP69k
	Basic protection class	–	IP65
	Maximum permissible overpressure in the robot housing	bar (psi)	0.1 (1.45)
	Housing type	–	Wash-down flat
Working space	Height x diameter	mm (in)	225 x 1200 (8.9 x 47) 350 x 750 (13.8 x 29.5)
	Rotation	–	Unlimited
Weight	–	kg (lb)	approximately 100 (220)
Noise level	–	dB(A)	< 70

Category	Parameter	Unit	VRKP4S0FWF VRKP4S0RWF
Material	External casing	–	Stainless steel 1.4301, POM-C, PTFE, FPM, EPDM, PVDF, TPE, PE, PEEK

(1) Loads above the maximum load are possible with restrictions. If required, contact your local Schneider Electric service representative.

(2) For a load mounted centrally underneath the flange and a distance of maximum 100 mm (3.9 in) between flange and mass center of gravity.

(3) +/-0.1° is possible with optional equipment. For further information, refer to *Rotational Module*, page 184, *Tilting Module*, page 194, *Double Rotational Module*, page 202 and *Rotational Tilting Module*, page 216.

(4) When designing the gripper, be aware of any appearance of mass moments of inertia as well as friction, which could lead to exceeding the maximum torque and consequential damage.

(5) Maximum torque of the rotational axis with the optional Telescopic Axis Double is 3 Nm (31 lbf-in). For further information, refer to *Mounting the Telescopic Axis Double*, page 182.

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

Robot VRKP4•••NC

Mechanical and Electrical Data of VRKP4•••NC

Category	Parameter	Unit	VRKP4S0FNC VRKP4S0RNC	VRKP4L0FNC VRKP4L0RNC	VRKP4S0 MNC00045
General data	Rated load	kg (lb)	1.5 (3.3)		
	Maximum load(1)	kg (lb)	15 (33)		12 (29)
	Maximum velocity	m/s (ft/s)	10 (33)		
	Maximum acceleration(2) for 1 kg (2.2 lb)	m/s^2 (ft/s^2)	100 (328)		
	Maximum acceleration(2) for 1.5 kg (3.3 lb)	m/s^2 (ft/s^2)	75 (246)		
	Maximum acceleration(2) for > 1.5 kg (3.3 lb)	m/s^2 (ft/s^2)	(1)		
	Number of axes	–	3 (fixed option) / 4 (rotational axis installed)		4
	Position repeatability (ISO 9283)	mm (in)	Position: 0.1 (0.0039)		
		–	Angle: +/-0.3° (3)		Angle: +/-0.1°
	Maximum torque of the rotational axis(4)	Nm (lbf-in)	4.5 (40)(5)		16
Electrical data	Mains voltage - 3-phase	Vac	480(6)		
	Control voltage (with brake)	Vdc	+24 (-10…+6%)	+24 (-20…+25%)	+24 (-10…+6%)
	Motor main axes	–	SH30703P02 F2000	ILM0703P02 F0000	SH30703P02 F2000
	Motor rotational axis	–	SH30702P02 F2000	ILM0702P02 F0000	SH30402P07 F2000
	Power consumption for a typical pick & place cycle with 1.5 kg (3.3 lb)	kW (hp)	0.35 (0.47)		
Mechanical data	Installation type	–	Ceiling installation		
	Protection class for moving parts	–	IP69k		
	Basic protection class	–	IP65		
	Housing type	–	Compact		
Working space	Height x diameter	mm (in)	225 x 1200 (7.1 x 47) 350 x 750 (13.8 x 29.5)		
	Rotation	–	Unlimited		
Weight	–	kg (lb)	approximately 75 (165)		
Noise level	–	dB(A)	< 70 dB(A)		

Category	Parameter	Unit	VRKP4S0FNC VRKP4S0RNC	VRKP4L0FNC VRKP4L0RNC	VRKP4S0 MNC00045
Material	External casing	–	Stainless steel 1.4301, aluminum, POM-C, FPM, TPE, PE, PEEK		Stainless steel 1.4301, aluminum, steel nickel-plated, zinc nickel-plated, POM-C, FPM, TPE, PE, PEEK, EPDM

(1) Loads above the maximum load are possible with restrictions. If required, contact your local Schneider Electric service representative.

(2) For a load mounted centrally underneath the flange and a distance of maximum 100 mm (3.9 in) between flange and mass center of gravity.

(3) +/-0.1° is possible with optional equipment. For further information, refer to *Rotational Module*, page 184, *Tilting Module*, page 194, *Double Rotational Module*, page 202 and *Rotational Tilting Module*, page 216.

(4) When designing the gripper, be aware of any appearance of mass moments of inertia as well as friction, which could lead to exceeding the maximum torque and consequential damage.

(5) Maximum torque of the rotational axis with the optional Telescopic Axis Double is 3 Nm (31 lbf-in). For further information, refer to *Mounting the Telescopic Axis Double*, page 182.

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

Robot VRKP5•••WF

Mechanical and Electrical Data of VRKP5•••WF

Category	Parameter	Unit	VRKP5S0FWF VRKP5S0RWF
General data	Rated load	kg (lb)	1.5 (3.3)
	Maximum load [1]	kg (lb)	15 (33)
	Maximum velocity	m/s (ft/s)	10 (33)
	Maximum acceleration[2] for 1 kg (2.2 lb)	m/s^2 (ft/s^2)	90 (295)
	Maximum acceleration[2] for 1.5 kg (3.3 lb)	m/s^2 (ft/s^2)	70 (230)
	Maximum acceleration[2] for > 1.5 kg (3.3 lb)	m/s^2 (ft/s^2)	[1]
	Number of axes	–	3 (fixed option) / 4 (rotational axis installed)
	Position repeatability (ISO 9283)	mm (in)	Position: 0.1 (0.0039)
		–	Angle: +/-0.3° [3]
	Maximum torque of the rotational axis[4]	Nm (lbf-in)	4.5 (40)[5]
Electrical data	Mains voltage - 3-phase	Vac	480[6]
	Control voltage (with brake)	Vdc	+24 (-10…+6%)
	Fan voltage	Vdc	+24 (-10…+6%)
	Motor main axes	–	SH30703P02F2000
	Motor rotational axis	–	MH30701P02F2200
	Power consumption for a typical pick & place cycle with 1.5 kg (3.3 lb)	kW (hp)	0.35 (0.47)
Mechanical data	Installation type	–	Ceiling installation
	Protection class for moving parts	–	IP69k
	Basic protection class	–	IP65
	Maximum permissible overpressure in the robot housing	bar (psi)	0.1 (1.45)
	Housing type	–	Wash-down flat
Working space	Height x diameter	mm (in)	225 x 1400 (8.9 x 55) 400 x 800 (15.7 x 31.5)
	Rotation	–	Unlimited
Weight	–	kg (lb)	approximately 115 (254)
Noise level	–	dB(A)	< 70 dB(A)

Category	Parameter	Unit	**VRKP5S0FWF** **VRKP5S0RWF**
Material	External casing	–	Stainless steel 1.4301, aluminum, POM-C, FPM, TPE, PE, PEEK

(1) Loads above the maximum load are possible with restrictions. If required, contact your local Schneider Electric service representative.

(2) For a load mounted centrally underneath the flange and a distance of maximum 100 mm (3.9 in) between flange and mass center of gravity.

(3) +/-0.1° is possible with optional equipment. For further information, refer to *Rotational Module*, page 184, *Tilting Module*, page 194, *Double Rotational Module*, page 202 and *Rotational Tilting Module*, page 216.

(4) When designing the gripper, be aware of any appearance of mass moments of inertia as well as friction, which could lead to exceeding the maximum torque and consequential damage.

(5) Maximum torque of the rotational axis with the optional Telescopic Axis Double is 3 Nm (31 lbf-in). For further information, refer to *Mounting the Telescopic Axis Double*, page 182.

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

Robot VRKP5•••NC

Mechanical and Electrical Data of VRKP5•••NC

Category	Parameter	Unit	VRKP5S0FNC VRKP5S0RNC	VRKP5L0FNC VRKP5L0RNC
General data	Rated load	kg (lb)	1.5 (3.3)	
	Maximum load (1)	kg (lb)	15 (33)	
	Maximum velocity	m/s (ft/s)	10 (33)	
	Maximum acceleration(2) for 1 kg (2.2 lb)	m/s^2 (ft/s^2)	90 (295)	
	Maximum acceleration(2) for 1.5 kg (3.3 lb)	m/s^2 (ft/s^2)	70 (230)	
	Maximum acceleration(2) for > 1.5 kg (3.3 lb)	m/s^2 (ft/s^2)	(1)	
	Number of axes	–	3 (fixed option) / 4 (rotational axis installed)	
	Position repeatability (ISO 9283)	mm (in)	Position: 0.1 (0.0039)	
		–	Angle: +/-0.3° (3)	
	Maximum torque of the rotational axis(4)	Nm (lbf-in)	4.5 (40)(5)	
Electrical data	Mains voltage - 3-phase	Vac	480(6)	
	Control voltage (with brake)	Vdc	+24 (-10…+6%)	+24 (-20…+25%)
	Motor main axes	–	SH30703P02F2000	ILM0703P02F0000
	Motor rotational axis	–	SH30702P02F2000	ILM0702P02F0000
	Power consumption for a typical pick & place cycle with 1.5 kg (3.3 lb)	kW (hp)	0.35 (0.47)	
Mechanical data	Installation type	–	Ceiling installation	
	Protection class for moving parts	–	IP69k	
	Basic protection class	–	IP65	
	Housing type	–	Compact	
Working space	Height x diameter	mm (in)	225 x 1400 (8.9 x 55) 400 x 800 (15.7 x 31.5)	
	Rotation	–	Unlimited	
Weight	–	kg (lb)	approximately 80 (176)	
Noise level	–	dB(A)	< 70 dB(A)	

Category	Parameter	Unit	VRKP5S0FNC VRKP5S0RNC	VRKP5L0FNC VRKP5L0RNC
Material	External casing	–	Stainless steel 1.4301, aluminum, POM-C, FPM, TPE, PE, PEEK	

(1) Loads above the maximum load are possible with restrictions. If required, contact your local Schneider Electric service representative.

(2) For a load mounted centrally underneath the flange and a distance of maximum 100 mm (3.9 in) between flange and mass center of gravity.

(3) +/-0.1° is possible with optional equipment. For further information, refer to *Rotational Module*, page 184, *Tilting Module*, page 194, *Double Rotational Module*, page 202 and *Rotational Tilting Module*, page 216.

(4) When designing the gripper, be aware of any appearance of mass moments of inertia as well as friction, which could lead to exceeding the maximum torque and consequential damage.

(5) Maximum torque of the rotational axis with the optional Telescopic Axis Double is 3 Nm (31 lbf-in). For further information, refer to *Mounting the Telescopic Axis Double*, page 182.

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

Robot VRKP6•••WF

Mechanical and Electrical Data of VRKP6•••WF

Category	Parameter	Unit	VRKP6S0FWF VRKP6S0RWF
General data	Rated load	kg (lb)	1.5 (3.3)
	Maximum load without restrictions	kg (lb)	10 (22)
	Load with restrictions (1)	kg (lb)	10…15 (22…33)
	Maximum velocity	m/s (ft/s)	10 (33)
	Maximum acceleration(2) for 1 kg (2.2 lb)	m/s^2 (ft/s^2)	80 (262)
	Maximum acceleration(2) for 1.5 kg (3.3 lb)	m/s^2 (ft/s^2)	60 (197)
	Maximum acceleration(2) for > 1.5 kg (3.3 lb)	m/s^2 (ft/s^2)	(1)
	Number of axes	–	3 (fixed option) / 4 (rotational axis installed)
	Position repeatability (ISO 9283)	mm (in)	Position: 0.1 (0.0039)
		–	Angle: +/-0.3° (3)
	Maximum torque of the rotational axis(4)	Nm (lbf-in)	4.5 (40)(5)
Electrical data	Mains voltage - 3-phase	Vac	480(6)
	Control voltage (with brake)	Vdc	+24 (-10…+6%)
	Fan voltage	Vdc	+24 (-10…+6%)
	Motor main axes	–	SH30703P02F2000
	Motor rotational axis	–	MH30701P02F2200
	Power consumption for a typical pick & place cycle with 1.5 kg (3.3 lb)	kW (hp)	0.35 (0.47)
Mechanical data	Installation type	–	Ceiling installation
	Protection class for moving parts	–	IP69k
	Basic protection class	–	IP65
	Maximum permissible overpressure in the robot housing	bar (psi)	0.1 (1.45)
	Housing type	–	Wash-down flat
Working space	Height x diameter	mm (in)	275 x 1600 (10.8 x 63) 450 x 1000 (17.7 x 39)
	Rotation	–	Unlimited
Weight	–	kg (lb)	approximately 115 (254)
Noise level	–	dB(A)	< 70

Category	Parameter	Unit	VRKP6S0FWF VRKP6S0RWF
Material	External casing	–	Stainless steel 1.4301, aluminum, POM-C, FPM, TPE, PE, PEEK

(1) Loads above the maximum load are possible with restrictions. If required, contact your local Schneider Electric service representative.

(2) For a load mounted centrally underneath the flange and a distance of maximum 100 mm (3.9 in) between flange and mass center of gravity.

(3) +/-0.1° is possible with optional equipment. For further information, refer to *Rotational Module*, page 184, *Tilting Module*, page 194, *Double Rotational Module*, page 202 and *Rotational Tilting Module*, page 216.

(4) When designing the gripper, be aware of any appearance of mass moments of inertia as well as friction, which could lead to exceeding the maximum torque and consequential damage.

(5) Maximum torque of the rotational axis with the optional Telescopic Axis Double is 3 Nm (31 lbf-in). For further information, refer to *Mounting the Telescopic Axis Double*, page 182.

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

Robot VRKP6•••NC

Mechanical and Electrical Data of VRKP6•••NC

Category	Parameter	Unit	VRKP6S0FNC VRKP6S0RNC	VRKP6L0FNC VRKP6L0RNC
General data	Rated load	kg (lb)	1.5 (3.3)	
	Maximum load without restrictions	kg (lb)	10 (22)	
	Load with restrictions (1)	kg (lb)	10…15 (22…33)	
	Maximum velocity	m/s (ft/s)	10 (33)	
	Maximum acceleration(2) for 1 kg (2.2 lb)	m/s^2 (ft/s^2)	80 (262)	
	Maximum acceleration(2) for 1.5 kg (3.3 lb)	m/s^2 (ft/s^2)	60 (197)	
	Maximum acceleration(2) for > 1.5 kg (3.3 lb)	m/s^2 (ft/s^2)	(1)	
	Number of axes	–	3 (fixed option) / 4 (rotational axis installed)	
	Position repeatability (ISO 9283)	mm (in)	Position: 0.1 (0.0039)	
		–	Angle: +/-0.3° (3)	
	Maximum torque of the rotational axis(4)	Nm (lbf-in)	4.5 (40)(5)	
Electrical data	Mains voltage - 3-phase	Vac	480(6)	
	Control voltage (with brake)	Vdc	+24 (-10…+6%)	+24 (-20…+25%)
	Motor main axes	–	SH30703P02F2000	ILM0703P02F0000
	Motor rotational axis	–	SH30702P02F2000	ILM0702P02F0000
	Power consumption for a typical pick & place cycle with 1.5 kg (3.3 lb)	kW (hp)	0.35 (0.47)	
Mechanical data	Installation type	–	Ceiling installation	
	Protection class for moving parts	–	IP69k	
	Basic protection class	–	IP65	
	Housing type	–	Compact	
Working space	Height x diameter	mm (in)	275 x 1600 (10.8 x 63) 450 x 1000 (17.7 x 39)	
	Rotation	–	Unlimited	
Weight	–	kg (lb)	approximately 80 (176)	
Noise level	–	dB(A)	< 70	

Category	**Parameter**	**Unit**	**VRKP6S0FNC** **VRKP6S0RNC**	**VRKP6L0FNC** **VRKP6L0RNC**
Material	External casing	–	Stainless steel 1.4301, aluminum, POM-C, FPM, TPE, PE, PEEK	

(1) Loads above the maximum load are possible with restrictions. If required, contact your local Schneider Electric service representative.

(2) For a load mounted centrally underneath the flange and a distance of maximum 100 mm (3.9 in) between flange and mass center of gravity.

(3) +/-0.1° is possible with optional equipment. For further information, refer to *Rotational Module*, page 184, *Tilting Module*, page 194, *Double Rotational Module*, page 202 and *Rotational Tilting Module*, page 216.

(4) When designing the gripper, be aware of any appearance of mass moments of inertia as well as friction, which could lead to exceeding the maximum torque and consequential damage.

(5) Maximum torque of the rotational axis with the optional Telescopic Axis Double is 3 Nm (31 lbf-in). For further information, refer to *Mounting the Telescopic Axis Double*, page 182.

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

Robot VRKP6•••WF••E00

Mechanical and Electrical Data of VRKP6•••WF••E00

Category	Parameter	Unit	VRKP6S0FWF••E00 VRKP6S0RWF••E00
General data	Rated load	kg (lb)	1.5 (3.3)
	Maximum load without restrictions	kg (lb)	10 (22)
	Load with restrictions(1)	kg (lb)	10…15 (22…33)
	Maximum velocity	m/s (ft/s)	10 (33)
	Maximum acceleration(2) for 1 kg (2.2 lb)	m/s^2 (ft/s^2)	75 (246)
	Maximum acceleration(2) for 1.5 kg (3.3 lb)	m/s^2 (ft/s^2)	55 (180)
	Maximum acceleration(2) for > 1.5 kg (3.3 lb)	m/s^2 (ft/s^2)	(1)
	Number of axes	–	3 (fixed option) / 4 (rotational axis installed)
	Position repeatability (ISO 9283)	mm (in)	Position: 0.1 (0.0039)
		–	Angle: +/-0.3° (3)
	Maximum torque of the rotational axis(4)	Nm (lbf-in)	4.5 (40)(5)
Electrical data	Mains voltage - 3-phase	Vac	480(6)
	Control voltage (with brake)	Vdc	+24 (-10…+6%)
	Fan voltage	Vdc	+24 (-10…+6%)
	Motor main axes	–	SH30703P02F2000
	Motor rotational axis	–	MH30701P02F2200
	Power consumption for a typical pick & place cycle with 1.5 kg (3.3 lb)	kW (hp)	0.35 (0.47)
Mechanical data	Installation type	–	Ceiling installation
	Protection class for moving parts	–	IP69k
	Basic protection class	–	IP65
	Maximum permissible overpressure in the robot housing	bar (psi)	0.1 (1.45)
	Housing type	–	Wash-down flat
Working space	Height x diameter	mm (in)	400 x 1600 (15.7 x 63) 550 x 1150 (21.7 x 45)
	Rotation	–	Unlimited
Weight	–	kg (lb)	approximately 115 (254)
Noise level	–	dB(A)	< 70

Category	Parameter	Unit	VRKP6S0FWF••E00 VRKP6S0RWF••E00
Material	External casing	–	Stainless steel 1.4301, aluminum, POM-C, FPM, TPE, PE, PEEK

(1) Loads above the maximum load are possible with restrictions. If required, contact your local Schneider Electric service representative.

(2) For a load mounted centrally underneath the flange and a distance of maximum 100 mm (3.9 in) between flange and mass center of gravity.

(3) +/-0.1° is possible with optional equipment. For further information, refer to *Rotational Module*, page 184, *Tilting Module*, page 194, *Double Rotational Module*, page 202 and *Rotational Tilting Module*, page 216.

(4) When designing the gripper, be aware of any appearance of mass moments of inertia as well as friction, which could lead to exceeding the maximum torque and consequential damage.

(5) Maximum torque of the rotational axis with the optional Telescopic Axis Double is 3 Nm (31 lbf-in). For further information, refer to *Mounting the Telescopic Axis Double*, page 182.

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

Robot VRKP6•••NC••E00

Mechanical and Electrical Data of VRKP6•••NC••E00

Category	Parameter	Unit	VRKP6S0FNC00E00 VRKP6S0RNC00E00
General data	Rated load	kg (lb)	1.5 (3.3)
	Maximum load without restrictions	kg (lb)	10 (22)
	Load with restrictions(1)	kg (lb)	10…15 (22…33)
	Maximum velocity	m/s (ft/s)	10 (33)
	Maximum acceleration(2) for 1 kg (2.2 lb)	m/s^2 (ft/s^2)	75 (246)
	Maximum acceleration(2) for 1.5 kg (3.3 lb)	m/s^2 (ft/s^2)	55 (180)
	Maximum acceleration(2) for > 1.5 kg (3.3 lb)	m/s^2 (ft/s^2)	(1)
	Number of axes	–	3 (fixed option) / 4 (rotational axis installed)
	Position repeatability (ISO 9283)	mm (in)	Position: 0.1 (0.0039)
		–	Angle: +/-0.3° (3)
	Maximum torque of the rotational axis(4)	Nm (lbf-in)	4.5 (40)(5)
Electrical data	Mains voltage - 3-phase	Vac	480(6)
	Control voltage (with brake)	Vdc	+24 (-10…+6%)
	Motor main axes	–	SH30703P02F2000
	Motor rotational axis	–	SH30702P02F2000
	Power consumption for a typical pick & place cycle with 1.5 kg (3.3 lb)	kW (hp)	0.35 (0.47)
Mechanical data	Installation type	–	Ceiling installation
	Protection class for moving parts	–	IP69k
	Basic protection class	–	IP65
	Housing type	–	Compact
Working space	Height x diameter	mm (in)	400 x 1600 (15.7 x 63) 550 x 1150 (21.7 x 45)
	Rotation	–	Unlimited
Weight	–	kg (lb)	approximately 80 (176)
Noise level	–	dB(A)	< 70

Category	Parameter	Unit	VRKP6S0FNC00E00 VRKP6S0RNC00E00
Material	External casing	–	Stainless steel 1.4301, aluminum, POM-C, FPM, TPE, PE, PEEK

(1) Loads above the maximum load are possible with restrictions. If required, contact your local Schneider Electric service representative.

(2) For a load mounted centrally underneath the flange and a distance of maximum 100 mm (3.9 in) between flange and mass center of gravity.

(3) +/-0.1° is possible with optional equipment. For further information, refer to *Rotational Module*, page 184, *Tilting Module*, page 194, *Double Rotational Module*, page 202 and *Rotational Tilting Module*, page 216.

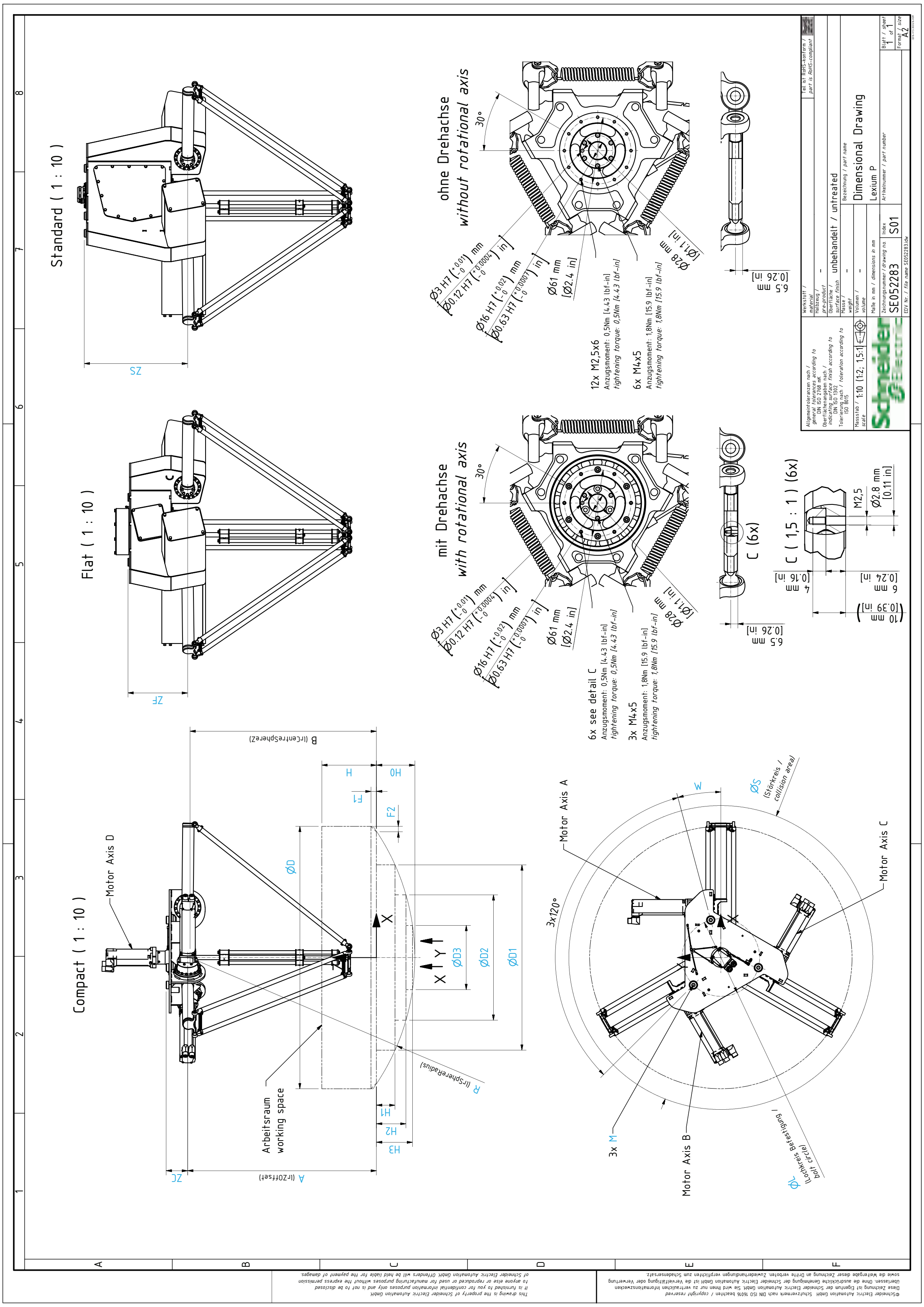
(4) When designing the gripper, be aware of any appearance of mass moments of inertia as well as friction, which could lead to exceeding the maximum torque and consequential damage.

(5) Maximum torque of the rotational axis with the optional Telescopic Axis Double is 3 Nm (31 lbf-in). For further information, refer to *Mounting the Telescopic Axis Double*, page 182.

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

Dimensional Drawings

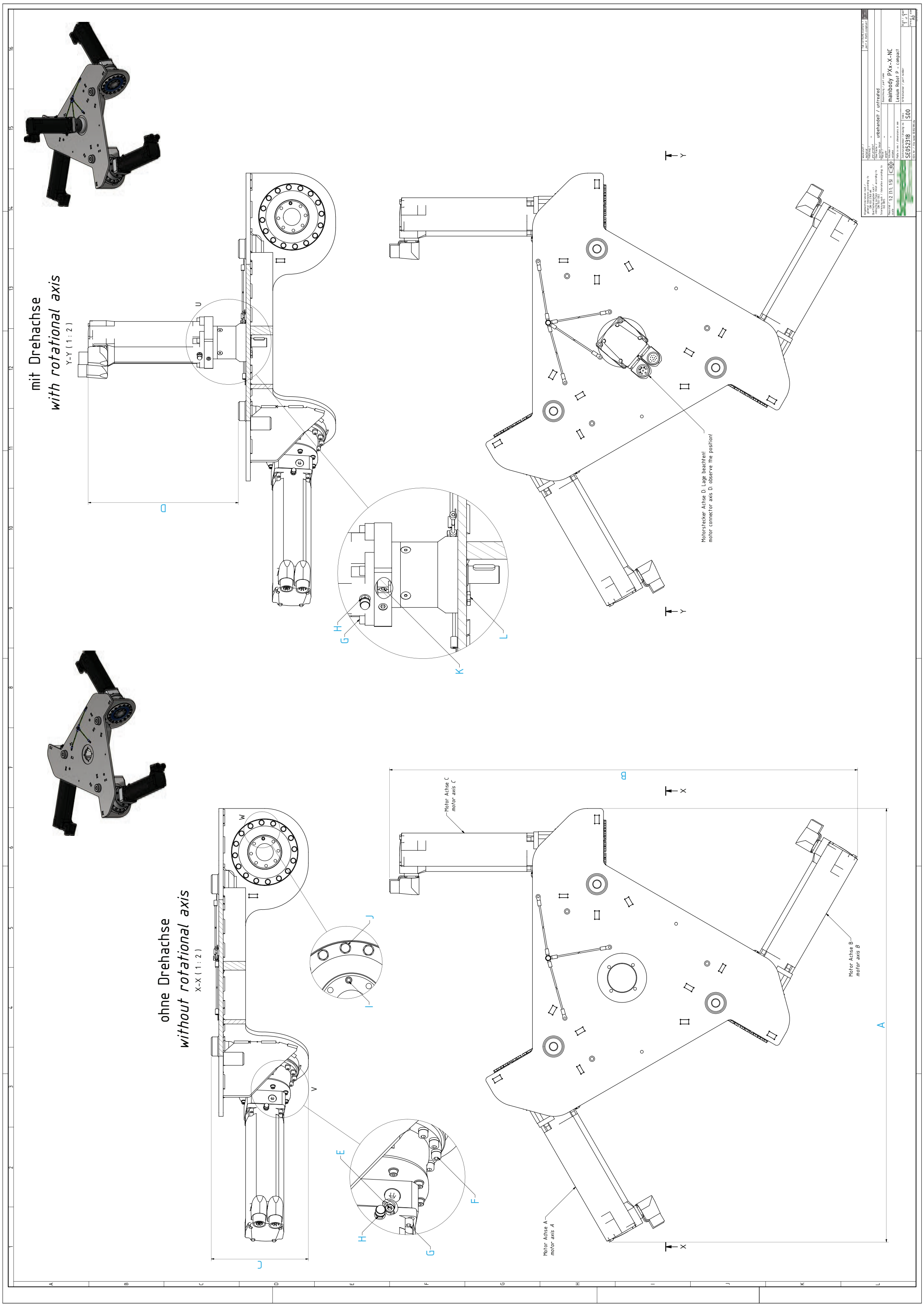
Dimensional Drawing of the Lexium P Robot



Dimen-sion	Description	Unit	VRKP0	VRK-P-0•••••••-E00	VRKP1	VRK-P-1•••••••-E00	VRKP2	VRKP4	VRKP5	VRKP6	VRK-P-6•••••••-E00
ØD	Working space diameter	mm (in)	400 (15.7)	400 (15.7)	600 (23.6)	600 (23.6)	800 (31.5)	1200 (47)	1400 (55)	1600 (63)	1600 (63)
H	Working space height	mm (in)	100 (3.9)	160 (6.3)	125 (4.9)	190 (7.5)	190 (7.5)	250 (9.8)	275 (10.8)	300 (11.8)	400 (15.7)
H0	Working space depth	mm (in)	44.5 (1.75)	38.7 (1.52)	81.5 (3.2)	70.6 (2.8)	84.9 (3.34)	175.4 (6.9)	193.1 (7.6)	250.9 (9.9)	257.9 (10.2)
ØD1	Auxiliary diameter 1	mm (in)	300 (11.8)	292 (11.5)	462 (18.2)	472 (18.6)	557 (22)	847 (33.3)	1013 (40)	1240 (49)	1235 (49)
H1	Auxiliary height 1	mm (in)	20 (0.79)	20 (0.79)	35 (1.38)	30 (1.18)	30 (1.18)	85 (3.35)	80 (3.15)	100 (3.9)	125 (4.9)
ØD2	Auxiliary diameter 2	mm (in)	188 (7.4)	200 (7.9)	318 (12.5)	338 (13.3)	415 (16.3)	574 (22.6)	734 (29)	833 (33)	826 (32.5)
H2	Auxiliary height 2	mm (in)	34 (1.34)	30 (1.18)	60 (2.36)	50 (1.97)	55 (2.17)	135 (5.3)	135 (5.3)	185 (7.3)	200 (7.9)
ØD3	Auxiliary diameter 3	mm (in)	75 (2.95)	75 (2.95)	175 (6.9)	177 (7)	240 (9.4)	293 (11.5)	413 (16.3)	342 (13.5)	307 (12)
H3	Auxiliary height 3	mm (in)	43 (1.7)	37.5 (1.48)	75 (2.95)	65 (2.56)	75 (2.95)	165 (6.5)	175 (6.9)	240 (9.4)	250 (9.8)
F1	Chamfer dimension 1	mm (in)	–	–	–	–	35 (1.38)	25 (0.98)	50 (1.97)	25 (0.98)	–
F2	Chamfer dimension 2	mm (in)	–	–	–	–	60 (2.36)	25 (0.98)	50 (1.97)	25 (1.98)	–
A	Z offset	mm (in)	438.2 (17.3)	554 (22)	528 (20.8)	646.5 (25.5)	650 (25.6)	863.5 (34)	997.4 (39)	1100 (43)	1245 (49)
B	Sphere center distance	mm (in)	427.2 (16.8)	543 (21.4)	517 (20.4)	635.5 (25)	650 (25.6)	863.5 (34)	997.4 (39)	1100 (43)	1245 (49)
R	Sphere radius	mm (in)	471.7 (18.6)	581.7 (23)	598.5 (23.6)	706.1 (28)	734.9 (29)	1038.9 (41)	1190.5 (47)	1350.9 (53)	1502.9 (59)
W	Bolt circle start angle	mm (in)	15 (0.59)	15 (0.59)	15 (0.59)	15 (0.59)	25 (0.98)	15 (0.59)	11 (0.43)	11 (0.43)	11 (0.43)
ØL	Bolt circle diameter	mm (in)	240 (9.4)	240 (9.4)	240 (9.4)	240 (9.4)	200 (7.9)	355 (14)	500 (19.7)	500 (19.7)	500 (19.7)
ØS	Collision area diameter	mm (in)	590 (32)	590 (32)	790 (31)	790 (31)	990 (39)	1390 (55)	1590 (63)	1790 (70)	1790 (70)
M	Threaded hole	–	M12 x 25	M12 x 25	M12 x 25	M12 x 25	M16 x 25	M16 x 25	M16 x 25	M16 x 25	M16 x 25
	Tightening torque	Nm (lbf-in)	54 (478)	54 (478)	54 (478)	54 (478)	100 (885)	100 (885)	100 (885)	100 (885)	100 (885)
ZC	Mounting distance compact housing	mm (in)	88 (3.46)	88 (3.46)	88 (3.46)	88 (3.46)	98 (3.86)	98 (3.86)	98 (3.86)	98 (3.86)	98 (3.86)

Dimension	Description	Unit	VRKP0	VRKP0•••••••-E00	VRKP1	VRKP1•••••••-E00	VRKP2	VRKP4	VRKP5	VRKP6	VRKP6•••••••-E00
ZF	Mounting distance flat housing	mm (in)	267 (10.5)	267 (10.5)	267 (10.5)	267 (10.5)	273 (10.7)	273 (10.7)	273 (10.7)	273 (10.7)	273 (10.7)
ZS	Mounting distance standard housing	mm (in)	–	–	–	–	473 (18.6)	473 (18.6)	–	–	–

Detail Drawing of the Main Body of VRKP•S0•NC



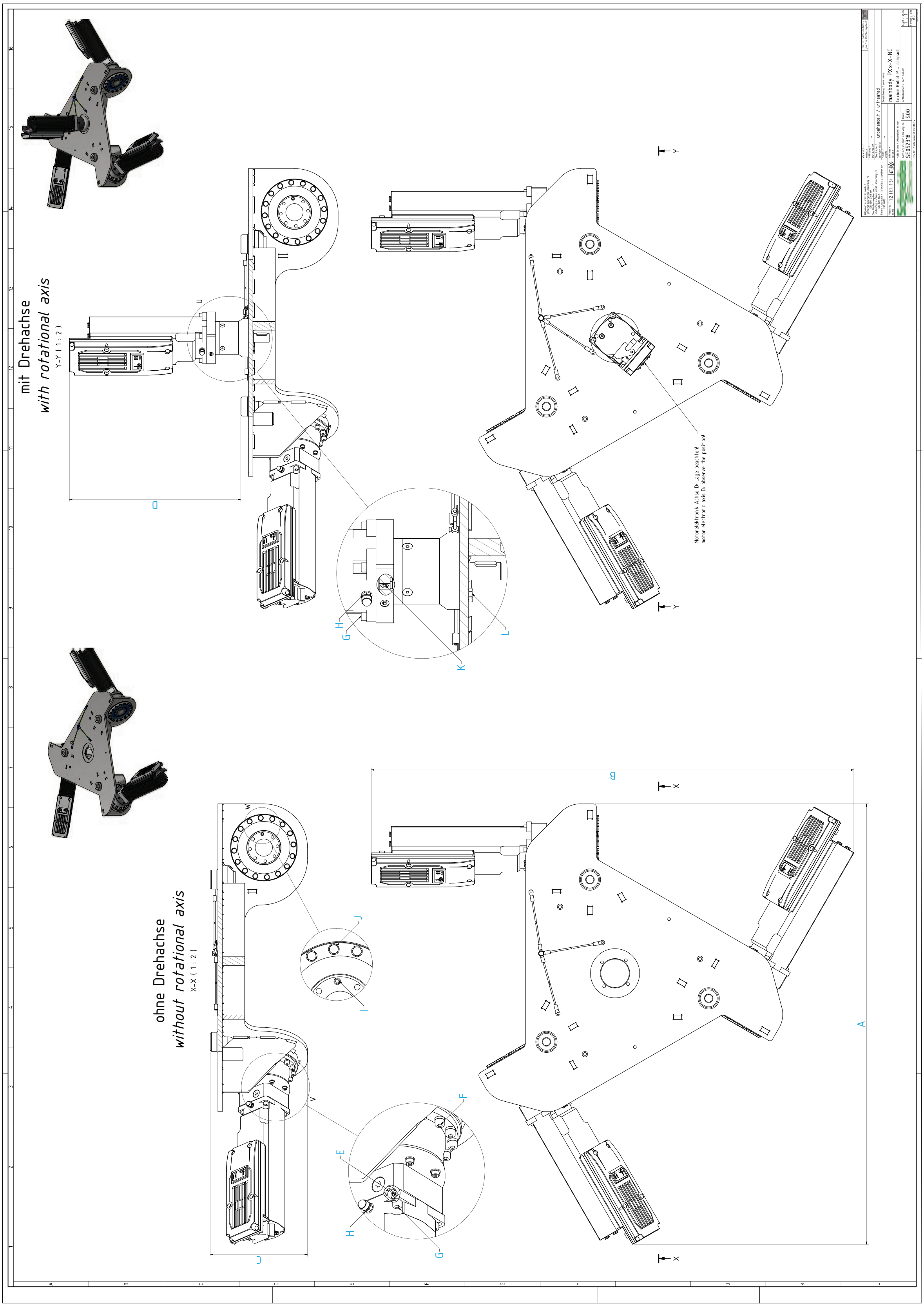
Dimen-sion	Description	Unit	VRKP0S••NC VRKP1S••NC	VRKP2S0•NC	VRKP4S0•NC	VRKP5S0•NC VRKP6S0•NC
A	Width A	mm (in)	617 (24.3)	774 (30.5)	794 (31.3)	906 (36)
B	Width B	mm (in)	636 (25)	790 (31)	857 (34)	922 (36)
C	Height C	mm (in)	148 (5.8)	178 (7)	178 (7)	178 (7)

Dimen-sion	Description		Unit	VRKP0S••NC VRKP1S••NC	VRKP2S0•NC	VRKP4S0•NC	VRKP5S0•NC VRKP6S0•NC
D	Height D		mm (in)	225 (8.9)	275 (10.8)	275 (10.8)	275 (10.8)
E	Clamping screw gearbox main axis	Wrench size	mm	3	4	4	4
		Tightening torque	Nm (lbf-in)	4.1 (36)	9.5 (84)	9.5 (84)	9.5 (84)
		Quantity	–	3			
F	Screw gearbox main axis to housing	Wrench size	mm	3	4	4	4
		Tightening torque	Nm (lbf-in)	3 (26.6)	4.7 (42)	4.7 (42)	4.7 (42)
		Quantity	–	24	48	48	48
G	Screw motor to gearbox(2)	Wrench size	mm	4			
		Tightening torque	Nm (lbf-in)	3.5 (31)			
		Quantity	–	12 or 16(1)			
H	Hex nut grounding cable motor	Wrench size	mm	7			
		Tightening torque	Nm (lbf-in)	2.5 (22)			
		Quantity	–	3 or 4(1)			
I	Indexing bolt upper arm(2)	Wrench size	mm	2.5	3	3	3
		Tightening torque	Nm (lbf-in)	Hand-tight			
		Quantity	–	3			
J	Screw for Protector Cap	Wrench size	mm	7	8	8	8
		Tightening torque	Nm (lbf-in)	2 (17.7)	3.5 (31)	3.5 (31)	3.5 (31)
		Quantity	–	24	48	48	48
K(1)	Clamping screw gearbox rotational axis	Wrench size	mm	3			
		Tightening torque	Nm (lbf-in)	4.5 (40)			
		Quantity	–	1			
L(1)	Screw gearbox rotational axis to housing	Wrench size	mm	8			
		Tightening torque	Nm (lbf-in)	3.5 (31)			
		Quantity	–	4			

(1) For robots with a rotational axis.

(2) Medium threadlocked with Loctite 243.

Detail Drawing of the Main Body of VRKP•L0•NC



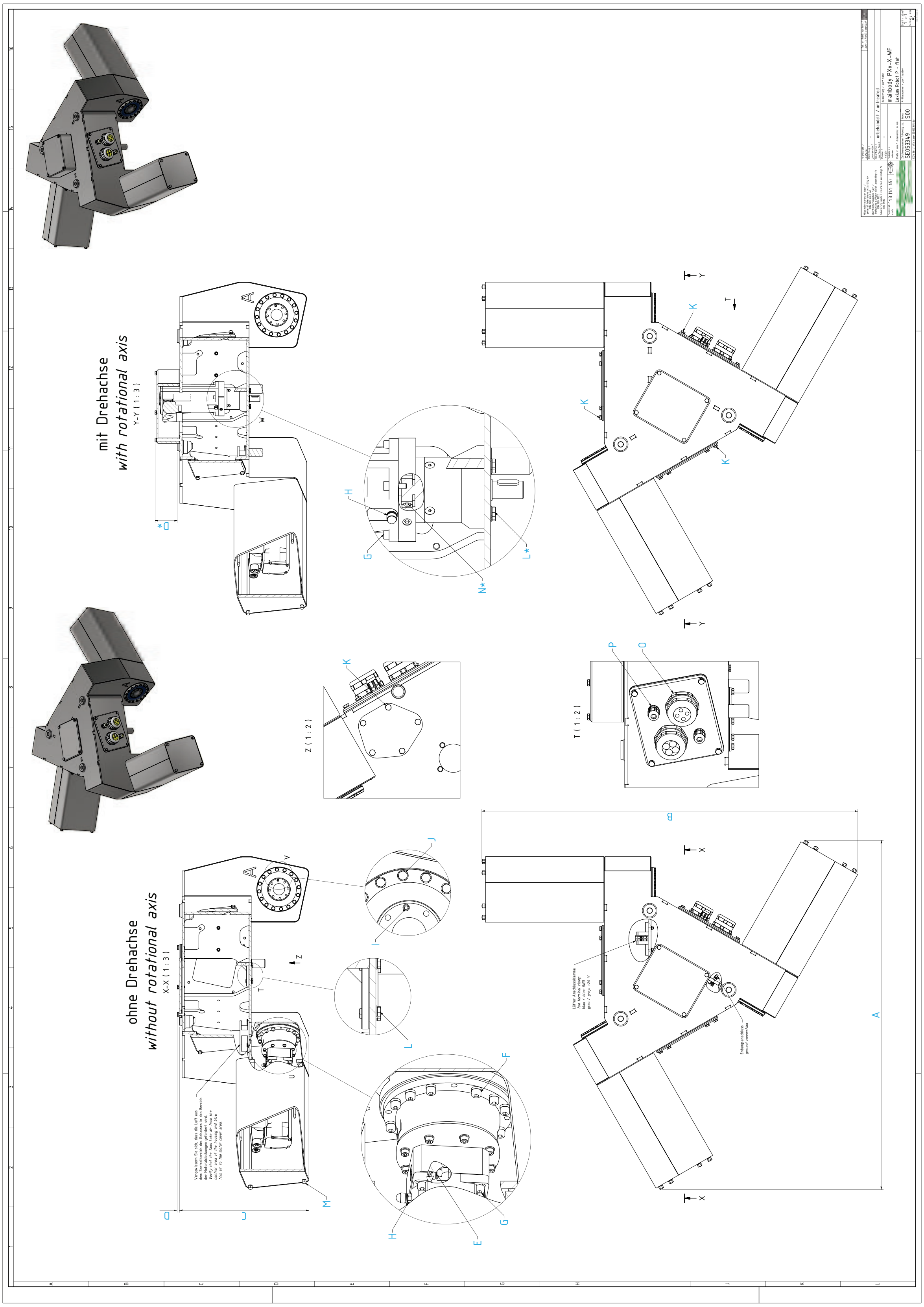
Dimension	Description	Unit	VRKP2L0•NC	VRKP4L0•NC	VRKP5L0•NC VRKP6L0•NC
A	Width A	mm (in)	800 (31.5)	806 (32)	918 (36)
B	Width B	mm (in)	817 (32)	884 (35)	948 (37)
C	Height C	mm (in)	178 (7)		

Dimension	Description		Unit	VRKP2L0•NC	VRKP4L0•NC	VRKP5L0•NC VRKP6L0•NC
D	Height D		mm (in)	313 (12.3)		
E	Clamping screw gearbox main axis	Wrench size	mm	4		
		Tightening torque	Nm (lbf-in)	9.5 (84)		
		Quantity	–	3		
F	Screw gearbox main axis to housing	Wrench size	mm	4		
		Tightening torque	Nm (lbf-in)	4.7 (42)		
		Quantity	–	48		
G	Screw motor to gearbox[2]	Wrench size	mm	4		
		Tightening torque	Nm (lbf-in)	3.5 (31)		
		Quantity	–	12 or 16[1]		
H	Hex nut grounding cable motor	Wrench size	mm	7		
		Tightening torque	Nm (lbf-in)	2.5 (22)		
		Quantity	–	3 or 4[1]		
I	Indexing bolt upper arm[2]	Wrench size	mm	3		
		Tightening torque	Nm (lbf-in)	Hand-tight		
		Quantity	–	3		
J	Screw for Protector Cap	Wrench size	mm	8		
		Tightening torque	Nm (lbf-in)	3.5 (31)		
		Quantity	–	48		
K[1]	Clamping screw gearbox rotational axis	Wrench size	mm	3		
		Tightening torque	Nm (lbf-in)	4.5 (40)		
		Quantity	–	1		
L[1]	Screw gearbox rotational axis to housing	Wrench size	mm	8		
		Tightening torque	Nm (lbf-in)	3.5 (31)		
		Quantity	–	4		

(1) For robots with a rotational axis.

(2) Medium threadlocked with Loctite 243.

Detail Drawing of the Main Body of VRKP•S0•WF



Dimen-sion	Description	Unit	VRKP0S0•WF VRKP1S0•WF	VRKP2•••WF	VRKP4S0•WF	VRKP5S0•WF VRKP6S0•WF
A	Width A	mm (in)	667 (26)	959 (37.8)	959 (37.8)	1078 (42)
B	Width B	mm (in)	698 (27.5)	966 (38)	1033 (41)	1187 (47)
C	Height C	mm (in)	331 (13)	356 (14)	356 (14)	356 (14)

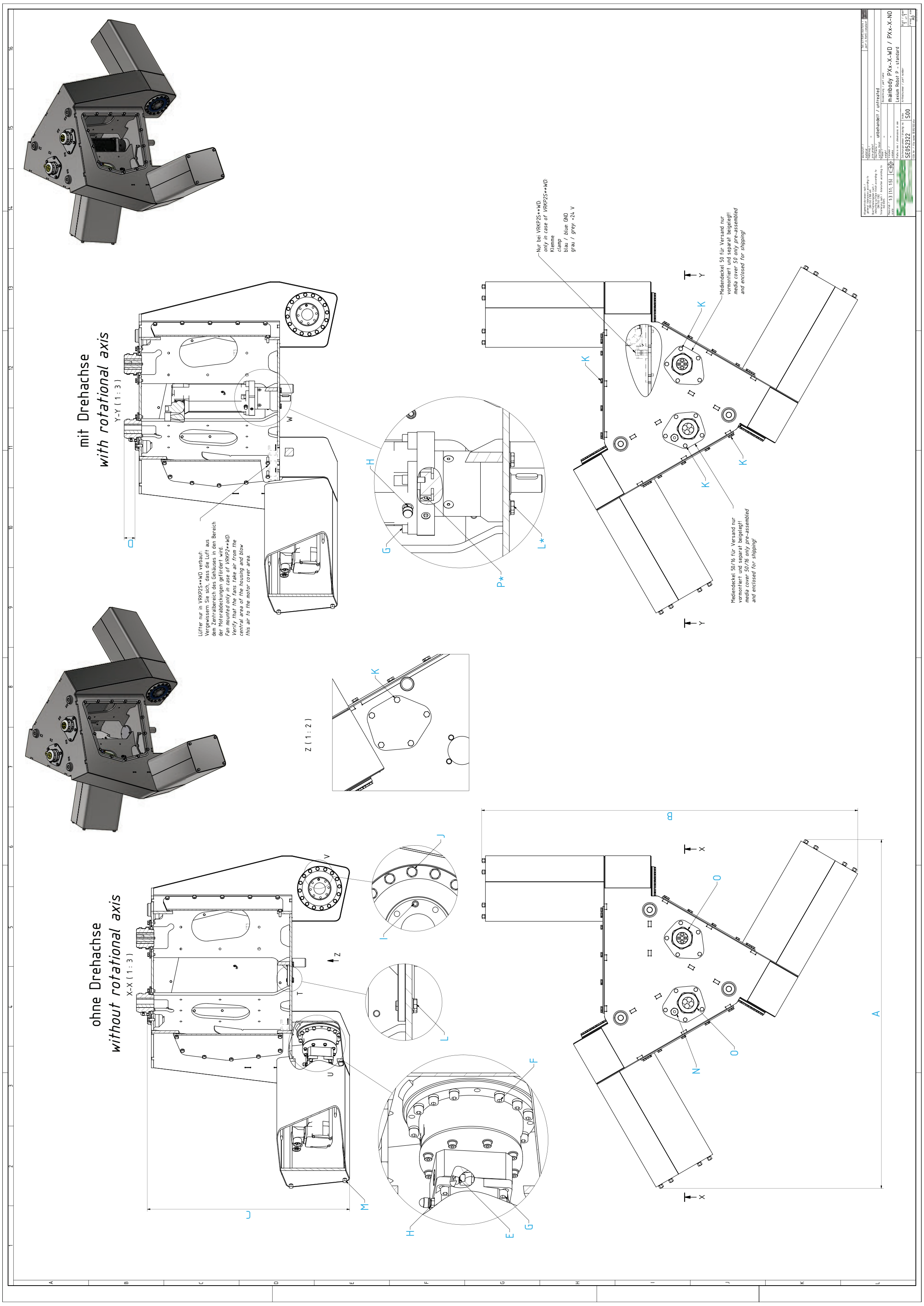
Dimen-sion	Description		Unit	VRKP0S0•WF VRKP1S0•WF	VRKP2•••WF	VRKP4S0•WF	VRKP5S0•WF VRKP6S0•WF
D	Height D		mm (in)	2 (0.08)	6 (0.2)	6 (0.2)	6 (0.2)
D*(1)	Height D*		mm (in)	57 (2.24)	61 (2.4)	61 (2.4)	61 (2.4)
E	Clamping screw gearbox main axis	Wrench size	mm	3	4	4	4
		Tightening torque	Nm (lbf-in)	4.1 (36)	9.5 (84)	9.5 (84)	9.5 (84)
		Quantity	–	3			
F	Screw gearbox main axis to housing	Wrench size	mm	3	4	4	4
		Tightening torque	Nm (lbf-in)	3 (26.6)	4.7 (42)	4.7 (42)	4.7 (42)
		Quantity	–	24	48	48	48
G	Screw motor to gearbox(2)	Wrench size	mm	4			
		Tightening torque	Nm (lbf-in)	3.5 (31)			
		Quantity	–	12 or 16(1)			
H	Hex nut grounding cable motor	Wrench size	mm	7			
		Tightening torque	Nm (lbf-in)	2.5 (22)			
		Quantity	–	3 or 4(1)			
I	Indexing bolt upper arm(2)	Wrench size	mm	2.5	3	3	3
		Tightening torque	Nm (lbf-in)	Hand-tight			
		Quantity	–	3			
J	Screw for Protector Cap	Wrench size	mm	7	8	8	8
		Tightening torque	Nm (lbf-in)	2 (17.7)	3.5 (31)	3.5 (31)	3.5 (31)
		Quantity	–	24	48	48	48
K	Screw media cover	Wrench size	mm	10			
		Tightening torque	Nm (lbf-in)	6 (53)			
		Quantity	–	5			
L	Screw cover rotational axis	Wrench size	mm	8			
		Tightening torque	Nm (lbf-in)	3.5 (31)			
		Quantity	–	4			
L*(1)	Screw gearbox rotational axis to housing	Wrench size	mm	8			
		Tightening torque	Nm (lbf-in)	3.5 (31)			
		Quantity	–	4			
M	Threaded rod motor cover	Wrench size	mm	10			
		Tightening torque	Nm (lbf-in)	6 (53)			
		Quantity	–	12			
N*(1)	Clamping screw gearbox rotational axis	Wrench size	mm	3			
		Tightening torque	Nm (lbf-in)	4.5 (40)			
		Quantity	–	1			

Dimen-sion	Description		Unit	VRKP0S0•WF VRKP1S0•WF	VRKP2•••WF	VRKP4S0•WF	VRKP5S0•WF VRKP6S0•WF
O	Cable gland M50 for motor/ encoder cable	Wrench size	mm	56			
		Tightening torque	Nm (lbf-in)	10 (89)			
		Quantity	–	2 or 4(1)	2	2	2
P	Cable gland M16 for grounding cable/fan cable	Wrench size	mm	19			
		Tightening torque	Nm (lbf-in)	6 (53)			
		Quantity	–	2 or 4(1)	2	2	2

(1) For robots with a rotational axis.

(2) Medium threadlocked with Loctite 243.

Detail Drawing of the Main Body of VRKP•S0•WD



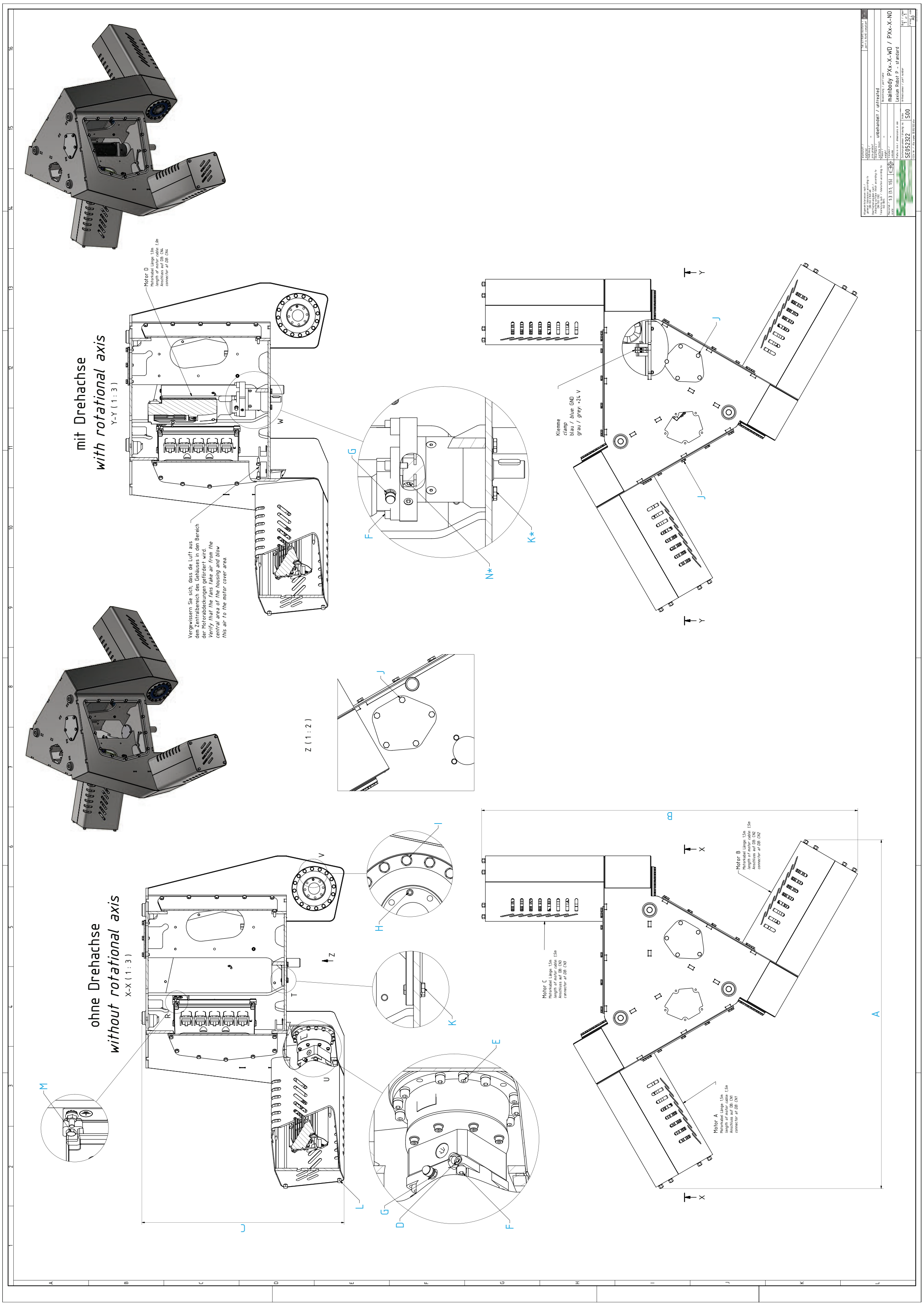
Dimension	Description	Unit	VRKP2S0•WD	VRKP4S0•WD
A	Width A	mm (in)	959 (38)	
B	Width B	mm (in)	966 (38)	1033 (41)
C	Height C	mm (in)	556 (22)	
D	Height D	mm (in)	30 (1.18)	

Dimension	Description		Unit	VRKP2S0•WD	VRKP4S0•WD
E	Clamping screw gearbox main axis	Wrench size	mm	4	
		Tightening torque	Nm (lbf-in)	9.5 (84)	
		Quantity	–	3	
F	Screw gearbox main axis to housing	Wrench size	mm	4	
		Tightening torque	Nm (lbf-in)	4.7 (42)	
		Quantity	–	48	
G	Screw motor to gearbox(2)	Wrench size	mm	4	
		Tightening torque	Nm (lbf-in)	3.5 (31)	
		Quantity	–	12 or 16(1)	
H	Hex nut grounding cable motor	Wrench size	mm	7	
		Tightening torque	Nm (lbf-in)	2.5 (22)	
		Quantity	–	3 or 4(1)	
I	Indexing bolt upper arm(2)	Wrench size	mm	3	
		Tightening torque	Nm (lbf-in)	Hand-tight	
		Quantity	–	3	
J	Screw for Protector Cap	Wrench size	mm	8	
		Tightening torque	Nm (lbf-in)	3.5 (31)	
		Quantity	–	48	
K	Screw media cover / maintenance cover	Wrench size	mm	10	
		Tightening torque	Nm (lbf-in)	6 (53)	
		Quantity	–	57	
L	Screw cover rotational axis	Wrench size	mm	8	
		Tightening torque	Nm (lbf-in)	3.5 (31)	
		Quantity	–	4	
L*(1)	Screw gearbox rotational axis to housing	Wrench size	mm	8	
		Tightening torque	Nm (lbf-in)	3.5 (31)	
		Quantity	–	4	
M	Threaded rod motor cover	Wrench size	mm	10	
		Tightening torque	Nm (lbf-in)	6 (53)	
		Quantity	–	12	
N	Cable gland M16 for grounding cable	Wrench size	mm	19	
		Tightening torque	Nm (lbf-in)	6 (53)	
		Quantity	–	1	
O	Cable gland M50 for motor / encoder cable	Wrench size	mm	56	
		Tightening torque	Nm (lbf-in)	10 (89)	
		Quantity	–	2	
P*(1)	Clamping screw gearbox rotational axis	Wrench size	mm	3	
		Tightening torque	Nm (lbf-in)	4.5 (40)	
		Quantity	–	1	

(1) For robots with a rotational axis.

(2) Medium threadlocked with Loctite 243.

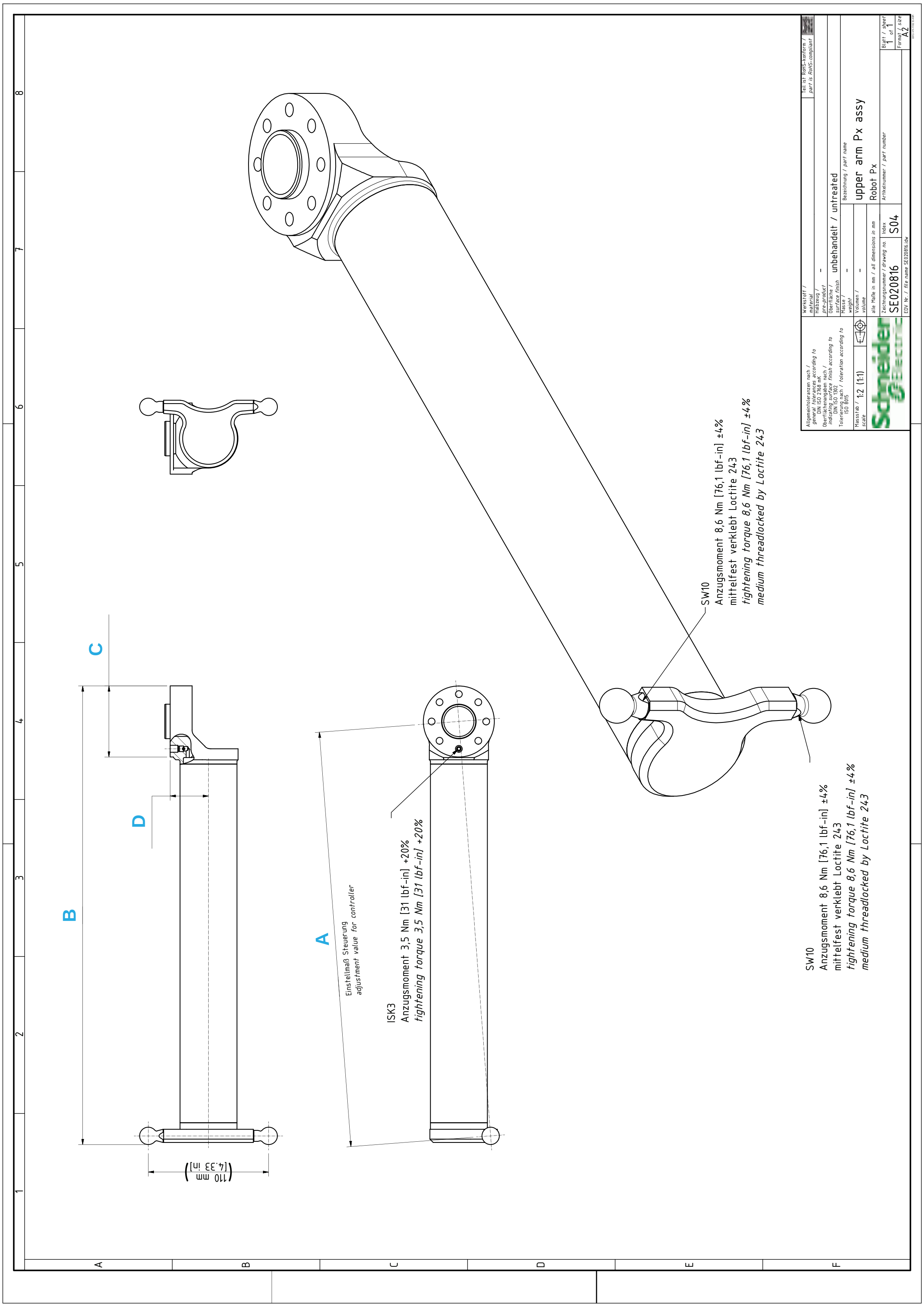
Detail Drawing of the Main Body of VRKP•L0•WD / VRKP•L0•NO



Dimension	Description	Unit	VRKP4L0•WD VRKP4L0•NO
A	Width A	mm (in)	959 (38)
B	Width B	mm (in)	1033 (41)
C	Height C	mm (in)	556 (22)

Dimension	Description		Unit	VRKP4L0•WD VRKP4L0•NO
D	Clamping screw gearbox main axis	Wrench size	mm	4
		Tightening torque	Nm (lbf-in)	9.5 (84)
		Quantity	–	3
E	Screw gearbox main axis to housing	Wrench size	mm	4
		Tightening torque	Nm (lbf-in)	4.7 (42)
		Quantity	–	48
F	Screw motor to gearbox(2)	Wrench size	mm	4
		Tightening torque	Nm (lbf-in)	3.5 (31)
		Quantity	–	12 or 16(1)
G	Hex nut grounding cable motor	Wrench size	mm	7
		Tightening torque	Nm (lbf-in)	2.5 (22)
		Quantity	–	3 or 4(1)
H	Indexing bolt upper arm(2)	Wrench size	mm	3
		Tightening torque	Nm (lbf-in)	Hand-tight
		Quantity	–	3
I	Screw for Protector Cap	Wrench size	mm	8
		Tightening torque	Nm (lbf-in)	3.5 (31)
		Quantity	–	48
J	Screw media cover / maintenance cover	Wrench size	mm	10
		Tightening torque	Nm (lbf-in)	6 (53)
		Quantity	–	57
K	Screw cover rotational axis	Wrench size	mm	8
		Tightening torque	Nm (lbf-in)	3.5 (31)
		Quantity	–	4
K*(1)	Screw gearbox rotational axis to housing	Wrench size	mm	8
		Tightening torque	Nm (lbf-in)	3.5 (31)
		Quantity	–	4
L	Threaded rod motor cover	Wrench size	mm	10
		Tightening torque	Nm (lbf-in)	6 (53)
		Quantity	–	12
M	Fixing bolt ILM Distribution Box	Wrench size	mm	8
		Tightening torque	Nm (lbf-in)	3.5 (31)
		Quantity	–	4
N*(1)	Clamping screw gearbox rotational axis	Wrench size	mm	3
		Tightening torque	Nm (lbf-in)	4.5 (40)
		Quantity	–	1
(1) For robots with a rotational axis. (2) Medium threadlocked with Loctite 243.				

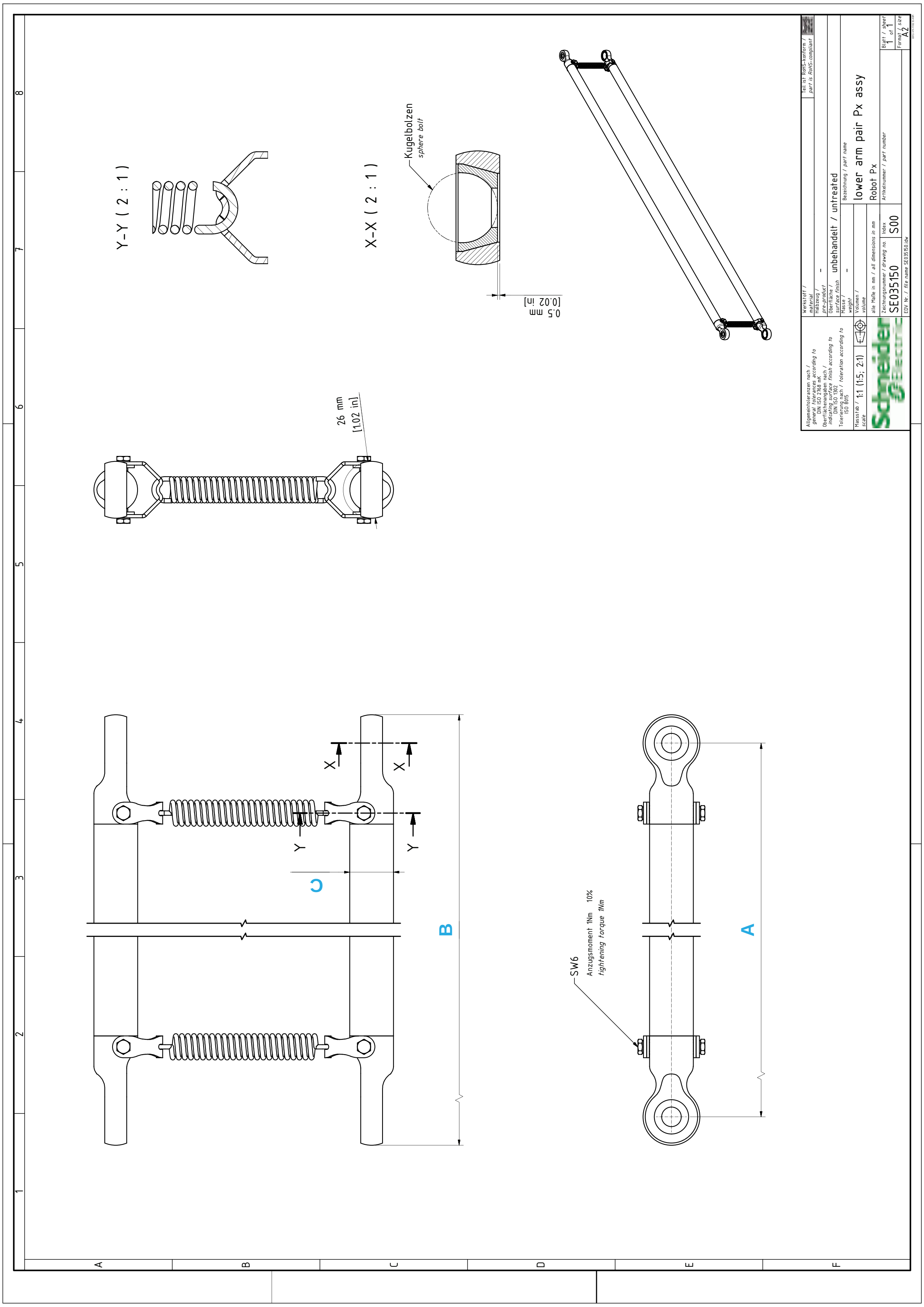
Detail Drawing of the Upper Arm



Dimension	Description	Unit	Robot type					
			VRKP0	VRKP1	VRKP2	VRKP4	VRKP5	VRKP6
A	Adjustment value for controller	mm (in)	180 (7.1)	230 (9)	280 (11)	380 (15)	430 (17)	480 (19)
B	Total length	mm	206.9	257.1	319	419.4	469.5	519.6

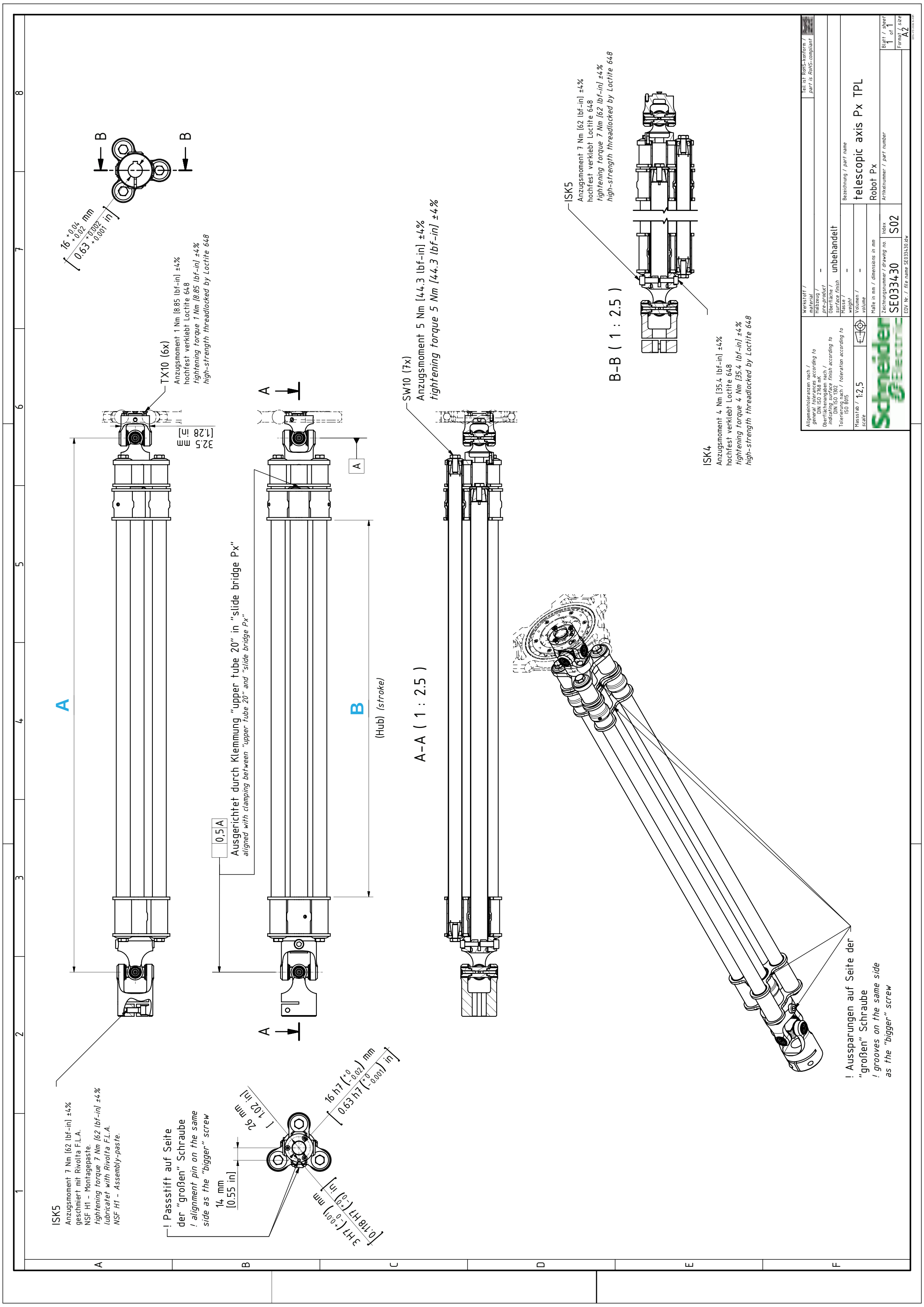
Dimension	Description	Unit	Robot type					
			VRKP0	VRKP1	VRKP2	VRKP4	VRKP5	VRKP6
		(in)	(8.1)	(10.1)	(13)	(16.5)	(18.5)	(20.5)
C	Flange diameter	mm (in)	40 (1.57)	40 (1.57)	65 (2.56)	65 (2.56)	65 (2.56)	65 (2.56)
D	Flange center distance	mm (in)	25 (0.98)	25 (0.98)	35 (1.38)	35 (1.38)	35 (1.38)	35 (1.38)

Detail Drawing of the Lower Arm



Dimension	Description	Unit	Robot type								
			VRKP0	VRKP-0•••••••-E00	VRKP1	VRKP-1•••••••-E00	VRKP2	VRKP4	VRKP5	VRKP6	VRKP-6•••••••-E00
A	Adjustment value for controller	mm (in)	400 (15.7)	500 (19.7)	500 (19.7)	600 (23.6)	600 (23.6)	900 (35.4)	1050 (41)	1150 (45)	1270 (50)
B	Total length	mm (in)	426 (16.8)	526 (20.7)	526 (20.7)	626 (24.6)	626 (24.6)	926 (36.5)	1076 (42.4)	1176 (46)	1296 (51)
C	Tube diameter	mm (in)	16 (0.63)	16 (0.63)	16 (0.63)	20 (0.79)	20 (0.79)	20 (0.79)	20 (0.79)	20 (0.79)	20 (0.79)

Detail Drawing of the Telescopic Axis



Dimen-sion	Description	Unit	Robot type								
			VRKP0	VRK-P-0•••••••-E00	VRKP1	VRK-P-1•••••••-E00	VRKP2	VRKP4	VRKP5	VRKP6	VRK-P-6•••••••-E00
A	Minimum length	mm (in)	326.8 (12.9)	381.8 (15)	390.2 (15.4)	444 (17.5)	458.4 (18)	610.4 (24)	686.4 (27)	766.4 (30.2)	842.4 (33)
B	Stroke	mm (in)	147 (5.8)	202 (8)	210.4 (8.3)	264.2 (10.4)	278.6 (11)	430.6 (17)	506.6 (20)	586.6 (23)	662.6 (26)

Electrical Connections

Electrical Connections

Electrical Connections of Lexium P Robots with SH3 Motors (VRKP•S)

Connection power P30 (size 1): Connection power, brake, and temperature sensor

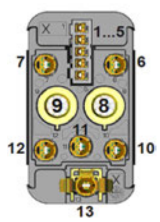
Representation	Pin	Designation	Meaning	Range
	1	W	Performance	3 x 0...480 Vac
	2	PE	Protective ground (earth) cable	–
	3	U	Performance	3 x 0...480 Vac
	4	V	Performance	3 x 0...480 Vac
	A	+	Brake	24 Vdc
	B	-	Brake	0 Vdc
	C	T1	Temperature sensor	–
	D	T2	Temperature sensor	–

Encoder Connection: Encoder SKS/SKM-36

Representation	Pin	Designation	Meaning	Range
	1	REF COS	Reference signal Cosinus	–
	2	RS 485 +	Parameter channel +	–
	3	–	–	–
	4	–	–	–
	5	SIN	Sinusoidal trace	–
	6	REF SIN	Reference signal sine	–
	7	RS 485 -	Parameter channel -	–
	8	COS	Cosine track	–
	9	–	–	–
	10	0 V	Supply Voltage	DC 0 V
	11	–	–	–
	12	U_s	Supply Voltage	DC 7...12 V

Electrical Connections of Lexium P Robots with ILM Motors (VRKP•L0)

Connector Lexium 62 ILM Servo Module

Representation	Pin	Designation	Meaning
	1	IE_sig	Inverter Enable (differential signal)
	2	IE_ref	
	3	Brake	Braking signal
	4	N.C.	Not connected
	5	N.C.	Not connected
	6	0 V	Control voltage 0 V
	7	24 V	Control voltage 24 V

Representa-tion	Pin	Designation	Meaning
	8.1	Rx+	Sercos port 1 - Input (not assigned for daisy chain wiring)
	8.2	Tx-	Sercos port 1 - Output (not assigned for daisy chain wiring)
	8.3	Rx-	Sercos port 1 - Input (not assigned for daisy chain wiring)
	8.4	Tx+	Sercos port 1 - Output (not assigned for daisy chain wiring)
	9.1	Rx+	Sercos port 2 - Input (not assigned for daisy chain wiring)
	9.2	Tx-	Sercos port 2 - Output (not assigned for daisy chain wiring)
	9.3	Rx-	Sercos port 2 - Input (not assigned for daisy chain wiring)
	9.4	Tx+	Sercos port 2 - Output (not assigned for daisy chain wiring)
	10	DC -	DC bus voltage -
	11	Shield	Shielded connector
	12	DC +	DC bus voltage +
	13	PE	Protective ground (earth) cable

Fan Connections (Only for VRKP2S0•WD / VRKP2•••WF / VRKP4L0•WD / VRKP4L0•NO / VRKP4S0•WF / VRKP5S0•WF / VRKP6S0•WF)

Pin	Designation	Meaning
1	0 Vdc	Fan - supply voltage
2	24 Vdc	Fan + supply voltage

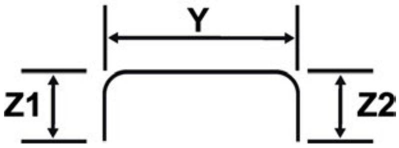
NOTE: For each fan, 260 mA are required, that is, 3x 260 mA are required for each robot.

For further information on fan connections and cabling the fans, refer to *Electrical Installation*, page 127.

Performance Data

Typical Cycle Time

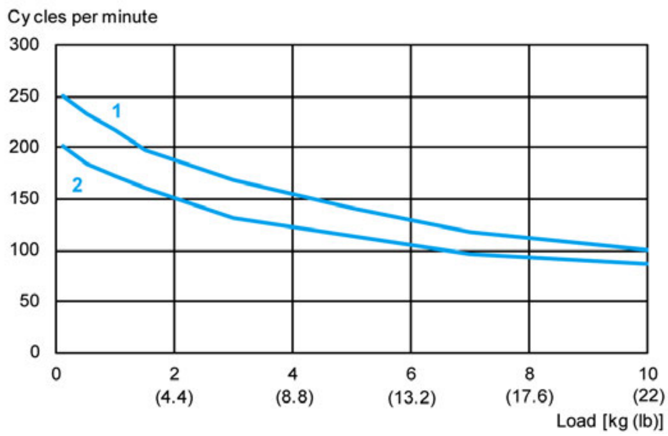
Robot Path (pick-place-pick):



Cycle Times of Robot VRKP0

The following measurements are performed at an ambient temperature of 20 °C (68 °F) with a PacDrive 3 and use the `SchneiderElectricRobotics` library.

Path Z1 x Y x Z2 in mm (in)	Load [kg (lb)]	Cycle times [s][1]	Cycles per minute
15 x 200 x 15 (0.59 x 7.9 x 0.59)	0.1 (0.22)	0.24	250
	0.5 (1.1)	0.258	232
	1.0 (2.2)	0.276	217
	1.5 (3.3)	0.305	197
	3.0 (6.6)	0.355	169
	5.0 (11)	0.424	141
	7.0 (15.4)	0.515	117
	10.0 (22)	0.593	101
25 x 305 x 25 (0.98 x 12 x 0.98)	0.1 (0.22)	0.297	202
	0.5 (1.1)	0.327	184
	1.0 (2.2)	0.348	173
	1.5 (3.3)	0.376	160
	3.0 (6.6)	0.455	132
	5.0 (11)	0.528	114
	7.0 (15.4)	0.628	96
	10.0 (22)	0.695	86
(1) Cycle times contain the back and forth motion. A position is considered as reached when the robot remains permanently in a window of +/-0.25 mm (0.0098 in) around the target position.			



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

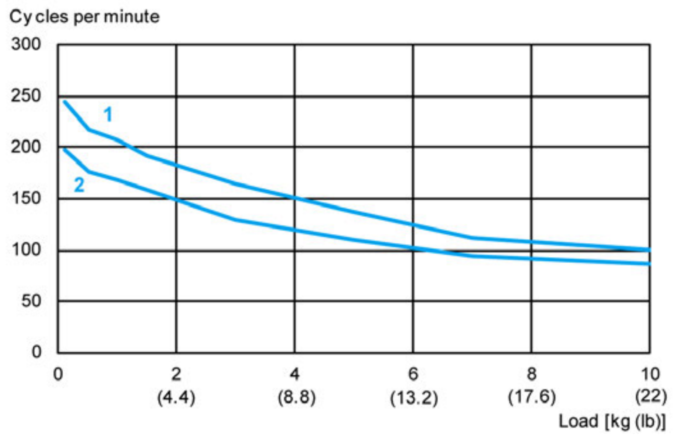
2 25 x 305 x 25 mm (0.98 x 12 x 0.98 in)

Cycle Times of Robot VRKP0•••••••E00

The following measurements are performed at an ambient temperature of 20 °C (68 °F) with a PacDrive 3 and use the `SchneiderElectricRobotics` library.

Path Z1 x Y x Z2 in mm (in)	Load [kg (lb)]	Cycle times [s][1]	Cycles per minute
15 x 200 x 15 (0.59 x 7.9 x 0.59)	0.1 (0.22)	0.246	244
	0.5 (1.1)	0.275	218
	1.0 (2.2)	0.290	207
	1.5 (3.3)	0.312	192
	3.0 (6.6)	0.364	165
	5.0 (11)	0.439	137
	7.0 (15.4)	0.538	112
	10.0 (22)	0.595	101
25 x 305 x 25 (0.98 x 12 x 0.98)	0.1 (0.22)	0.302	198
	0.5 (1.1)	0.340	176
	1.0 (2.2)	0.356	169
	1.5 (3.3)	0.380	158
	3.0 (6.6)	0.464	129
	5.0 (11)	0.548	109
	7.0 (15.4)	0.631	95
	10.0 (22)	0.695	86

(1) Cycle times contain the back and forth motion. A position is considered as reached when the robot remains permanently in a window of +/-0.25 mm (0.0098 in) around the target position.



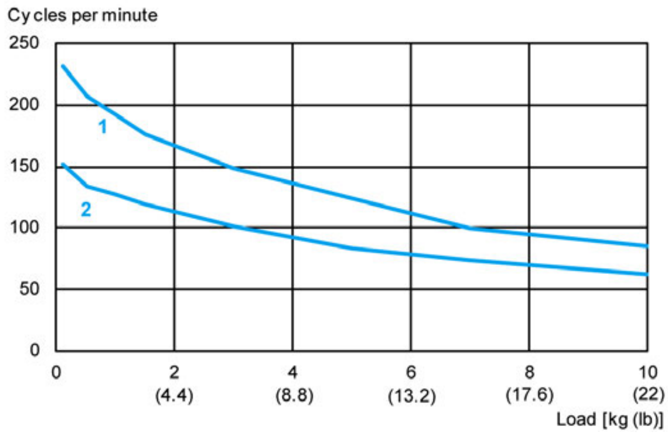
1 15 x 200 x 15 mm (0.59 x 7.9 x 0.59 in)

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

Cycle Times of Robot VRKP1

The following measurements are performed at an ambient temperature of 20 °C (68 °F) with a PacDrive 3 and use the `SchneiderElectricRobotics` library.

Path Z1 x Y x Z2 in mm (in)	Load [kg (lb)]	Cycle times [s][1]	Cycles per minute
15 x 200 x 15 (0.59 x 7.9 x 0.59)	0.1 (0.22)	0.258	232
	0.5 (1.1)	0.290	207
	1.0 (2.2)	0.313	192
	1.5 (3.3)	0.340	176
	3.0 (6.6)	0.405	148
	5.0 (11)	0.483	124
	7.0 (15.4)	0.607	99
	10.0 (22)	0.708	85
25 x 305 x 25 (0.98 x 12 x 0.98)	0.1 (0.22)	0.313	192
	0.5 (1.1)	0.352	171
	1.0 (2.2)	0.397	151
	1.5 (3.3)	0.426	141
	3.0 (6.6)	0.502	120
	5.0 (11)	0.618	97
	7.0 (15.4)	0.732	82
	10.0 (22)	0.817	73
70 x 400 x 70 (2.76 x 15.7 x 2.76)	0.1 (0.22)	0.396	152
	0.5 (1.1)	0.447	134
	1.0 (2.2)	0.470	128
	1.5 (3.3)	0.503	119
	3.0 (6.6)	0.592	101
	5.0 (11)	0.719	83
	7.0 (15.4)	0.825	73
	10.0 (22)	0.964	62
(1) Cycle times contain the back and forth motion. A position is considered as reached when the robot remains permanently in a window of +/-0.25 mm (0.0098 in) around the target position.			



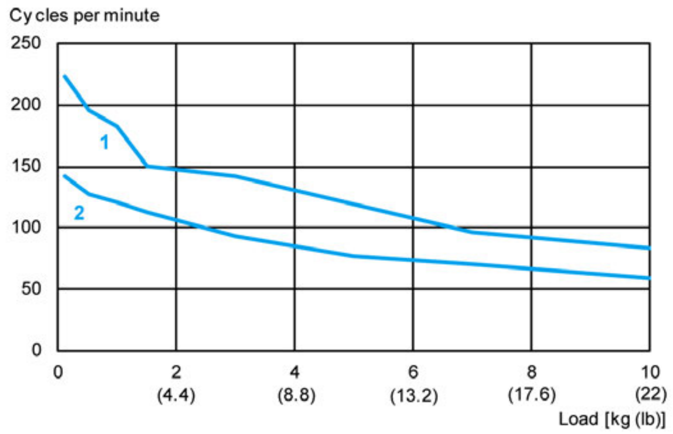
1 15 x 200 x 15 mm (0.59 x 7.9 x 0.59 in)

2 70 x 400 x 70 mm (2.76 x 15.7 x 2.76 in)

Cycle Times of Robot VRKP1•••••••E00

The following measurements are performed at an ambient temperature of 20 °C (68 °F) with a PacDrive 3 and use the `SchneiderElectricRobotics` library.

Path Z1 x Y x Z2 in mm (in)	Load [kg (lb)]	Cycle times [s](1)	Cycles per minute
15 x 200 x 15 (0.59 x 7.9 x 0.59)	0.1 (0.22)	0.269	223
	0.5 (1.1)	0.306	196
	1.0 (2.2)	0.330	182
	1.5 (3.3)	0.400	150
	3.0 (6.6)	0.422	142
	5.0 (11)	0.505	119
	7.0 (15.4)	0.616	97
	10.0 (22)	0.719	83
25 x 305 x 25 (0.98 x 12 x 0.98)	0.1 (0.22)	0.329	183
	0.5 (1.1)	0.385	156
	1.0 (2.2)	0.426	141
	1.5 (3.3)	0.444	135
	3.0 (6.6)	0.532	113
	5.0 (11)	0.629	95
	7.0 (15.4)	0.741	81
	10.0 (22)	0.841	71
70 x 400 x 70 (2.76 x 15.7 x 2.76)	0.1 (0.22)	0.423	142
	0.5 (1.1)	0.469	128
	1.0 (2.2)	0.498	121
	1.5 (3.3)	0.536	112
	3.0 (6.6)	0.644	93
	5.0 (11)	0.775	77
	7.0 (15.4)	0.845	71
	10.0 (22)	1.019	59
(1) Cycle times contain the back and forth motion. A position is considered as reached when the robot remains permanently in a window of +/-0.25 mm (0.0098 in) around the target position.			



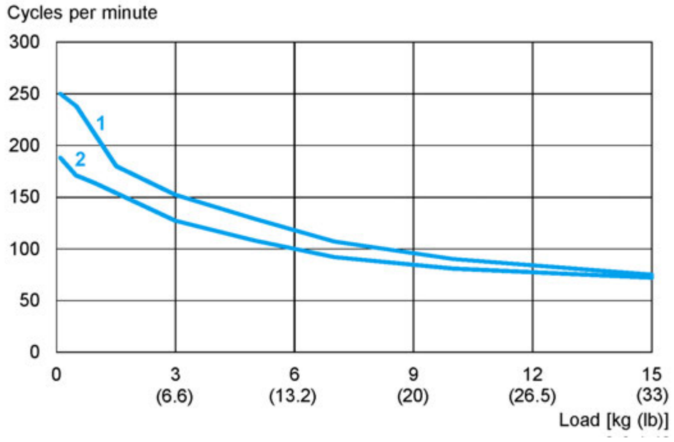
1 15 x 200 x 15 mm (0.59 x 7.9 x 0.59 in)

2 70 x 400 x 70 mm (2.76 x 15.7 x 2.76 in)

Cycle Times of Robot VRKP2

The following measurements are performed at an ambient temperature of 20 °C (68 °F) with a PacDrive 3 and use the `SchneiderElectricRobotics` library.

Path Z1 x Y x Z2 in mm (in)	Load [kg (lb)]	Cycle times [s][1]	Cycles per minute
25 x 305 x 25 (0.98 x 12 x 0.98)	0.1 (0.22)	0.24	250
	0.5 (1.1)	0.252	238
	1.0 (2.2)	0.287	209
	1.5 (3.3)	0.333	180
	3.0 (6.6)	0.396	152
	5.0 (11)	0.464	129
	7.0 (15.4)	0.56	107
	10.0 (22)	0.665	90
	15.0 (33)	0.801	75
70 x 400 x 70 (2.76 x 15.7 x 2.76	0.1 (0.22)	0.32	188
	0.5 (1.1)	0.35	171
	1.0 (2.2)	0.369	163
	1.5 (3.3)	0.39	154
	3.0 (6.6)	0.473	127
	5.0 (11)	0.556	108
	7.0 (15.4)	0.652	92
	10.0 (22)	0.743	81
	15.0 (33)	0.853	70
(1) Cycle times contain the back and forth motion. A position is considered as reached when the robot remains permanently in a window 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)

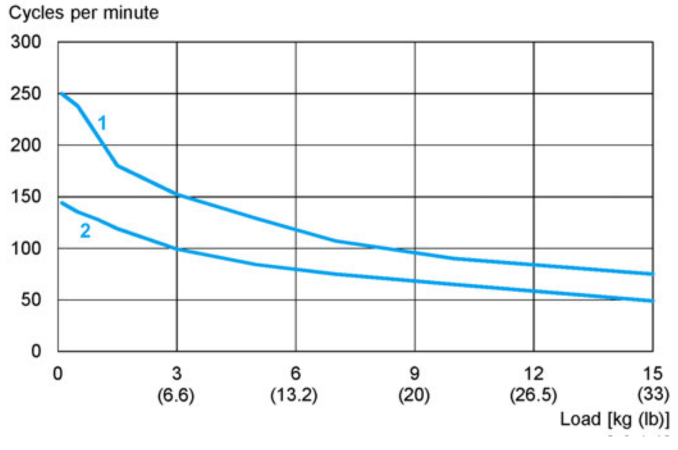
2 70 x 400 x 70 mm (2.76 x 15.7 x 2.76 in)

Cycle Times of Robot VRKP4

The following measurements are performed at an ambient temperature of 20 °C (68 °F) with a PacDrive 3 and use the `SchneiderElectricRobotics` library.

Path Z1 x Y x Z2 in mm (in)	Load [kg (lb)]	Cycle times [s](1)	Cycles per minute
25 x 305 x 25 (0.98 x 12 x 0.98)	0.1 (0.22)	0.288	208
	0.5 (1.1)	0.32	188
	1.0 (2.2)	0.325	185
	1.5 (3.3)	0.355	169
	3.0 (6.6)	0.424	142
	5.0 (11)	0.497	121
	7.0 (15.4)	0.537	112
	10.0 (22)	0.659	91
	15.0 (33)	0.924	65
70 x 400 x 70 (2.76 x 15.7 x 2.76)	0.1 (0.22)	0.325	185
	0.5 (1.1)	0.362	166
	1.0 (2.2)	0.375	160
	1.5 (3.3)	0.401	150
	3.0 (6.6)	0.471	127
	5.0 (11)	0.557	108
	7.0 (15.4)	0.617	97
	10.0 (22)	0.701	86
	15.0 (33)	0.985	61
90 x 700 x 90 (3.54 x 27.6 x 3.54)	0.1 (0.22)	0.418	144
	0.5 (1.1)	0.444	135
	1.0 (2.2)	0.469	128
	1.5 (3.3)	0.506	119
	3.0 (6.6)	0.607	99
	5.0 (11)	0.713	84
	7.0 (15.4)	0.803	75
	10.0 (22)	0.925	65
	15.0 (33)	1.223	49

(1) Cycle times contain the back and forth motion. A position is considered as reached when the robot remains permanently in a window of +/-0.25 mm (0.0098 in) around the target position.



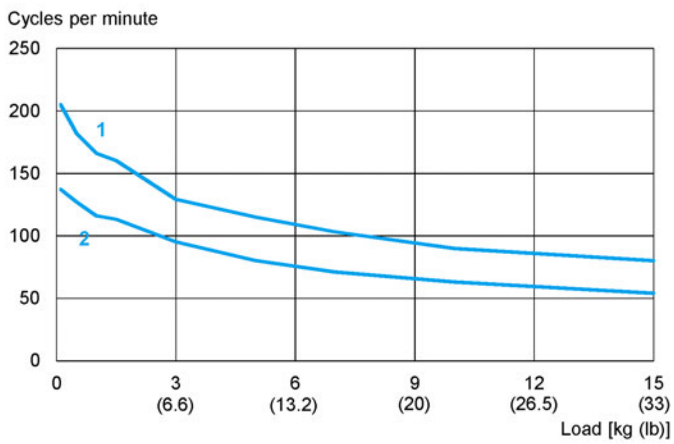
1 25 x 305 x 25 mm (0.98 x 12 x 0.98 in)

2 90 x 700 x 90 mm (3.54 x 27.6 x 3.54 in)

Cycle Times of Robot VRKP5

The following measurements are performed at an ambient temperature of 20 °C (68 °F) with a PacDrive 3 and use the `SchneiderElectricRobotics` library.

Path Z1 x Y x Z2 in mm (in)	Load [kg (lb)]	Cycle times [s][1]	Cycles per minute
25 x 305 x 25 (0.98 x 12 x 0.98)	0.1 (0.22)	0.292	205
	0.5 (1.1)	0.330	182
	1.0 (2.2)	0.362	166
	1.5 (3.3)	0.374	160
	3.0 (6.6)	0.466	129
	5.0 (11)	0.520	115
	7.0 (15.4)	0.584	103
	10.0 (22)	0.668	90
	15.0 (33)	0.754	80
70 x 400 x 70 (2.76 x 15.7 x 2.76)	0.1 (0.22)	0.340	176
	0.5 (1.1)	0.366	164
	1.0 (2.2)	0.400	150
	1.5 (3.3)	0.420	143
	3.0 (6.6)	0.490	122
	5.0 (11)	0.584	103
	7.0 (15.4)	0.622	97
	10.0 (22)	0.732	82
	15.0 (33)	0.926	65
90 x 700 x 90 (3.54 x 27.6 x 3.54)	0.1 (0.22)	0.438	137
	0.5 (1.1)	0.472	127
	1.0 (2.2)	0.518	116
	1.5 (3.3)	0.530	113
	3.0 (6.6)	0.632	95
	5.0 (11)	0.750	80
	7.0 (15.4)	0.843	71
	10.0 (22)	0.956	63
	15.0 (33)	1.102	54
(1) Cycle times contain the back and forth motion. A position is considered as reached when the robot remains permanently in a window 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 90 x 700 x 90 mm (3.54 x 27.6 x 3.54 in)

Cycle Times of Robot VRKP6

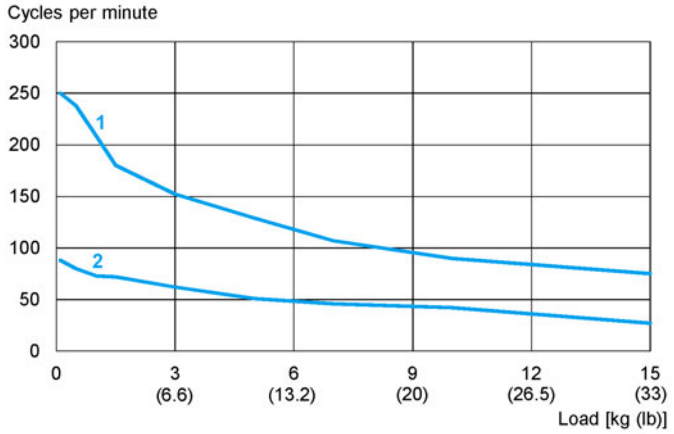
The following measurements are performed at an ambient temperature of 20 °C (68 °F) with a PacDrive 3 and use the `SchneiderElectricRobotics` library.

Path Z1 x Y x Z2 in mm (in)	Load [kg (lb)]	Cycle times [s][1]	Cycles per minute
25 x 305 x 25 (0.98 x 12 x 0.98)	0.1 (0.22)	0.333	180
	0.5 (1.1)	0.368	163
	1.0 (2.2)	0.405	148
	1.5 (3.3)	0.465	129
	3.0 (6.6)	0.499	120
	5.0 (11)	0.545	110
	7.0 (15.4)	0.595	101
	10.0 (22)	0.695	86
	15.0 (33)[2]	0.785	76
70 x 400 x 70 (2.76 x 15.7 x 2.76)	0.1 (0.22)	0.375	160
	0.5 (1.1)	0.400	150
	1.0 (2.2)	0.432	139
	1.5 (3.3)	0.449	134
	3.0 (6.6)	0.512	117
	5.0 (11)	0.595	101
	7.0 (15.4)	0.724	83
	10.0 (22)	0.811	74
	15.0 (33)[2]	0.986	61
90 x 700 x 90 (3.54 x 27.6 x 3.54)	0.1 (0.22)	0.509	118
	0.5 (1.1)	0.523	115
	1.0 (2.2)	0.564	106
	1.5 (3.3)	0.583	103
	3.0 (6.6)	0.707	85
	5.0 (11)	0.799	75
	7.0 (15.4)	0.899	67
	10.0 (22)	0.985	61
	15.0 (33)[2]	1.274	47

Path Z1 x Y x Z2 in mm (in)	Load [kg (lb)]	Cycle times [s](1)	Cycles per minute
110 x 1300 x 110 (4.3 x 51 x 4.3)	0.1 (0.22)	0.685	88
	0.5 (1.1)	0.749	80
	1.0 (2.2)	0.819	73
	1.5 (3.3)	0.835	72
	3.0 (6.6)	0.963	62
	5.0 (11)	1.170	51
	7.0 (15.4)	1.314	46
	10.0 (22)	1.436	42
	15.0 (33)(2)	2.250	27

(1) Cycle times contain the back and forth motion. A position is considered as reached when the robot remains permanently in a window of +/-0.25 mm (0.0098 in) around the target position.

(2) Loads up to 10 kg (22 lb). Heavier payloads of up to 15 kg (33 lb) upon request. If required, contact your local Schneider Electric service representative.



1 25 x 305 x 25 mm (0.98 x 12 x 0.98 in)

2 110 x 1300 x 110 mm (4.3 x 51 x 4.3 in)

Load Capacity Diagram

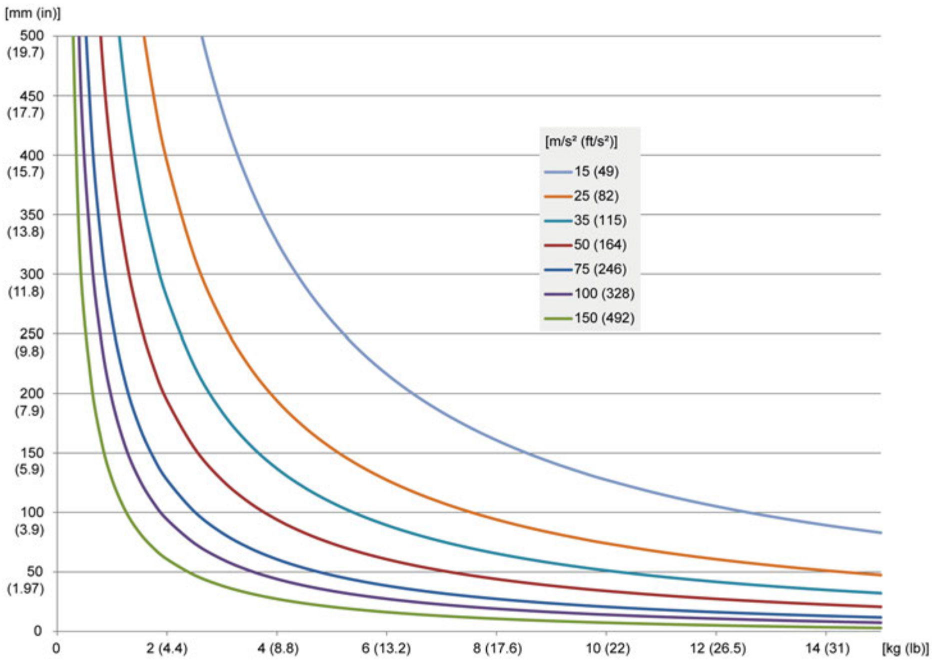
Overview

The two load diagrams show the maximum permissible distance of the mass center of gravity from the Flange Center Point (FCP) for a given acceleration relative to the mass. For detailed information, refer to the respective dimensional drawing in *Mechanical and Electrical Data*, page 33.

The limit values for the maximum tilting torque must always be complied with.

Maximum Tilting Torque (Vertical Distance From the FCP)

The loading capacity of the Lexium P robots is limited by the maximum tilting torque at the FCP. The following diagram shows the possible vertical distance of the mass center of gravity of the payload relative to the mass and the required maximum acceleration.



A maximum tilting torque of 20 Nm (177 lbf-in) is to be observed at the FCP.

Calculate the tilting torque with the following formula:

Tilting torque [Nm (lbf-in)] = payload [kg (lb)] x maximum acceleration [m/s^2 (ft/s^2)] x (vertical distance from the FCP [m (in)] + 0.006 m (0.236 in))

Positioning Performance

Overview

The following diagrams specify the performance of the telescopic axis and show that, in addition to the movement time, the rotation of the axis also requires time. In many applications the rotation of the rotational axis is the limiting element. An observation of its performance is inevitable for the layout of an application.

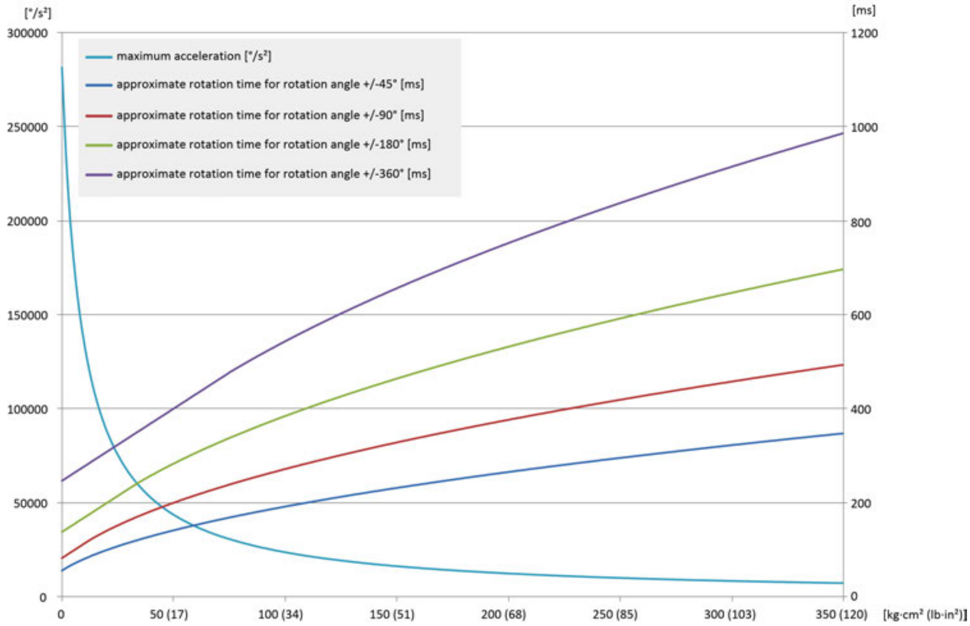
The diagrams show the movement time (Y2-axis), that is, the time required by the telescopic axis in order to rotate forward and backward by the specified angle.

The specified moment of inertia (X-axis) refers to the sum of the moments of inertia of the gripper and the customer end product. The inertia of the axis is already comprised in the diagram.

NOTE: When using the `SchneiderElectricRobotics` library the performance of the rotational axis is adapted automatically; specifying or determining the moments of inertia is not required.

Positioning Performance of the Telescopic Axes

The following graph presents the positioning performance of the telescopic axes of the Lexium P robots when the center of gravity of the gripper and the customer end product is located centrally under the telescopic axis (lateral displacement = 0).



Design of the Robot Frame

Design of the Robot Frame

System Requirements

Use the Lexium P robot for ceiling mounting. For special applications with an angularly suspended robot system, contact your local Schneider Electric service representative.

- Delta-3 robot of the Lexium P reach their highest level of performance and accuracy in the center of the working space.
- Position the robot to locate the movements to be executed as closely as possible to the center of the working space.
- 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. 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 the constant forces and torques stated below, but also have sufficient stiffness so that the deformations and vibrations which occur do not lead to any major deviations on the TCP. Ensure a sufficient transverse bracing in the frame.

Note the forces and torques to be taken up by the frame during normal operation:

Parameter	Value
Static load	approximately 1.2 kN (270 lbf)
Dynamic load	approximately 1.4 kN (315 lbf) in any direction
Dynamic torque	approximately 2000 Nm (17701 lbf-in)

Fasten the robot with three screws of property class 8.8 or greater, or A2-70 or greater.

For further information, refer to the respective dimensional drawing in *Mechanical and Electrical Data*, page 33.

NOTE: The configuration of the robot mechanics, the TCP velocity, as well as the additional payload have an effect on the total energy, which can potentially cause damage.

⚠ 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.

For further information about travel path and power loss, refer to *Run-on Motions of the Robot for Risk Analysis*, page 110.

Interference Contours in the Enclosure

When designing the enclosure, ensure that the upper and lower arms of the robot will have sufficient freedom of movement. Take into account the required space for the movement of the respective robot type and associated equipment.

The following table presents the type of the mounting surface and space in which the robot must be operated.

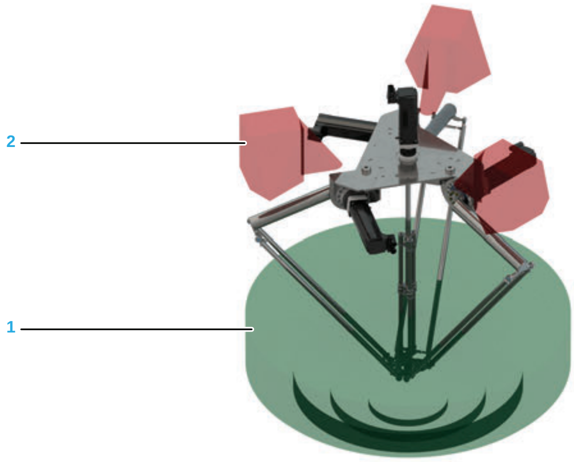
Robot type	Type of mounting surface and space
VRKP0•••WF	On a closed mounting surface (except for the mounting holes and the cable gland).
VRKP0•••NC	On a mounting surface with open spaces.
VRKP0•••WF••E00	On a closed mounting surface (except for the mounting holes and the cable gland).
VRKP0•••NC••E00	On a mounting surface with open spaces.
VRKP1•••WF	On a closed mounting surface (except for the mounting holes and the cable gland).
VRKP1•••NC	On a mounting surface with open spaces.
VRKP1•••WF••E00	On a closed mounting surface (except for the mounting holes and the cable gland).
VRKP1•••NC••E00	On a mounting surface with open spaces.
VRKP2•••NC	On a mounting surface with open spaces.
VRKP2•••WD VRKP2•••WF	On a closed mounting surface (except for the mounting holes and the cable gland).
VRKP4•••WD / VRKP4•••NO	On a closed mounting surface (except for the mounting holes and the cable gland).
VRKP4•••WF	On a closed mounting surface with limited working space or with entire working space on a mounting surface with open spaces.
VRKP4•••NC	On a mounting surface with open spaces.

Robot type	Type of mounting surface and space
VRKP5•••WF	On a closed mounting surface with limited working space or with entire working space on a mounting surface with open spaces.
VRKP5•••NC	On a mounting surface with open spaces.
VRKP6•••WF	On a closed mounting surface with limited working space or with entire working space on a mounting surface with open spaces.
VRKP6•••NC	On a mounting surface with open spaces.
VRKP6•••WF••E00	On a closed mounting surface with limited working space or with entire working space on a mounting surface with open spaces.
VRKP6•••NC••E00	On a mounting surface with open spaces.

For further information, refer to the respective dimensional drawing in *Mechanical and Electrical Data*, page 33.

The following figures illustrate the interference areas of the mounting surface for the different robot types.

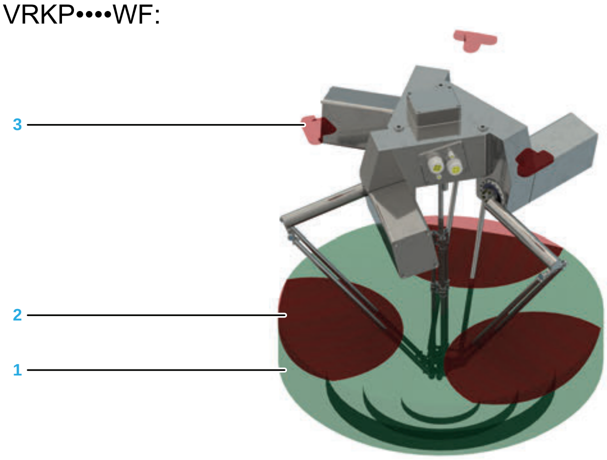
VRKP••••NC:



1 Working space

2 Interference area

VRKP••••WF:

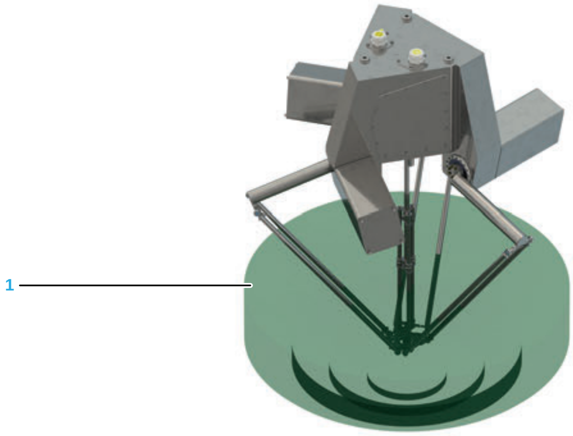


1 Working space

2 Unavailable working space on a closed mounting surface (not for VRKP0, VRKP1 and VRKP2)

3 Interference area (not for VRKP0, VRKP1 and VRKP2)

VRKP••••WD / VRKP••••NO:



1 Working space

For detailed information about the interference areas caused by upper and lower arm movements, refer to the 3D-CAD data on the Schneider Electric homepage (www.se.com) or contact your local Schneider Electric service representative.

Run-On Motions of the Robot for Risk Analysis

Run-On Motions of the Robot for Risk Analysis

Overview

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

⚠ WARNING

BREAKDOWN OF THE INTERNAL MOTOR HOLDING BRAKE

- Do not consider the internal motor holding brake to be a functional safety device.
- Take into account a possible breakdown of the internal motor holding brake during your safety analysis.
- Take into account that the internal motor holding brake of the robot only withstands a limited number of brake operations.

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

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

⚠ WARNING

LEAVING THE PLANNED TRAJECTORY OF THE ROBOT MECHANICS

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

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

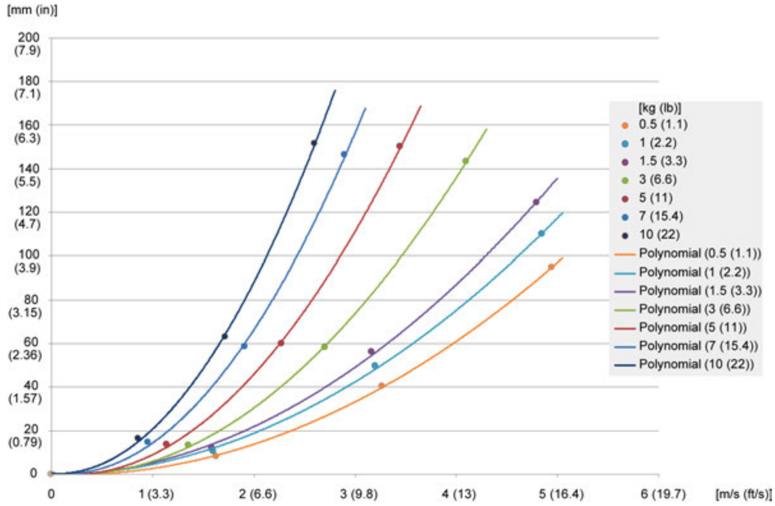
Stop Function Categories

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

Stop function category	Definition	Corresponds to
0	Stopping by immediate removal of power to the 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).

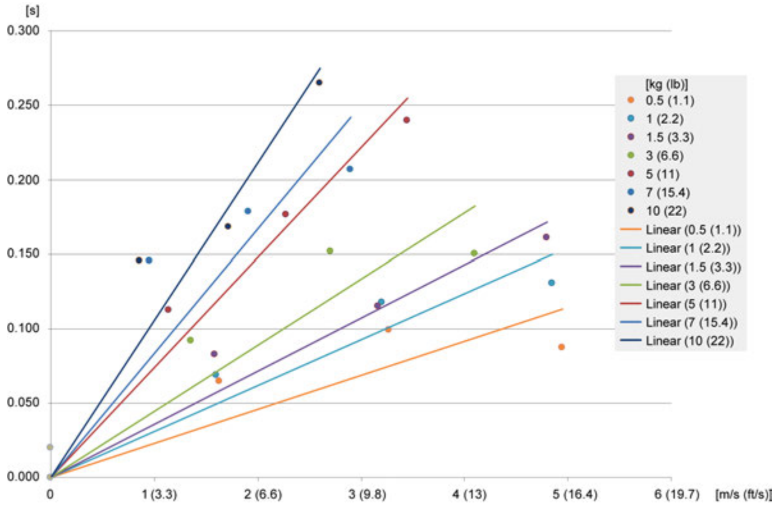
Run-On Path Robot VRKP0

Run-on path of the robot VRKP0 for stop category 0:



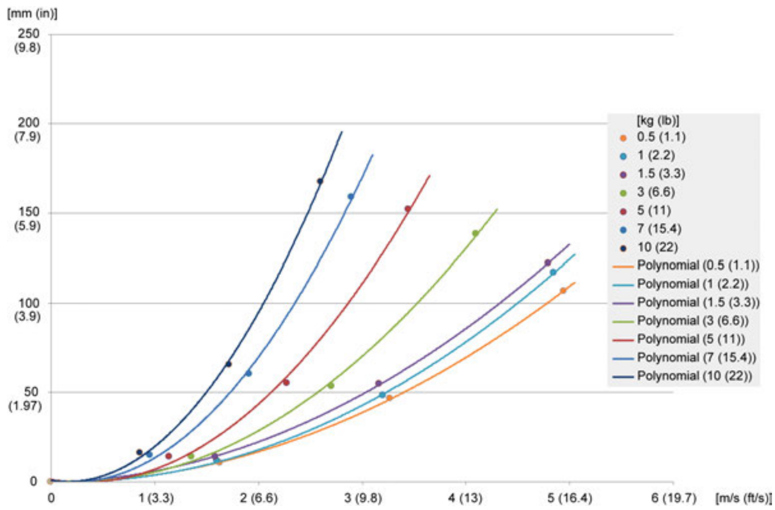
For further information, refer to IEC 60204-1. If necessary, use the holding brake for a stop category 0.

Stopping time of the robot VRKP0 for stop category 0:



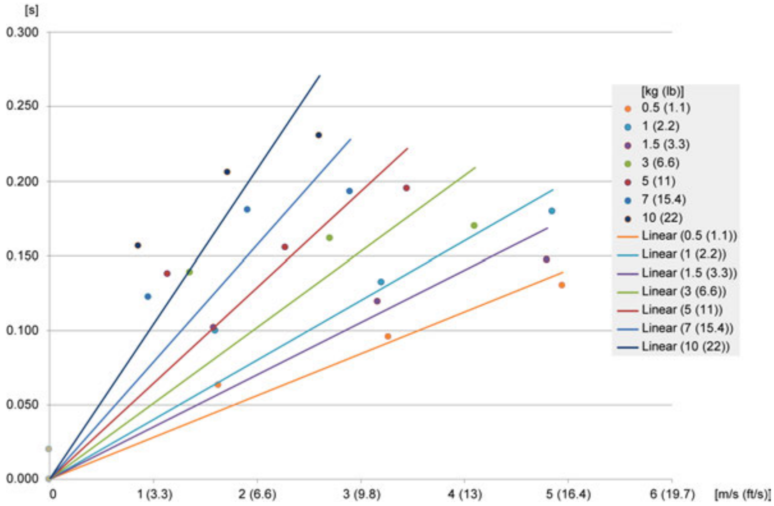
Run-On Path Robot VRKP0•••••••E00

Run-on path of the robot VRKP0•••••••E00 for stop category 0:



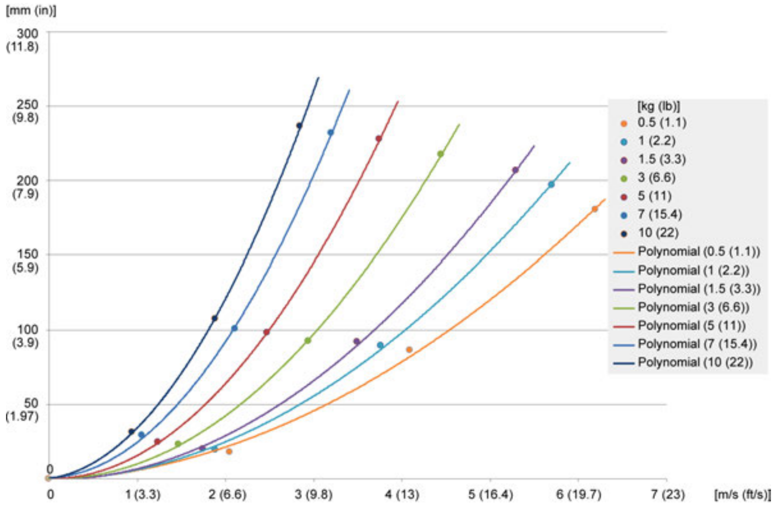
For further information, refer to IEC 60204-1. If necessary, use the holding brake for a stop category 0.

Stopping time of the robot VRKP0•••••••E00 for stop category 0:



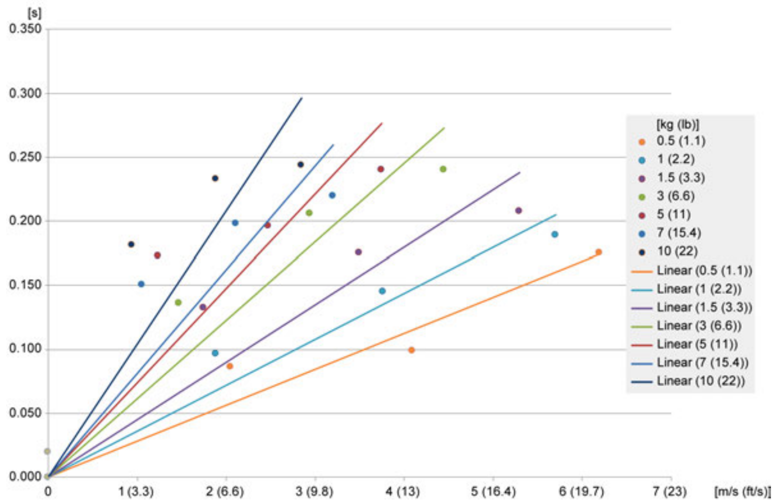
Run-On Path Robot VRKP1

Run-on path of the robot VRKP1 for stop category 0:



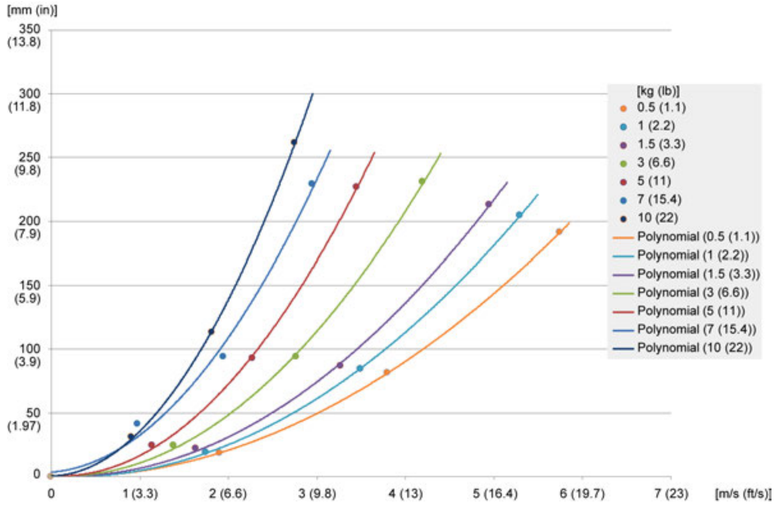
For further information, refer to IEC 60204-1. If necessary, use the holding brake for a stop category 0.

Stopping time of the robot VRKP1 for stop category 0:



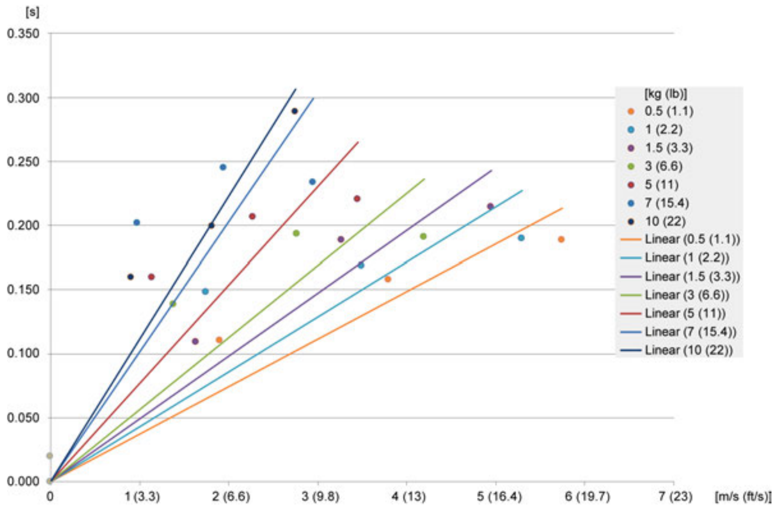
Run-On Path Robot VRKP1•••••••E00

Run-on path of the robot VRKP1•••••••E00 for stop category 0:



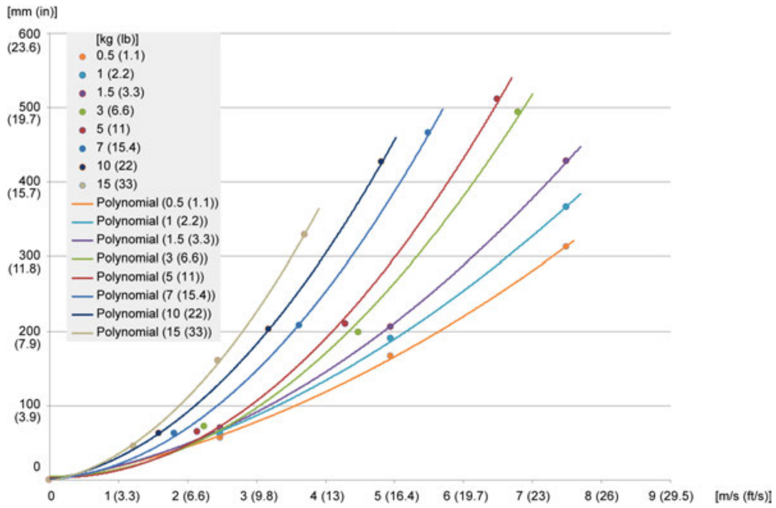
For further information, refer to IEC 60204-1. If necessary, use the holding brake for a stop category 0.

Stopping time of the robot VRKP1•••••••E00 for stop category 0:



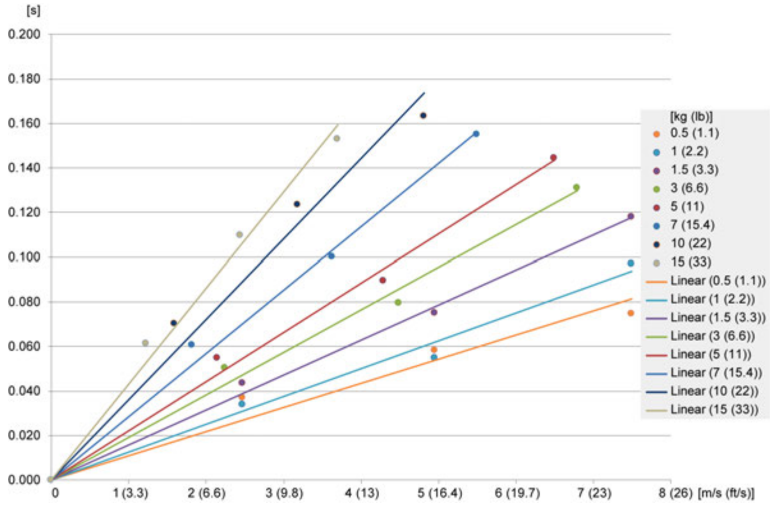
Run-On Path Robot VRKP2

Run-on path of the robot VRKP2 for stop category 0:



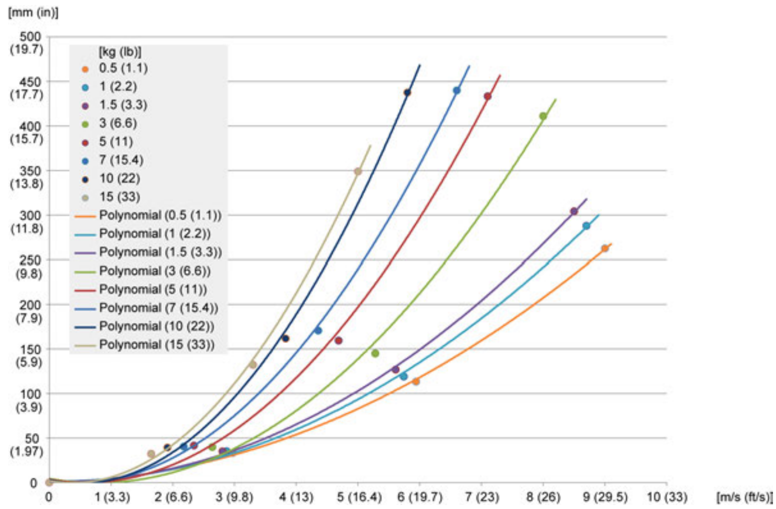
For further information, refer to IEC 60204-1. If necessary, use the holding brake for a stop category 0.

Stopping time of the robot VRKP2 for stop category 0:



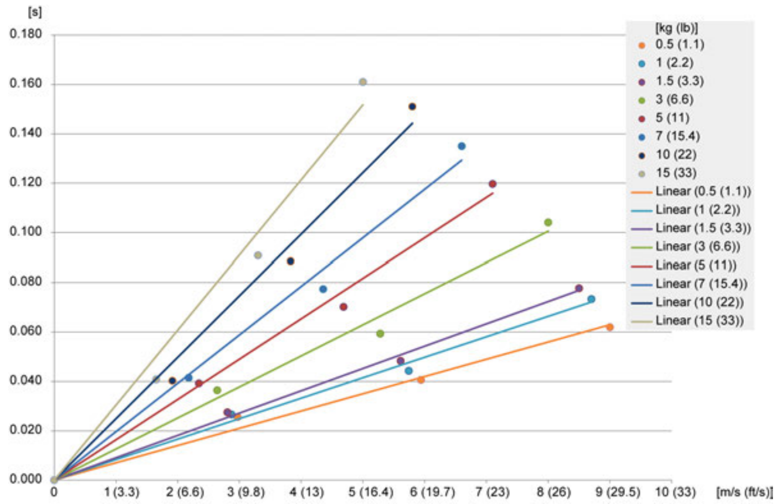
Run-On Path Robot VRKP4

Run-on path of the robot VRKP4 for stop category 0:



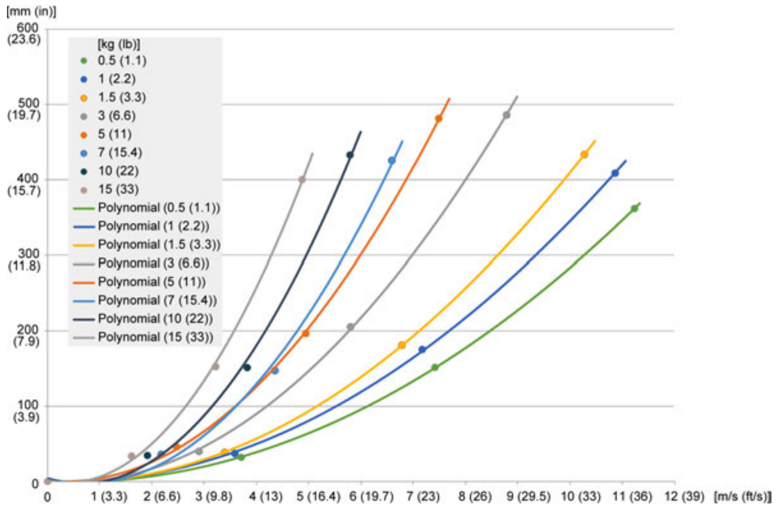
For further information, refer to IEC 60204-1. If necessary, use the holding brake for a stop category 0.

Stopping time of the robot VRKP4 for stop category 0:



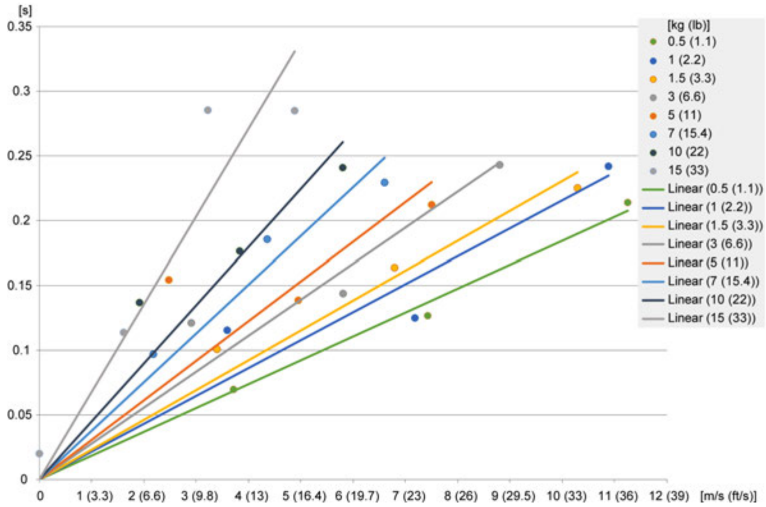
Run-On Path Robot VRKP5

Run-on path of the robot VRKP5 for stop category 0:



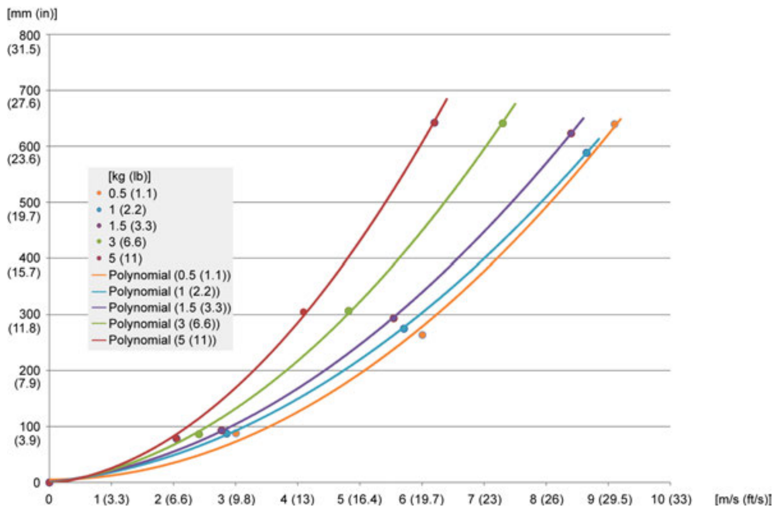
For further information, refer to IEC 60204-1. If necessary, use the holding brake for a stop category 0.

Stopping time of the robot VRKP5 for stop category 0:



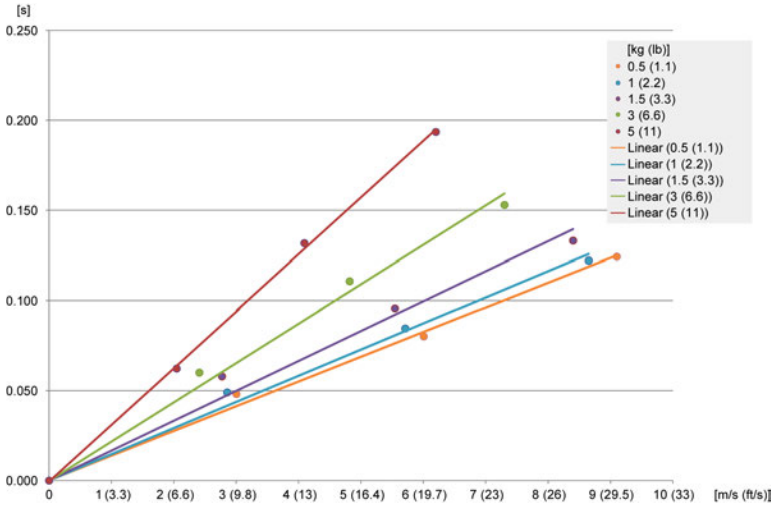
Run-On Path Robot VRKP6

Run-on path of the robot VRKP6 for stop category 0:



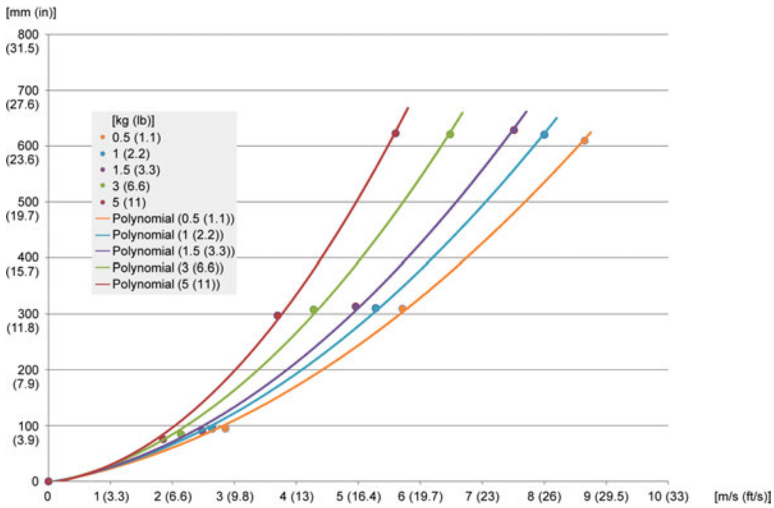
For further information, refer to IEC 60204-1. If necessary, use the holding brake for a stop category 0.

Stopping time of the robot VRKP6 for stop category 0:



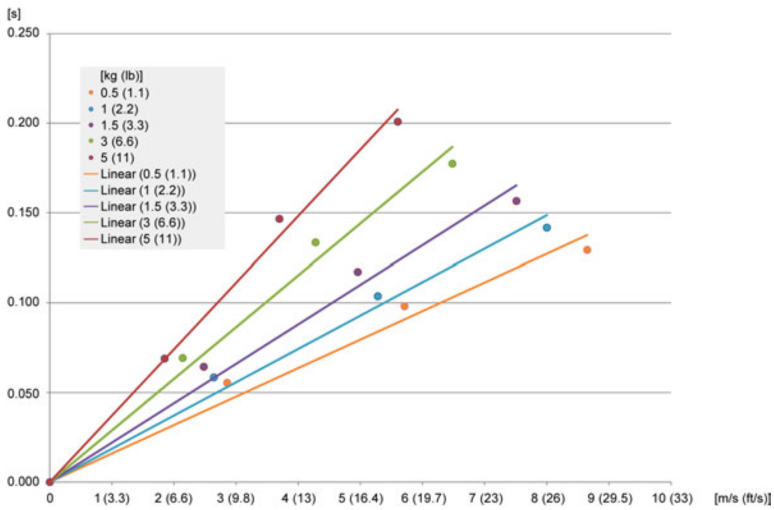
Run-On Path Robot VRKP6•••••••E00

Run-on path of the robot VRKP6•••••••E00 for stop category 0:



For further information, refer to IEC 60204-1. If necessary, use the holding brake for a stop category 0.

Stopping time of the robot VRKP6•••••••E00 for stop category 0:



Technical Data of the Motor and the Gearbox

Technical Data of the Motor and the Gearbox

Overview

For further information about the motor, record the motor reference on the type plate and refer to the corresponding motor manual.

For further information about the gearbox, record the gearbox reference on the type plate and refer to the corresponding gearbox manual.

Third-Party Motors

When using a third-party motor, take special care that the maximum permissible drive torque is not exceeded. Otherwise the robot could be rendered inoperable.

⚠WARNING
UNINTENDED MOVEMENTS Observe the maximum permissible drive torque of the corresponding motor and gearbox. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

The following table presents the maximum permissible torques at the respective axes.

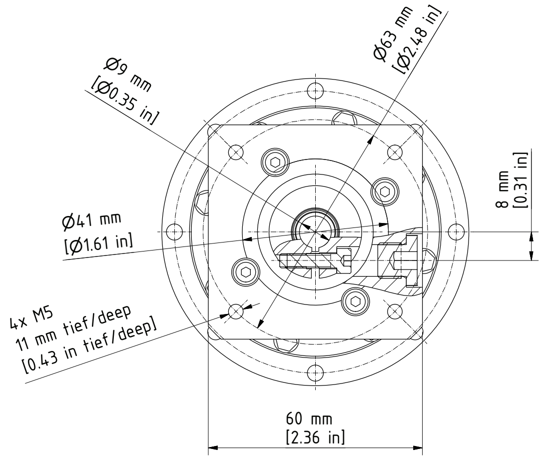
Parameter	Unit	Robot type	
		VRKP0WM, VRKP0WM•••••E00, VRKP1WM, VRKP1WM•••••E00	**VRKP2WM, VRKP4WM, VRKP5WM, VRKP6WM, VRKP6WM•••••E00**
Maximum drive torque on the input side of the gearbox at the main axes M_{max}	Nm (lbf-in)	0.9 (7.9)	4 (35.4)
Maximum speed on the input side of the gearbox at the main axes	1/min	7500	
Maximum drive torque on the input side of the gearbox at the rotational axis M_{max}	Nm (lbf-in)	0.45 (4)	
Maximum speed on the input side of the gearbox at the rotiaional axis	1/min	13000	

NOTE: When using a third-party motor, the protection class of the robot can deviate from that which is stated in *Mechanical and Electrical Data*, page 33. Verify that the protection class corresponds to the environments specified for the robot.

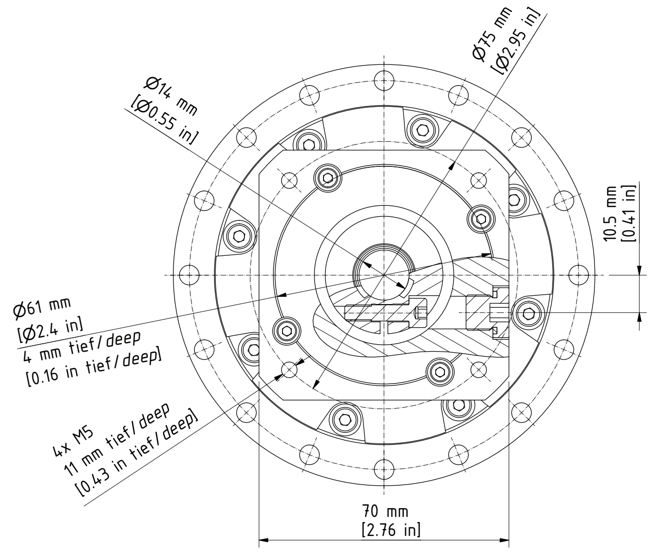
For information about mounting the motor to the gearbox, refer to the corresponding gearbox manual.

The following figure shows the dimensions of the input side of the adapter plate of the gearboxes at the main axes.

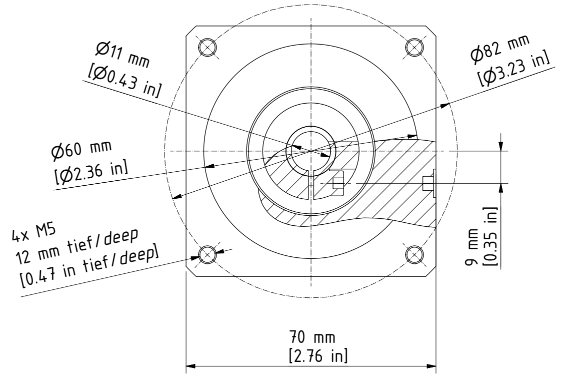
VRKP0WM, VRKP0WM•••••E00, VRKP1WM, VRKP1WM•••••E00



VRKP2WM, VRKP4WM, VRKP5WM, VRKP6WM, VRKP6WM•••••E00



The following figure shows the dimensions of the input side of the adapter plate of the gearbox at the rotational axis.



Transport and Commissioning

Transport and Unpacking

Transport and Storage

Transport Conditions

The Lexium P 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. You can find the total weight of your equipment on the container or in the transport documents.

For detailed information about transport conditions, refer to *Ambient Conditions*, page 32.

Storage

The Lexium P 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.

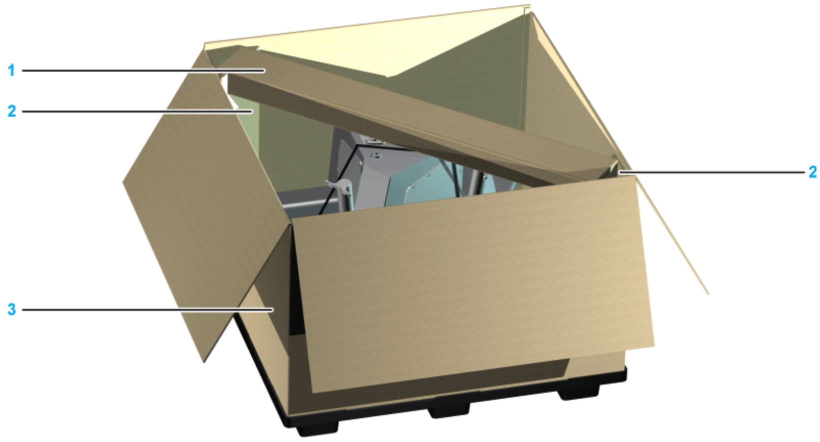
For detailed information about storage conditions, refer to *Ambient Conditions*, page 32.

Unpacking

Overview

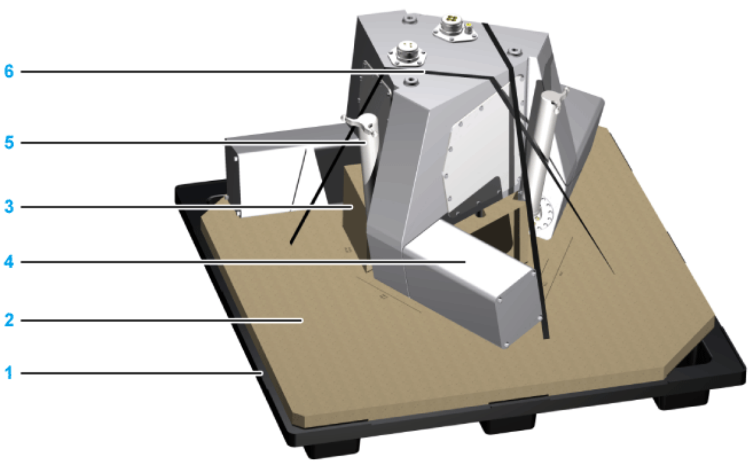
The following figures show the procedure to unpack and prepare the robot as an example.

Removing the Outer Carton

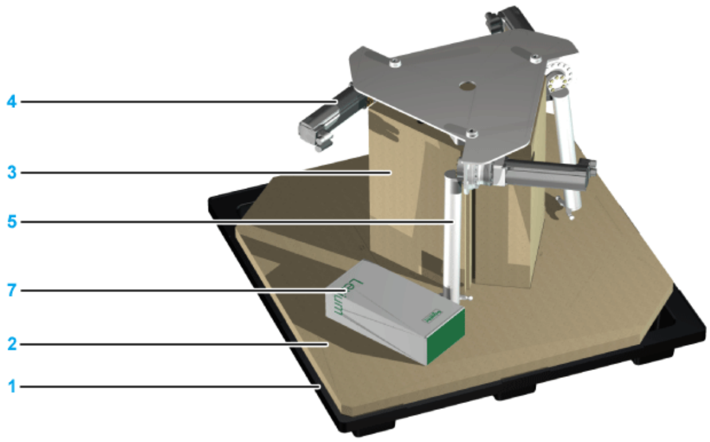
Step	Action
1	Remove the lashing straps from the outer carton.
2	Open the outer carton on the top side and remove the accessories box (1). 
3	Remove both triangular supports (2).
4	Lift up and remove the outer carton (3).

Presentation of the Robot Packaging

The following figure shows the packaging of robots VRKP0, VRKP1, VRKP2, VRKP4, VRKP5, and VRKP6•••WF.



The following figure shows the packaging of robot VRKP6•••NC.



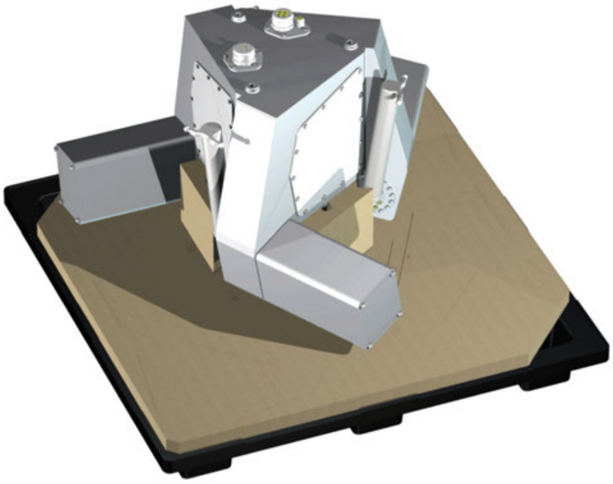
1	Plastic pallet (120 x 120 cm (47 in x 47 in))		5	Upper arms in transportation position
2	Base carton		6	Lashing straps
3	Carton block (where the housing sits)		7	Package containing the rotational axis motor and gearbox
4	Motor covers (suspended above the base carton)			

NOTE: In case of VRKP•••MNC the motorized module is packed inside the robot packaging in a carton.

Preparing the Robot for Installation

Refer to the previous figures under *Presentation of the Robot Packaging*, page 120 for the following steps:

Step	Action
1	Remove the robot lashing straps (6).
2	Only for VRKP6 robots with a rotational axis (VRKP6••R): Remove the additional carton containing the rotational motor and gearbox (7).
3	Verify the robot for transport damage.

Step	Action
4	Open the accessories box and verify all included parts for transport damage and completeness. It must contain: • 1x telescopic axis (only for robots with a rotational axis: VRKP•••R) • 3x lower arm pairs • 1x parallel plate • 1x instruction sheet for Lexium P robot (PKR43194) • 33x screws with sealing washers for maintenance covers (only for robots with a standard housing: VRKP••••WD / VRKP••••NO) • 3x cable glands (only for robots VRKP2S0•WD / VRKP4S0•WD / VRKP4S0•NO)
5	Only for robots with a standard housing (VRKP••••WD / VRKP••••NO): Remove the three bolts of each maintenance cover and remove the maintenance covers. 

NOTE: The variants VRKP4L0•WD / VRKP4L0•NO only have one media cover on the upper side. The second aperture is not covered at this variant and must remain open for ventilation.

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

For information on the disposal of the packaging, refer to *Disposal*, page 298.

Mechanical Installation

Information About Installation

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 *Hazard Information*, page 12.

Mounting the Robot

Overview

There are two ways of proceeding for handling and mounting of the robot. Study both ways of proceeding and determine which one would be appropriate for your environment.

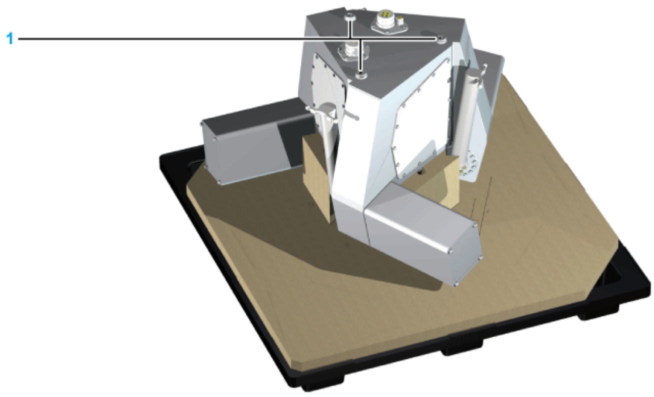
Installing by Forklift Truck

⚠WARNING

FALLING LOADS

- Drive slowly and carefully with the forklift truck.
- Do not carry out any sudden steering movements.
- Exercise care when initiating height adjustments of the forklift truck loading platform.

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

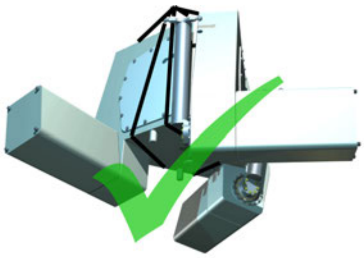
Step	Action
1	Using a forklift truck, lift the robot and the pallet into the enclosure. 
2	Fasten the robot to the frame by using the three provided threaded holes (1). Tightening torque and size of the threaded holes: • At VRKP0 / VRKP1: Size: M12 Tightening torque: 54 Nm (478 lbf-in) • At VRKP2 / VRKP4 / VRKP5 / VRKP6: Size: M16 Tightening torque: 100 Nm (855 lbf-in) Property class of the screws: 8.8 or greater, or A2-70 or greater 
3	Remove the carton block, the base carton, and the plastic pallet from the robot.

For information on the disposal of the packaging, refer to *Disposal*, page 298.

Installing by Crane

NOTE: The motor covers cannot carry the weight of the robot.

⚠WARNING
FALLING HEAVY LOAD • Attach lifting lugs to the robot body only. • Do not attach lifting lugs to the motor covers or the motors. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

Step	Action
1	Pull the three lifting lugs underneath the robot. 
2	Use the crane to carefully lift the robot into the enclosure.
3	Fasten the robot to the frame by using the three provided threaded holes (1). Tightening torque and size of the threaded holes: • At VRKP0 / VRKP1: Size: M12 Tightening torque: 54 Nm (478 lbf-in) • At VRKP2 / VRKP4 / VRKP5 / VRKP6: Size: M16 Tightening torque: 100 Nm (855 lbf-in) Property class of the screws: 8.8 or greater, or A2-70 or greater

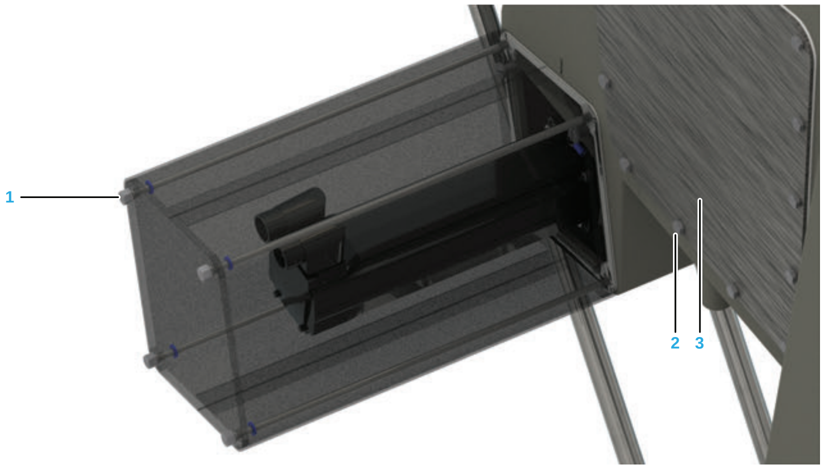
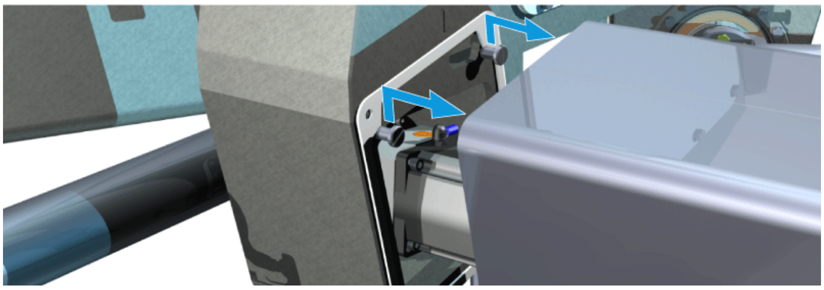
Electrical Installation

Opening the Robots VRKP••••WD / VRKP••••NO / VRKP••••WF for Cabling

Overview

The robot types VRKP••••WD / VRKP••••NO and VRKP••••WF are equipped with protective covers, which must be removed before cabling the robot.

Opening the Robots VRKP••••WD / VRKP••••NO / VRKP••••WF for Cabling

Step	Action
1	Verify whether the application requires a strain relief. **NOTE:** The motor cover is heavy (approximately 5 kg (11 lb)) and could cause damage or injury if it were to fall during removal.
2	Loosen the four threaded rods (1) at the rear end of the motor cover. 
3	Slightly lift the motor cover and remove it to the rear. 
4	Remove the screws and washers (2) from the maintenance cover (3) and then remove the maintenance cover complete with the sealing gasket.
5	Repeat the process for all the other protective covers.

⚠ CAUTION
FALLING HEAVY MOTOR COVER Secure in place the motor cover while loosening the screws. **Failure to follow these instructions can result in injury or equipment damage.**

NOTE: Keep all covers, bolts, and sealing gaskets to remount them later.

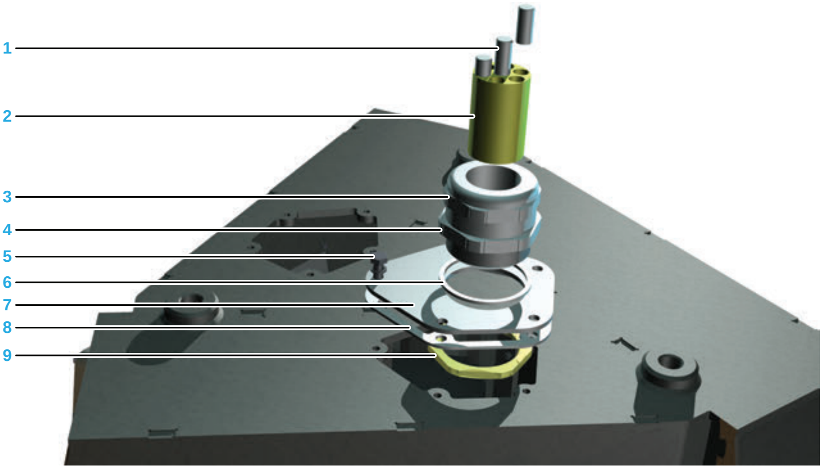
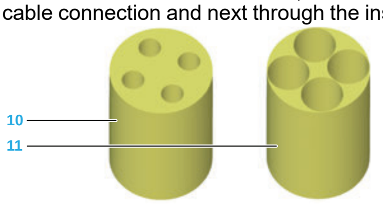
Cabling the VRKP•S0•WD

Procedure Overview

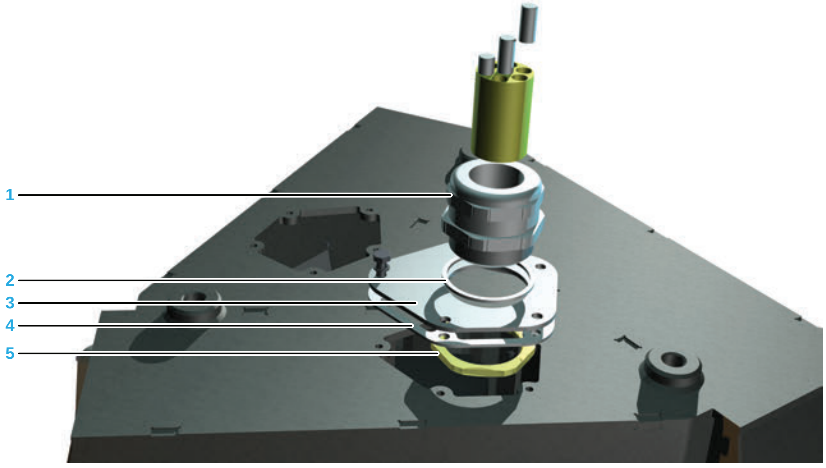
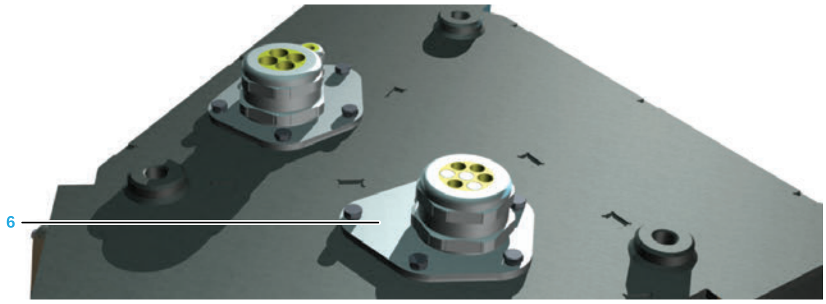
Perform the following procedures to cable the robot:

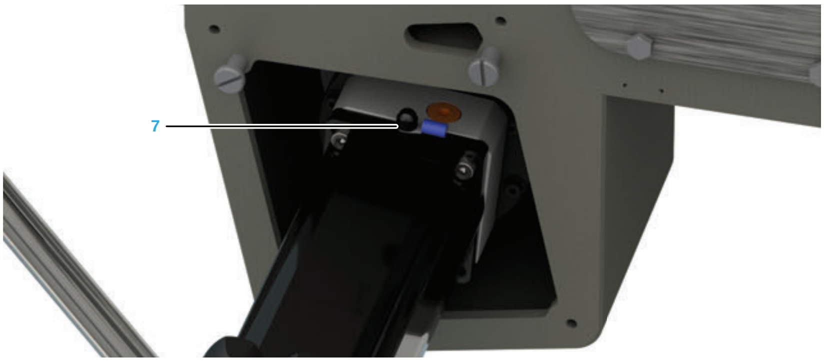
- Preparing the cable connections, page 129
- Connecting the components of the robot, page 130
- Cabling the fans (only for VRKP2S0•WD), page 132

Preparing the Cable Connections

Step	Action
1	Remove the five screws and washers (5) from the media cover (7). 
2	Remove the media cover with the mounted M50 cable connections and the media cover sealing gasket (8).
3	Dismount the two M50 cable connections: • Unscrew the M50 cable connection from the locknut (9). • Remove the sealing ring (6) from the M50 cable connection. • Unscrew the top half (3) of the M50 cable connection from the lower half (4).
4	Remove the sealing inserts (2) from the cable glands of the M50 cable connections.
5	Laterally slit each sealing insert in accordance with the respective number of cables to be routed.
6	Feed the three encoder cables (four with VRKP•••R) first through the top half of the M50 cable connection and next through the insert with the smaller apertures (10).  • Using the slits, press the cables from outside into the sealing inserts. • Feed each cable with a minimum cable length of 1.5 m (39.4 in) from the M50 cable connection to the motor connector.
7	Feed the three power cables (four with VRKP•••R) first through the top half of the M50 cable connection and next through the insert with the larger apertures (11).
8	Close any not required gland of the insert with a sealing plug (1).
9	Feed the cables through the lower half of the M50 cable connections and insert the sealing inserts into them.
10	Close the two halves of each M50 cable gland. Tightening torque: 15 Nm (133 lbf-in)

Connecting the Components of the Robot

Step	Action
1	Insert the sealing ring (2) between the M50 cable connection (1) and the media covers (3) and fasten the M50 cable connection to the media cover with the locknut (5). Tightening torque: 15 Nm (133 lbf-in) 
2	Feed the ground cables (protective earth ground) through the top half of the M16 cable connection and next through the sealing insert.
3	Only for VRKP2S0•WD: Feed the cable for fan connection (+24 Vdc supply) through the top half of the second M16 cable connection and next through the sealing insert.
4	Fasten the M16 cable connection to the media cover the same way as the M50 cable connection. Tightening torque: 6 Nm (53 lbf-in)
5	Feed the encoder cables, the power cables, and the ground cables (protective earth ground) through the media cover sealing gasket (4) and insert them into the opening of the robot housing. **NOTE:** For equipment that you are supplying that is not described in the present document, consult the documentation for those products.
6	Feed the encoder and the power cables to the motors.
7	Attach the encoder and the power cables as described in the *SH3 Servo Motor User Guide*.
8	Fasten each of the media covers including the media cover sealing gasket with the five screws and washers (6). Tightening torque: 6 Nm (53 lbf-in) 

Step	Action
9	Couple the DC buses of the servo amplifiers so that braking motors can feed back their power to the accelerating motors in the case of an on-path stop of the robot. Due to the coupling of the DC buses, the existing energy suffices in many cases for an on-path stop of the robot. In case of a power interruption of the 24 Vdc supply this backfeeding measure does not have any effect. For more information, see *Lexium 52 Hardware Guide* or *Lexium 62 Hardware Guide*. **NOTE:** When routing the cables, ensure that the grounding cap (7) remains on the ground connection of the motors. The motor supply cable may become damaged by the thread of the ground strap attachment. 
10	Verify the correct routing and fastening of the cables.

DANGER

ELECTRIC SHOCK DUE TO LOOSE WIRING OR CABLING

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

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

DANGER

ELECTRIC SHOCK DUE TO DAMAGED CABLES

Verify that the grounding cap is placed correctly on the grounding connection of the motor.

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

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.

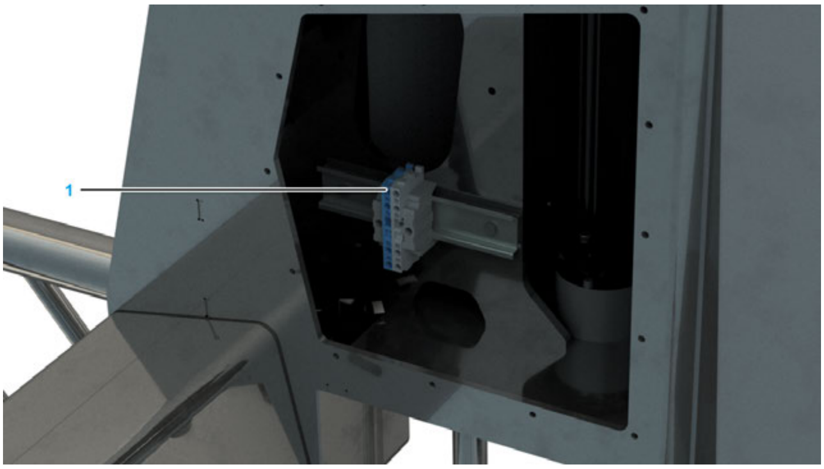
NOTICE

LOSS OF IP65 DEGREE OF PROTECTION

Replace each sealing gasket every time you remove the media cover.

Failure to follow these instructions can result in equipment damage.

Cabling the Fans (Only for VRKP2S0•WD)

Step	Action
1	Feed the cable for fan connection (+24 Vdc supply) to the terminal strip (1) inside the housing. 
2	Connect the 0 Vdc conductor to the blue multiple terminal.
3	Connect the +24 Vdc line to the gray multiple terminal. **NOTE:** For the distribution of the +24 Vdc supply for further customer-specific installations, use the following Schneider Electric accessories: • Blue terminal: NSYTRR24BL • Gray terminal: NSYTRR24 • End stop bracket: NSYTRAABV35
4	Verify the correct routing and fastening of the cables.
5	Verify that the fans take air from the central area of the housing and blow this air to the motor cover area.

DANGER

ELECTRIC SHOCK DUE TO LOOSE WIRING OR CABLING

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

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

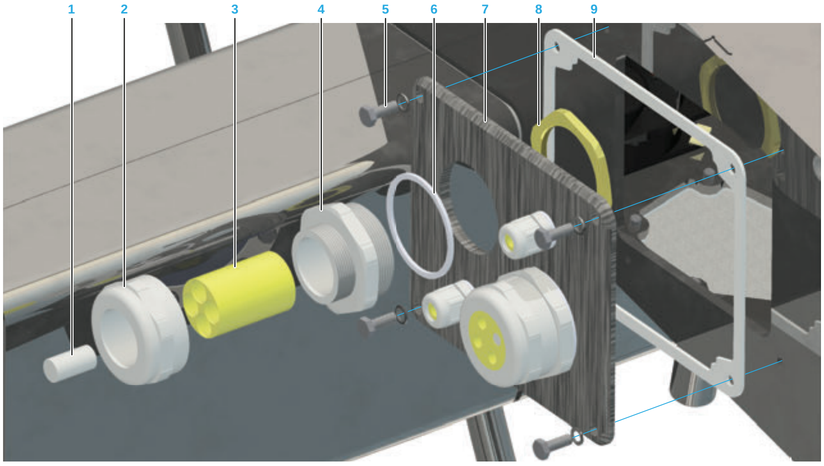
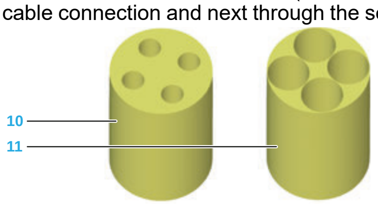
Cabling the VRKP•S0•WF

Procedure Overview

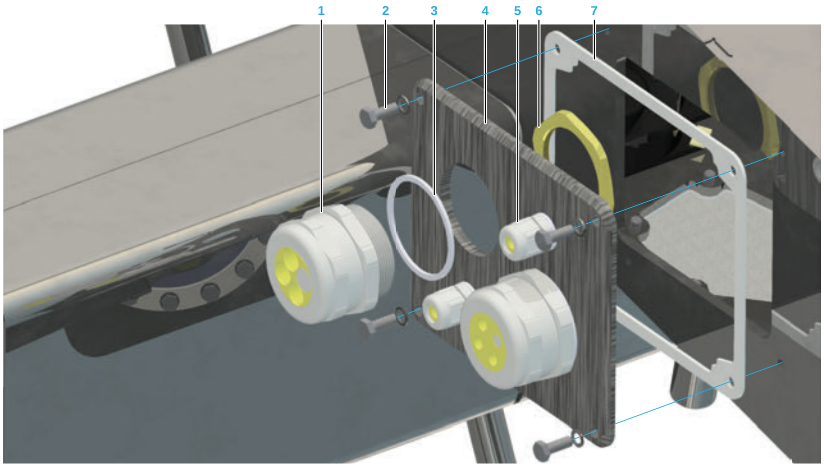
Perform the following procedures to cable the robot:

- Preparing the cable connections, page 133
- Connecting the components of the robot, page 134
- Cabling the fans, page 136

Preparing the Cable Connections

Step	Action
1	Remove the four screws and washers (5) from the media cover (7). 
2	Remove the media cover with the mounted cable connections and the media cover sealing gasket (9).
3	Dismount the two M50 cable connections: • Unscrew the M50 cable connection from the locknut (8). • Remove the sealing ring (6) from the M50 cable connection. • Unscrew the top half (2) of the M50 cable connection from the lower half (4).
4	Remove the sealing inserts (3) from the cable glands of the M50 cable connections.
5	Laterally slit each sealing insert in accordance with the respective number of cables to be routed.
6	Feed the three encoder cables (four with VRKP•••R) first through the top half of the M50 cable connection and next through the sealing insert with the smaller apertures (10).  **NOTE:** • Using the slits, press the cables from outside into the sealing inserts. • Feed each cable with a minimum cable length of 1.5 m (39.4 in) from the cable connection to the motor connector.
7	Feed the three power cables (four with VRKP•••R) first through the top half of the M50 cable connection and next through the sealing insert with the larger apertures (11).
8	Close any not required gland of the sealing insert with a sealing plug (1).
9	Feed the cables through the lower half of the M50 cable connections and insert the sealing inserts into them.
10	Close the two halves of each M50 cable gland. Tightening torque: 15 Nm (133 lbf-in)

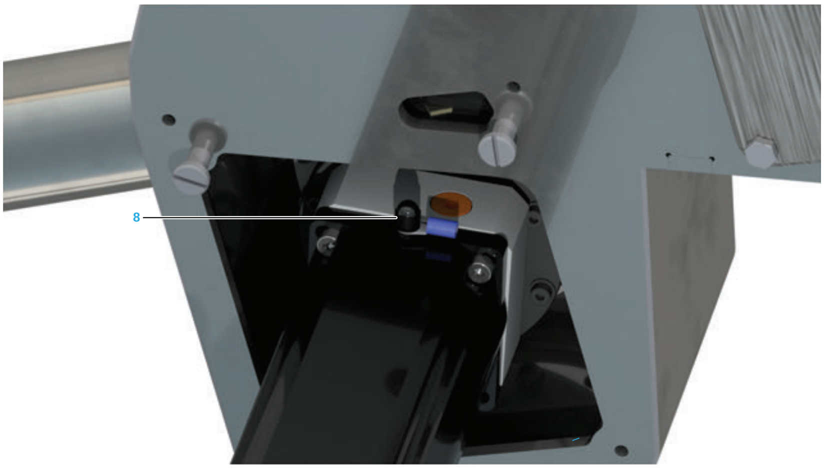
Connecting the Components of the Robot

Step	Action
1	Insert the sealing ring (3) between the M50 cable connections (1) and the media cover (4) and fasten the M50 cable connections to the media cover with the locknut (6). Tightening torque: 15 Nm (133 lbf-in) 
2	Feed the ground cables (protective earth ground) through the top half of one M16 cable connection (5) and next through the sealing insert.
3	Feed the cable for fan connection (+24 Vdc supply) through the top half of the second M16 cable connection and next through the sealing insert.
4	Fasten both M16 cable connections to the media cover the same way as the M50 cable connection. Tightening torque: 6 Nm (53 lbf-in)
5	Feed the encoder cable, the power cable, the fan cable, and the ground cables (protective earth ground) through the media cover sealing gasket (7) and insert them into the opening of the robot housing. **NOTE:** For equipment that you are supplying that is not described in the present document, consult the documentation for those products.
6	Feed the encoder and the power cables to the motors.
7	Attach the encoder and the power cables as described in the *SH3 Servo Motor User Guide* and the *MH3 Servo motor Motor Manual*.
8	Fasten the media covers including the media cover sealing gasket with the four screws and washers (2). Tightening torque: 6 Nm (53 lbf-in)

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>9</td><td>Couple the DC buses of the servo amplifiers so that braking motors can feed back their power to the accelerating motors in the case of an on-path stop of the robot. Due to the coupling of the DC buses, the existing energy suffices in many cases for an on-path stop of the robot. In case of a power interruption of the 24 Vdc supply this backfeeding measure does not have any effect.

For more information, see Lexium 52 Hardware Guide or Lexium 62 Hardware Guide.

NOTE: When routing the cables, ensure that the grounding cap (8) remains on the ground connection of the motors. The motor supply cable may become damaged by the thread of the ground strap attachment.


</td></tr>
<tr><td>10</td><td>Verify the correct routing and fastening of the cables.</td></tr>
</table>

DANGER

ELECTRIC SHOCK DUE TO LOOSE WIRING OR CABLING

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

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

DANGER

ELECTRIC SHOCK DUE TO DAMAGED CABLES

Verify that the grounding cap is placed correctly on the grounding connection of the motor.

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

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.

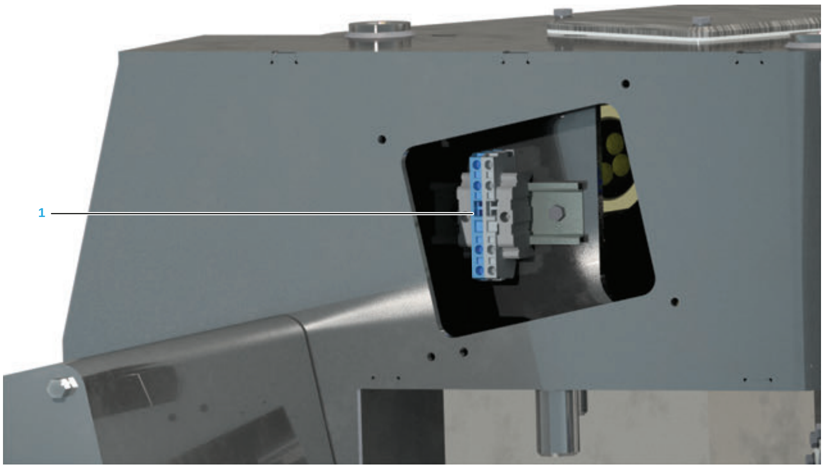
NOTICE

LOSS OF IP65 DEGREE OF PROTECTION

Replace each sealing gasket every time you remove the media cover.

Failure to follow these instructions can result in equipment damage.

Cabling the Fans

Step	Action
1	Feed the cable for fan connection (+24 Vdc supply) to the terminal strip (1) inside the housing. 
2	Connect the 0 Vdc conductor to the blue multiple terminal.
3	Connect the +24 Vdc line to the gray multiple terminal. **NOTE:** For the distribution of the +24 Vdc supply for further customer-specific installations, use the following Schneider Electric accessories: • Blue terminal: NSYTRR24BL • Gray terminal: NSYTRR24 • End stop bracket: NSYTRAABV35
4	Verify the correct routing and fastening of the cables.
5	Verify that the fans take air from the central area of the housing and blow this air to the motor cover area.

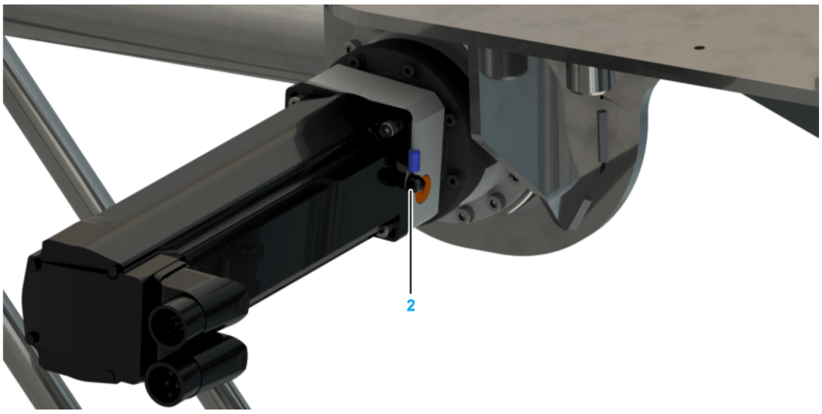
DANGER

ELECTRIC SHOCK DUE TO LOOSE WIRING OR CABLING

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

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

Cabling the VRKP•S0•NC

Step	Action
1	Feed the three encoder cables (four with VRKP0S0R / VRKP1S0R / VRKP2S0R / VRKP4S0R / VRKP5S0R / VRKP6S0R (2)) directly to the motors (1).  For robots with a motorized module: Cable the motorized module according to the cabling instructions of the respective module: • Cabling the Rotational Modules, page 188 • Cabling the Rotational Tilting Modules, page 221 • Cabling the Double Rotational Modules, page 208 • Cabling the Tilting Modules, page 197
2	Feed the three power cables (four with VRKP0S0R / VRKP1S0R / VRKP2S0R / VRKP4S0R / VRKP5S0R / VRKP6S0R) directly to the motors. **NOTE:** For equipment that you are supplying that is not described in the present document, consult the documentation for those products.
3	Attach the encoder and the power cables as described in the *SH3 Servo Motor User Guide* and the *MH3 Servo motor Motor Manual*.
4	Couple the DC buses of the servo amplifiers so that braking motors can feed back their power to the accelerating motors in the case of an on-path stop of the robot. Due to the coupling of the DC buses, the existing energy suffices in many cases for an on-path stop of the robot. In case of a power interruption of the 24 Vdc supply this backfeeding measure does not have any effect. For more information, see *Lexium 52 Hardware Guide* or *Lexium 62 Hardware Guide*. **NOTE:** When routing the cables, ensure that the grounding cap (2) remains on the ground connection of the motors. The motor supply cable may become damaged by the thread of the ground strap attachment. 
5	Verify the correct routing and fastening of the cables.

DANGER

ELECTRIC SHOCK DUE TO DAMAGED CABLES

Verify that the grounding cap is placed correctly on the grounding connection of the motor.

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

DANGER

ELECTRIC SHOCK DUE TO LOOSE WIRING OR CABLING

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

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

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.

Cabling the VRKP•L0•WD / VRKP•L0•NO

Procedure Overview

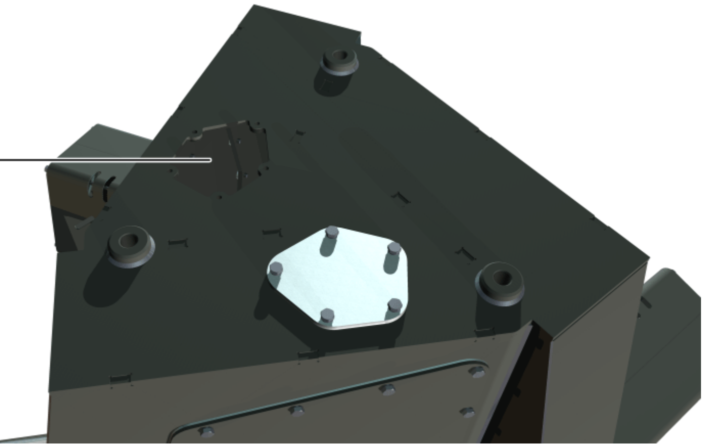
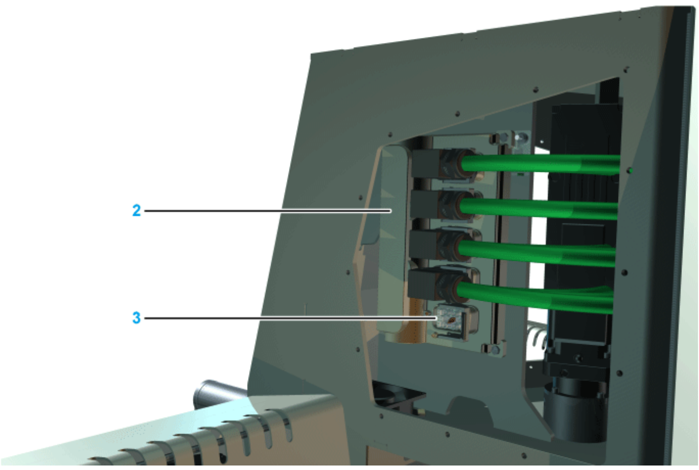
Perform the following procedures to cable the robot:

- Connecting the components of the robot, page 139
- Cabling the fans, page 140

NOTE: The VRKP•L0•WD / VRKP•L0•NO do not have any cable gland.

Connecting the Components of the Robot

NOTE: The motors are already connected to the X2-X5 connections before they leave the factory.

Step	Action
1	Feed the hybrid cable from the Lexium 62 Connection Module or from another Lexium 62 Distribution Box through the unclosed aperture (1) on the upper side of the housing. 
2	Feed the ground cables (protective earth ground) and the cable for fan connection (+24 Vdc supply) through the aperture of the housing.
3	Feed the hybrid cable with a minimum cable length of 0.5 m (19.7 in) from the aperture to the connection point of the internal Lexium 62 Distribution Box (2).  **NOTE:** For equipment that you are supplying that is not described in the present document, consult the documentation for those products.
4	Attach the hybrid cable to the connection X1 as described in the *Lexium 62 ILM Hardware Guide* (3).
5	Verify the correct routing and fastening of the cables.

⚠⚠DANGER

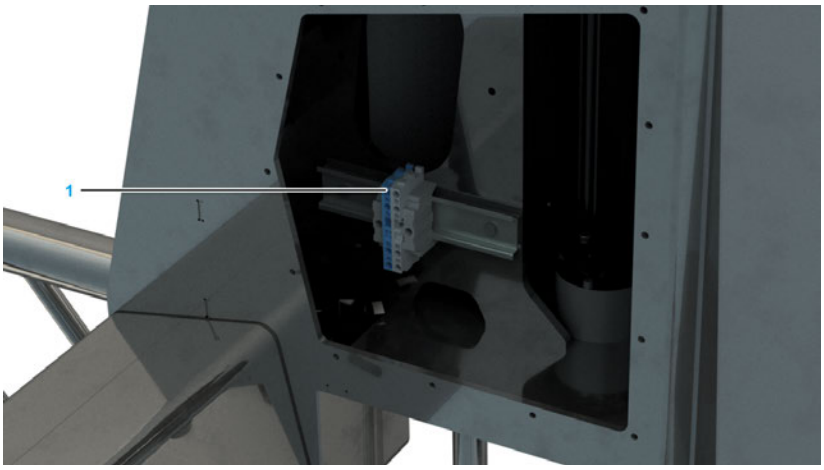
ELECTRIC SHOCK DUE TO LOOSE WIRING OR CABLING

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

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

For further information on the connection of the Lexium 62 Distribution Box, refer to the *Lexium 62 ILM Hardware Guide*.

Cabling the Fans

Step	Action
1	Feed the cable for fan connection (+24 Vdc supply) to the terminal strip (1) inside the housing. 
2	Connect the 0 Vdc conductor to the blue multiple terminal.
3	Connect the +24 Vdc line with the gray multiple terminal. For the distribution of the +24 Vdc supply for further customer-specific installations, use the following Schneider Electric accessories: • Blue terminal: NSYTRR24BL • Gray terminal: NSYTRR24 • End stop bracket: NSYTRAABV35
4	Verify the correct routing and fastening of the cables.
9	Verify that the fans take air from the central area of the housing and blow it out through the slits in the motor covers.

⚠⚠DANGER

ELECTRIC SHOCK DUE TO LOOSE WIRING OR CABLING

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

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

Cabling the VRKP•L0•NC

Step	Action
1	Select the connector from of the ILM hybrid cable on motor side: D1 (for example, cable VW3E1142R•••) **NOTE:** For equipment that you are supplying that is not described in the present document, consult the documentation for those products.
2	Feed the three hybrid cables (four with VRKP2L0R / VRKP4L0R / VRKP5L0R / VRKP6L0R (2)) from a Lexium 62 Distribution Box directly to the motors (1). 
3	Attach the hybrid cables as described in the *Lexium 62 ILM Hardware Guide*.
4	Verify the correct routing and fastening of the cables.

DANGER

ELECTRIC SHOCK DUE TO LOOSE WIRING OR CABLING

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

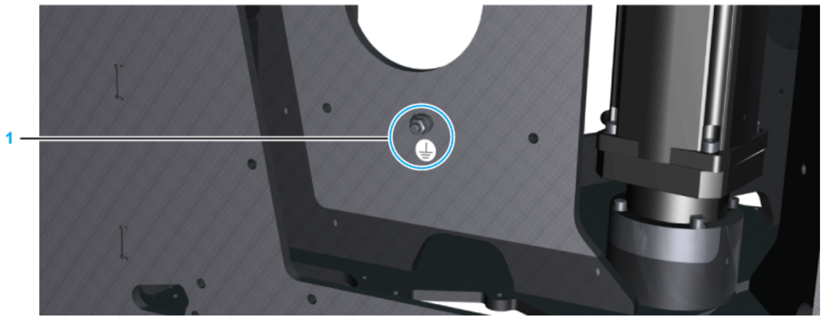
Failure to follow these instructions will result in death or serious injury.

For further information on the connection of the Lexium 62 Distribution Box, refer to the *Lexium 62 ILM Hardware Guide*.

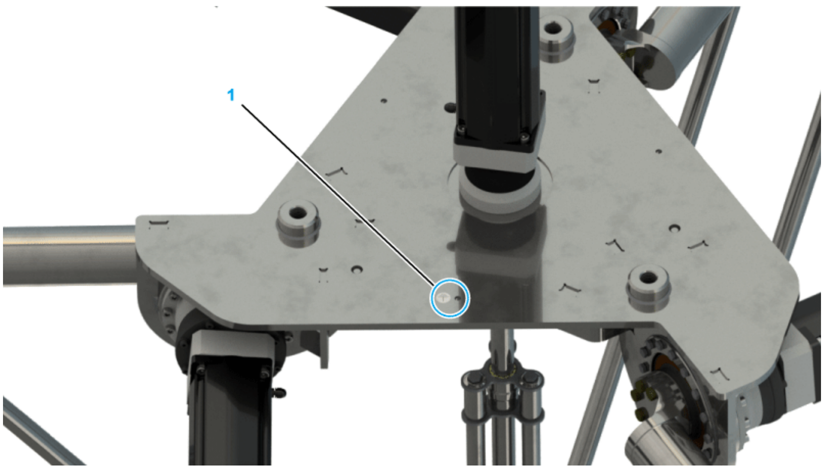
Grounding the Robot

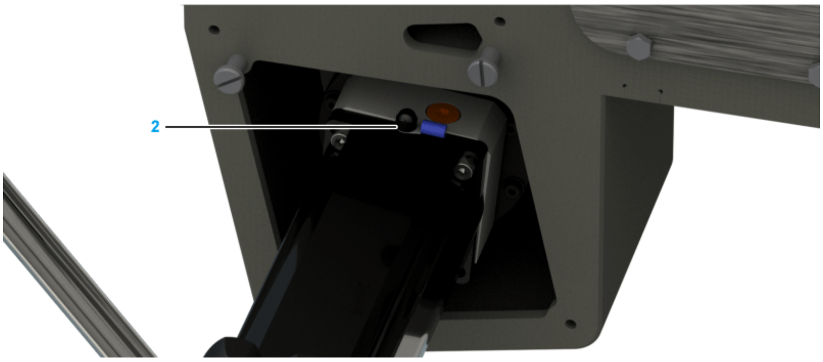
NOTE: When grounding the robot, use cables that comply with the applicable local standards, for example, cables that conform to NEC 70 / NFPA 79 in the USA.

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Feed and fasten the ground cable (protective earth ground) to the ground connection (1) of the robot housing. The ground connections are marked with the following symbol:

VRKP••••WD / VRKP••••NO


VRKP••••WF


VRKP••••NC

</td></tr>
</table>

Step	Action
2	Verify the correct routing and fastening of the preconnected ground connection between the motors (2) and the robot housing. Tightening torque: 2.5 Nm (22 lbf-in)  **NOTE:** • The graphic is an example for the position of the ground connection at a main axis motor. • The external protective ground connection wiring is determined by a number of variables. Read the hazard message at the end of this table.
3	Only for VRKP•L0•WD / VRKP•L0•NO: Fasten the ground cable to the ground connection (3) of the Lexium 62 Distribution Box (IEC 60417 - 5019 symbol). Tightening torque: 3.5 Nm (31 lbf-in) 
4	Only for robots with a motorized module: Ground the motorized module according to the cabling instructions of the respective module: • Cabling the Rotational Modules, page 188 • Cabling the Rotational Tilting Modules, page 221 • Cabling the Double Rotational Modules, page 208 • Cabling the Tilting Modules, page 197
5	Verify the correct routing and fastening of the cables.

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.

Closing the Robot

⚠ ⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Only use the sealing washers supplied.
- Only use stainless screws.
- Tighten the screws with the specified tightening torques in order to produce electric conductivity between the cover and the housing.
- Verify that all motor supply cables are permanently connected to the motors before closing the housing.

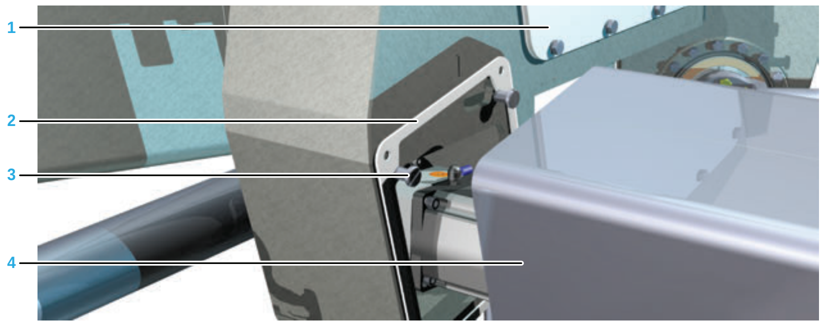
Failure to follow these instructions will result in death or serious injury.

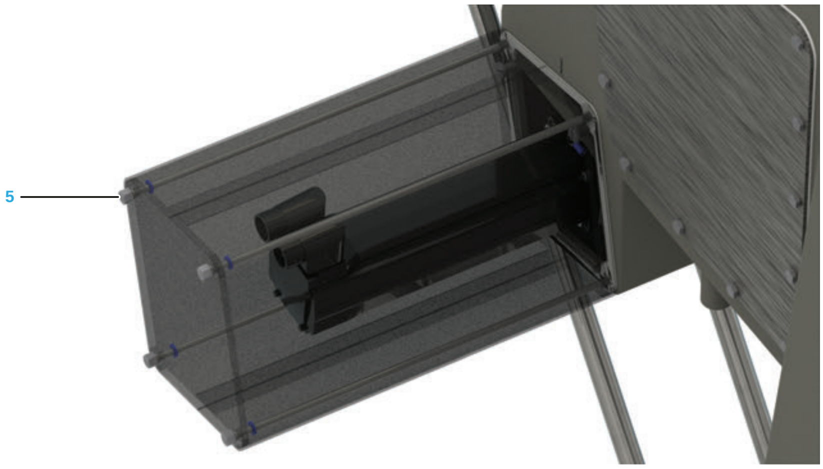
NOTICE

LOSS OF IP65 DEGREE OF PROTECTION

Replace each sealing gasket every time you remove the maintenance cover(s).

Failure to follow these instructions can result in equipment damage.

Step	Action
1	Mount the maintenance covers (1) including the seal to the robot. Tightening torque: 6 Nm (53 lbf-in)  **NOTE:** For transportation, the maintenance covers are loosely bolted with a few screws for a fast assembly. The screws and washers necessary for mounting are located among the small parts supplied in the interior of the housing. For information on screws and washers, refer to the respective detail drawing in *Mechanical and Electrical Data*, page 33.
2	Hook the motor cover seal (2) to the capture screws of the housing.
3	Hook the motor covers (4) on the capture screws (3) and ensure that the seals are positioned correctly. A motor cover protrusion of approximately 3 mm (0.118 in) is intended.

Step	Action
4	Tighten the four threaded rods at the rear end of each motor cover (5). Tightening torque: 6 Nm (53 lbf-in) 
5	Tighten the screws of the media covers on the upper and the bottom side of the robot. Tightening torque: 6 Nm (53 lbf-in)

Reducing Risks Around the Robot

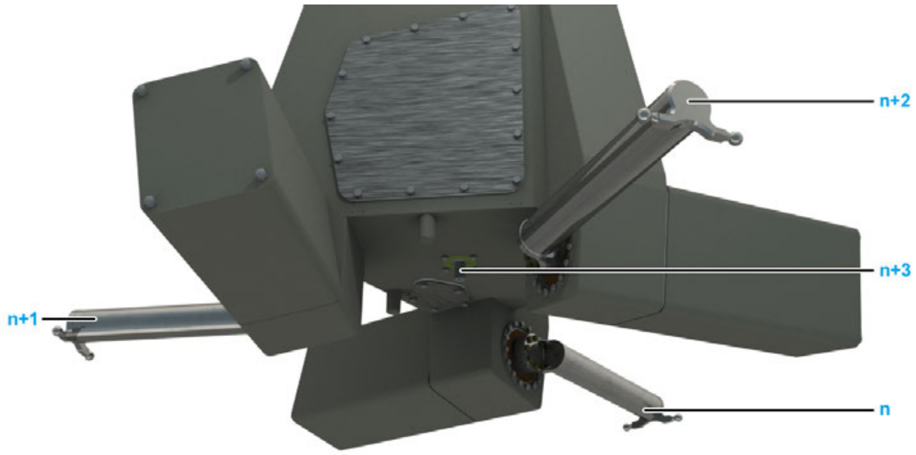
Step	Action
1	Install external safety-related devices in accordance to local regulations and standards.
2	When designing the safety-related devices, assume that the robot cannot be stopped by internal logic and must be stopped by the external safety-related devices. **NOTE:** More information about the circuitry of emergency stop and additional protection elements is contained in the document *Lexium 52 Hardware Guide*, *Lexium 62 Hardware Guide*, or *Lexium 62 ILM Hardware Guide*.
3	Only for VRKP4L0R: If necessary, mount an ILM62-DIO8 module on the rotational axis drive. **NOTE:** After assembling a DIO8 module, the performance can be affected due to decreased heat dissipation and possible overheating.

Initial Start-Up

Allocation of the Sercos Addresses

Presentation

Allocate the Sercos addresses of the servo amplifiers on the three main axes in ascending order and in counterclockwise direction.



Parametrization of the Robot Mechanics

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

Use the `SchneiderElectricRobotics` library for operating the Lexium P 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.

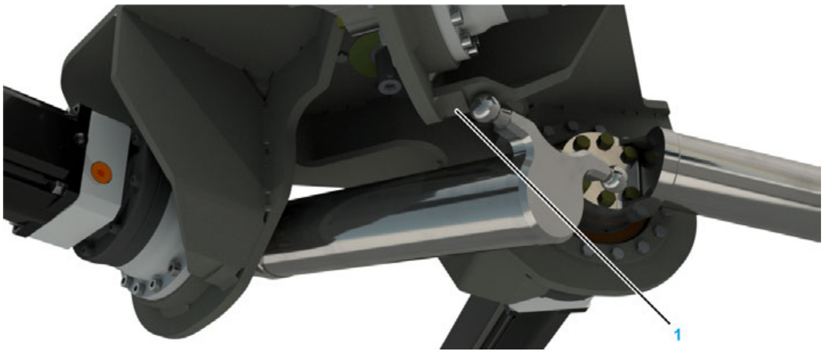
Verifying the Calibration and Motor Direction

Procedure Overview

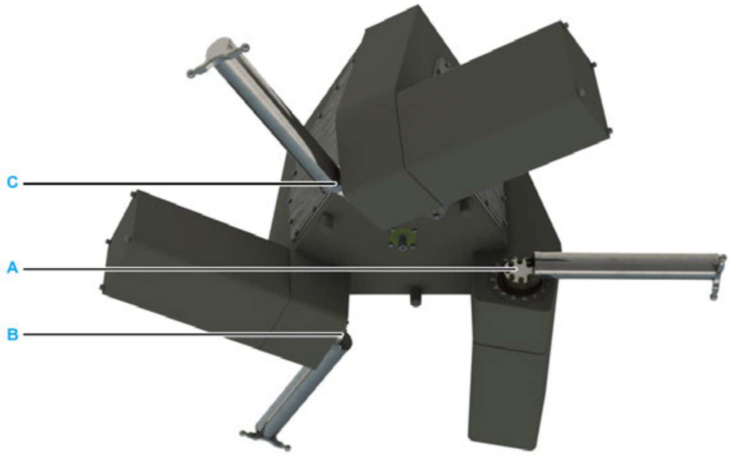
Perform the following steps to verify the calibration and motor direction:

- Verifying the calibration, page 151
- Verifying the motor direction of rotation, page 152
- Moving the upper arms to mounting position, page 152

Verifying the Calibration

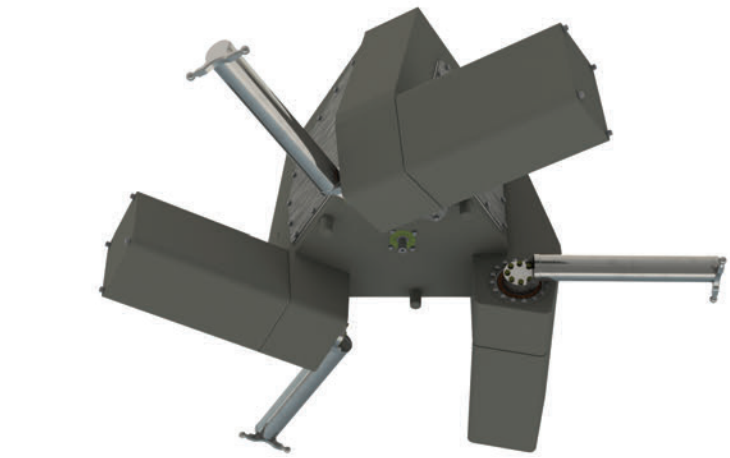
Step	Action
1	Open the brakes.
2	Carefully rotate an upper arm inwards until one ball pin contacts the limit stop on the underside of the housing (1). The following figure shows the upper arm of robot VRKP1/VRKP2 at the calibration position:  The following figure shows the upper arm of the robot VRKP0/VRKP4/VRKP5/VRKP6 at the calibration position:  For further information, refer to *Calibration of the Robot Mechanics*, page 272.
3	Verify that the angle indicated corresponds to the following value: • For VRKP0: -187.3° (+/-0.1°) • For VRKP1: -166.7° (+/-0.1°) • For VRKP2•••WD / VRKP2•••WF: -164.0° (+/-0.1°) • For VRKP2•••NC: -164.9° (+/-0.1°) • For VRKP4: -184.5° (+/-0.1°) • For VRKP5: -183.2° (+/-0.1°) • For VRKP6: -183.6° (+/-0.1°)
4	Move the arm outwards again until it is in a horizontal position (motor position ~0°).
5	Repeat the process for all upper arms.

Verifying the Motor Direction of Rotation

Step	Action
1	Slowly move the upper arms in manual mode, upwards and downwards. **NOTE:** Upwards (mathematically) is a positive change of an angle and downwards (mathematically) is a negative change of an angle.
2	Verify that the direction of rotation is correct.
3	Verify that the parameterized motor moves and the motors A, B, C are arranged in a counterclockwise position. 

For further information, refer to *Allocation of the Sercos Addresses*, page 149.

Moving the Upper Arms to Mounting Position

Step	Action
1	Slowly move the upper arms in manual mode to the mounting position for mounting the telescopic axis and the lower arms as shown in the following figure. 

Mounting the Telescopic Axis on Robots with a Rotational Axis

⚠⚠ DANGER

ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

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

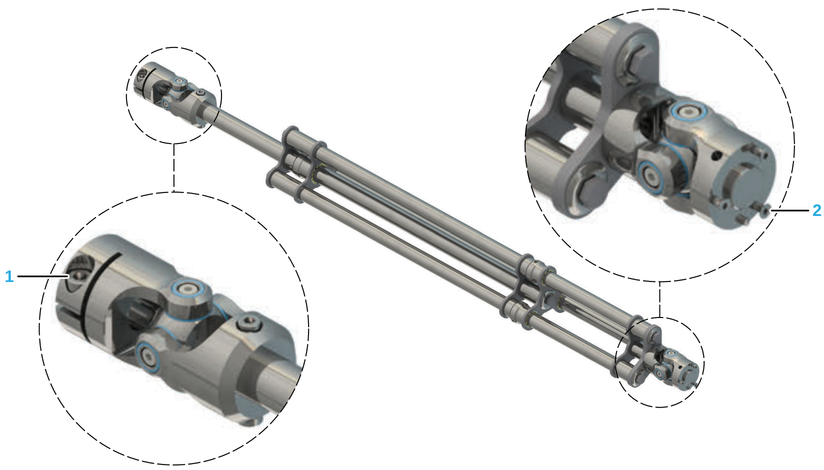
Failure to follow these instructions will result in death or serious injury.

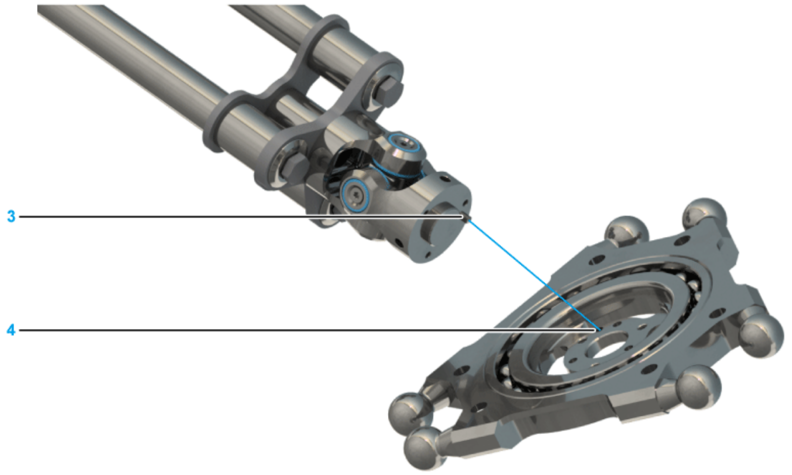
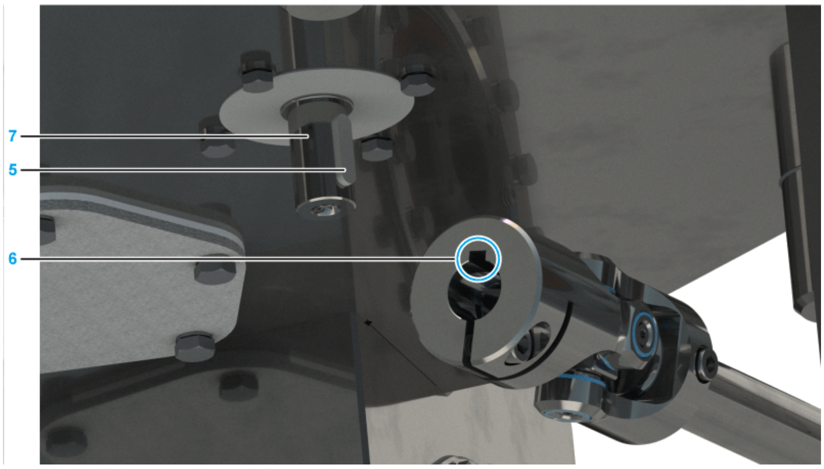
NOTICE

INSUFFICIENT PART CLEARANCE

Ensure that the universal joint does not touch the gearbox seal during assembly.

Failure to follow these instructions can result in equipment damage.

Step	Action
1	Extend the telescopic axis to its entire length, then retract the same and verify its resistance. **NOTE:** A light irregular resistance is normal and caused by the manufacturing tolerances of the tubes. The axis is run in during the first 100 hours of operation.
2	Loosen the clamping screw (1) at the top universal joint. 
3	Remove the three countersunk screws (2) from the underside of the bottom universal joint.

Step	Action
4	Place the parallel plate on the bottom universal joint as shown in the following figure and ensure that the locating pin (3) is in alignment with the corresponding hole of the parallel plate (4).  **NOTE:** In the delivery condition, the index pin is located in the universal joint of the telescopic axis. During dismounting, it may be located in the parallel plate.
5	Attach the parallel plate to the universal joint by using the three countersunk screws that were removed previously. Use the high strength retaining compound Loctite 648 for this purpose. Tightening torque: 1 Nm (8.9 lbf-in) **NOTE:** Apply the high strength retaining compound Loctite 648 into the tapped holes as opposed to applying it to the screws.
6	Push the universal joint (6) over the shaft (7) protruding from the robot housing until the universal joint comes into its stop position on the gear shaft flange. In doing so, rotate the universal joint to ensure that the recess in the universal joint is located above the keyway (5). 
7	Tighten the clamping screw (1) that was loosened previously. Tightening torque: 7.4 Nm (65 lbf-in)

Mounting the Lower Arms

Overview

DANGER

ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

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

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

The lower arms can be damaged if they are mounted incorrectly and then pulled apart.

NOTICE

INCORRECT MOUNTING OF LOWER ARMS

Always hold the lower arms at the level of the lower arm heads to pull them apart.

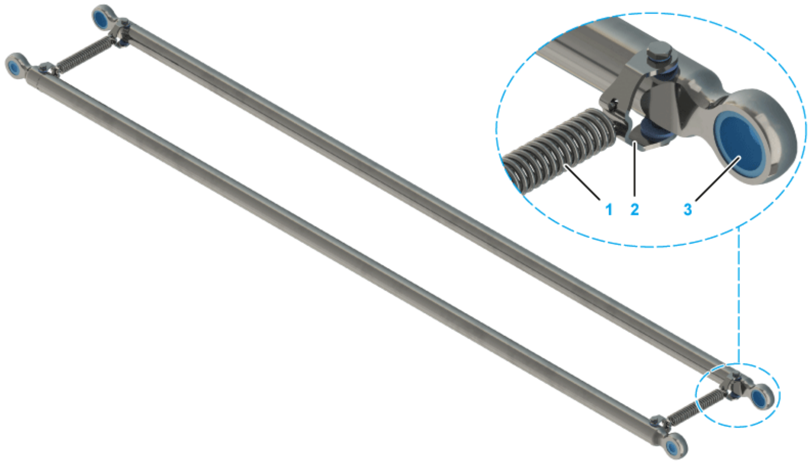
Failure to follow these instructions can result in equipment damage.

Procedure Overview

Perform the following steps to mount the lower arms:

- Assembling the lower arms, page 156
- Verifying the springs, page 156
- Hooking in the lower arms, page 156

Assembling the Lower Arms

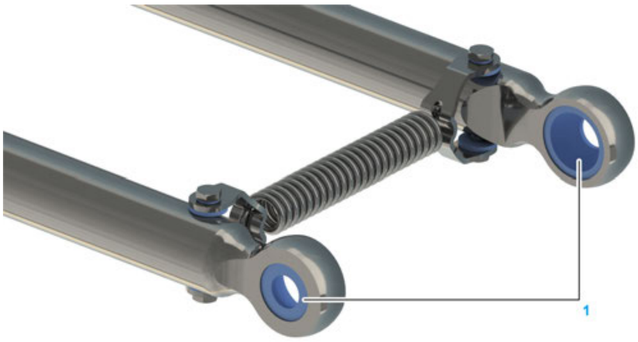
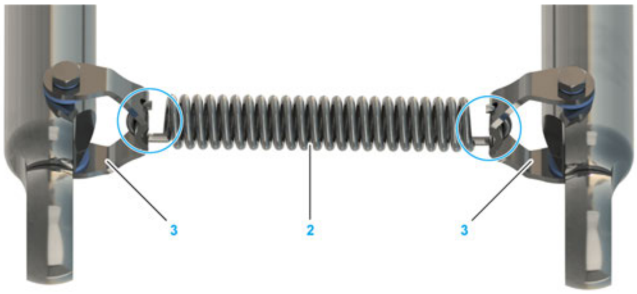
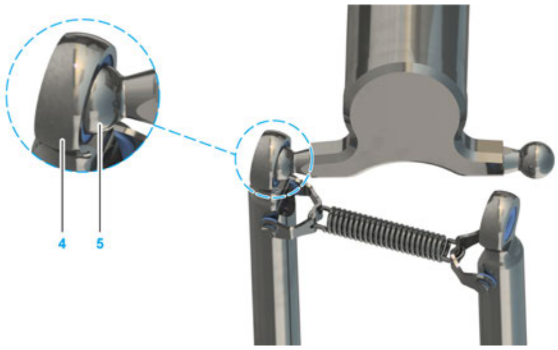
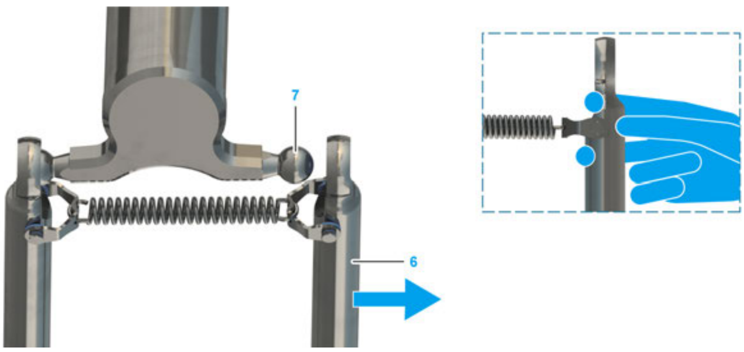
Step	Action
1	Verify that the lower arms show no visible signs of transport damage. If there are visible signs of transport damage, replace the lower arms, page 254.
2	Pull the springs (1) across the spring brackets (2) located on the lower arms and connect each of the two lower arms to form a lower arm pair. 
3	Use the figure above to verify the correct alignment of the lower arm heads and the ball sockets (3).
4	Attach a total of two springs per lower arm pair, one at the lower end, one at the upper end.

Verifying the Springs

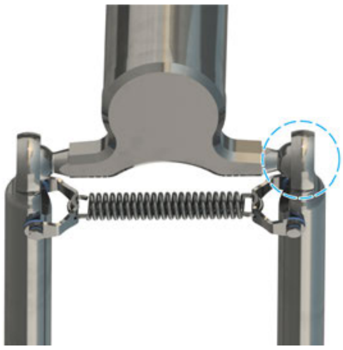
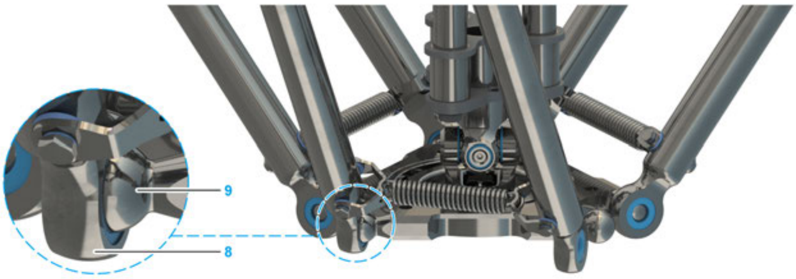
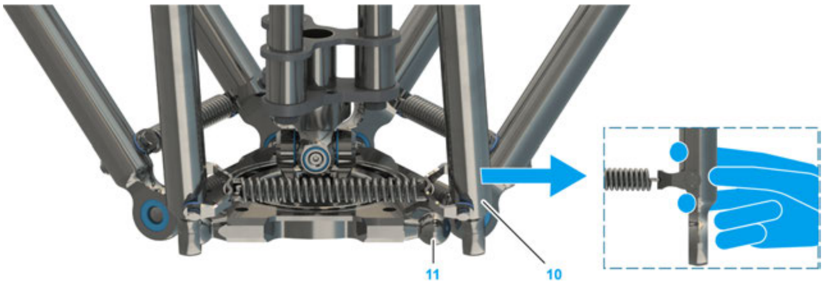
Verify that the spring windings are in contact with one another when they are completely contracted (no load condition). If the spring windings are not in contact, replace them.

Hooking in the Lower Arms

NOTICE
OVERSTRETCHING OF THE SPRINGS
• Never pull the springs further apart than necessary to pull the lower arm over the second ball pin of the upper arm.
• Avoid pulling the arms apart and simultaneously across both ball pins.
• Replace springs after exceeding the elastic limit of the springs (overstretch).
Failure to follow these instructions can result in equipment damage.

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Verify that the ball sockets (1) are located in each lower arm head.

</td></tr>
<tr><td>2</td><td>Verify that the springs (2) are embedded in the spring brackets (3).

</td></tr>
<tr><td>3</td><td>Pull a lower arm head (4) over a ball pin (5) of the upper arm.

</td></tr>
<tr><td>4</td><td>Pull the arm apart against the force of the spring in order to pull the lower arm (6) over the second ball pin (7) of the upper arm.


NOTE: Only touch the upper arm at its end and slightly rotate the aperture of the lower arm head in the direction of the ball pin.</td></tr>
</table>

Step	Action
5	Position the aperture of the lower arm on the ball pin.  **Result:** The lower arm is hooked on the upper arm.
6	Pull a lower arm head (8) over a ball pin (9) of the parallel plate.  **NOTE:** For robots with motorized modules, use the module instead of the parallel plate. Refer to: Mounting the Module on Robots with Motorized Modules, page 159.
7	Pull the arm apart against the force of the spring in order to pull the lower arm (10) over the second ball pin (11) of the upper arm.  **NOTE:** Only touch the upper arm at its ends as shown in the small graphic and slightly rotate the aperture of the lower arm head in the direction of the ball pin.
8	Position the aperture of the lower arm on the ball pin.  **Result:** The lower arm is hooked on the parallel plate.
9	Repeat the process for all lower arms.

Mounting the Module on Robots with Motorized Modules

Step	Action
1	Mount the module with the lower arms. When hooking in the module, ensure that the mounting for the gripper is located on the underside, as shown in the figure below. **NOTE:** The Rotational Module, the Tilting Module, the Double Rotational Module, and the Rotational Tilting Module can be rotated by n x 120°. Mount the respective module in its original position. See important information below this table. 
2	Move the module slowly and verify the position of the gripper.

Mounting the module in other than the original position will lead to inaccurate positioning.

NOTICE
DAMAGE DUE TO INCORRECT POSITIONING Verify that the mounting position of the module is consistent with the original position. **Failure to follow these instructions can result in equipment damage.**

Verifying the Coordinate System of the Robot

Step	Action
1	Slowly move the robot in manual mode in the direction of an axis of the coordinate system.
2	Verify that the robot moves in a straight line in the direction of the axis.
3	Verify that the robot moves in a straight line in a positive or negative direction of the coordinate system. **NOTE:** Arm of axis A is the cartesian coordinate X if coordinate system is not rotated by transformations variable `i_lrRotationAngle`.
4	Repeat the process for all axes of the coordinate system.

In case the robot does not move in a straight line on the path, proceed as follows:

Step	Action
1	Select the robot type when using the `SchneiderElectricRobotics` library.
2	When not using the `SchneiderElectricRobotics` library, verify the correct parameterization of the transformation and the axes.
3	Verify the calibration, page 151.
4	Verify the direction of rotation of all drives, page 152.
5	Calibrate the robot if required, page 272.

In case the robot moves along a straight line but not in the direction of the required coordinate system, proceed as follows:

Step	Action
1	Verify the definition of the coordinate system on the transformation.
2	Verify the definition of the motors in the correct sequence, page 152.

Setting the Monitoring

Operating Library

Use the `SchneiderElectricRobotics` and `RoboticModule` library for operating the Lexium P robots.

Software Limits for Working Space

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

Verifying the Brake Voltage

Verify the brake voltage as an incorrect voltage may cause premature wear of the brakes.

For further information, observe the respective operating instructions of the motors:

- VRKP0S0 / VRKP1S0 / VRKP2S0 / VRKP4S0 / VRKP5S0 / VRKP6S0: *SH3 Servo motor Motor Manual*

  For the rotational axis motor of VRKP0 / VRKP1: *MH3 Servo motor Motor Manual*
- VRKP2L0 / VRKP4L0 / VRKP5L0 / VRKP6L0: *Lexium 62 ILM Hardware Guide*

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 space 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 interruption, 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 70 °C (158 °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*, page 18.

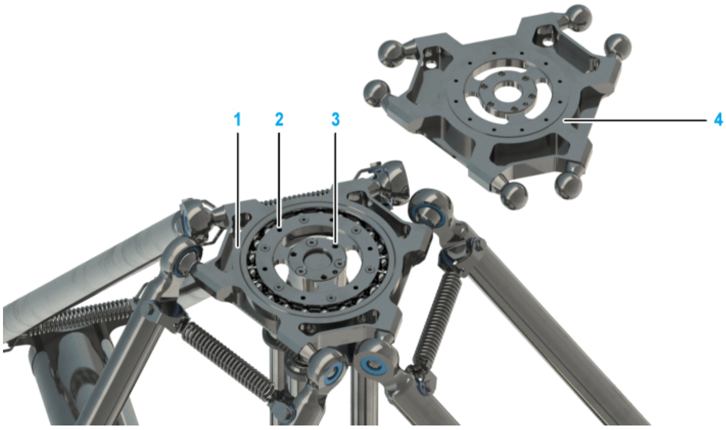
NOTE: Perform a start-up for an already configured robot when using the robot under modified operating conditions. For further information, refer to *Hazard Information*, page 12.

Commissioning Procedure

Step	Action
1	Verify the calibration and motor direction, page 151 and verify the coordinate system, page 160.
2	Comply with the instructions provided in the manual of the motor used and in the manual of the drives used.
3	Verify that the load conforms to the specified payloads for the robot before operating the robot.
4	Limit the maximum torque of the motor in accordance with the maximum drive torque of the robot.
5	Perform initial tests at reduced velocity.
6	Verify that the ambient conditions, page 32 conform to the appropriate specified conditions for the robot.

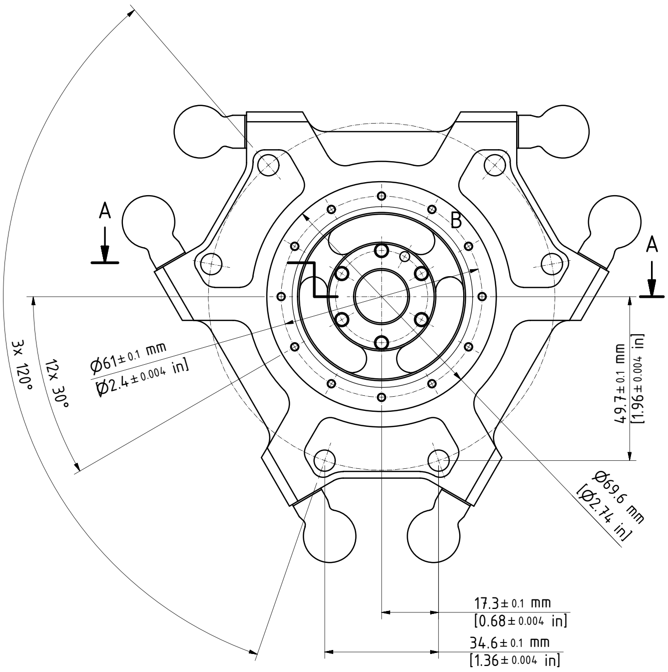
Mounting the Payload

Mounting the Gripper

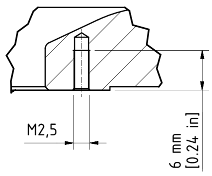
<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Fasten the gripper to the mounting points provided for this purpose on the parallel plate (1) for robots with a rotational axis:
• Pitch circle diameter 61 mm (2.4 in): 6 x M2.5 (2), tightening torque: 0.5 Nm (4.4 lbf-in), strength class of the screw: at least A2-70
• Pitch circle diameter 28 mm (1.1 in): 3 x M4 (3), tightening torque: 1.8 Nm (16 lbf-in), strength class of the screw: at least A4-80
Use the medium strength threadlocking adhesive Loctite 243 for this purpose.
For further information, refer to Flange Dimensions for Robots with Three Axes, page 165 or Flange Dimensions for Robots with a Rotational Axis, page 166.

NOTE: The mounting points on the parallel plate for robots without a rotational axis (4) are identical, but doubled.</td></tr>
<tr><td>2</td><td>Calibrate the rotational axis if this has not yet been done before the mounting of the gripper.
NOTE:
• Observe the permissible weights and distances that result in the maximum tilting torque.
• Maximum tilting torque on the bearing of the parallel plate for robots with a rotational axis: 20 Nm (177 lbf-in).</td></tr>
</table>

NOTE: A mounted gripper may cover the ball pin path of the open hybrid ball bearing. Cleaning could be constrained, this may lead to hygienic problems, or raised rotational torques of the bearing by collecting dirt inside the ball bearing. Keep the ball pin path free in order to allow the bearing to be flushed through from the top.

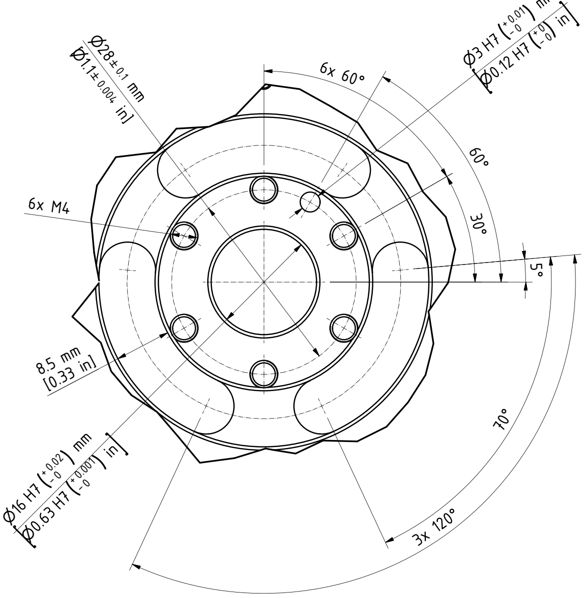
Flange Dimensions for Robots without a Rotational Axis



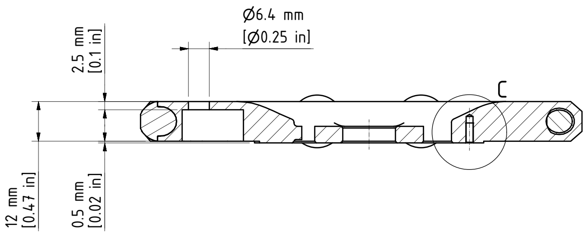
C (2 : 1)



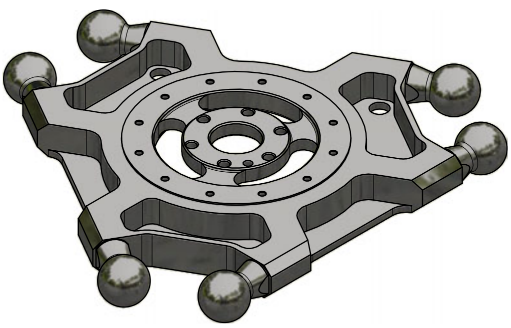
B (2 : 1)



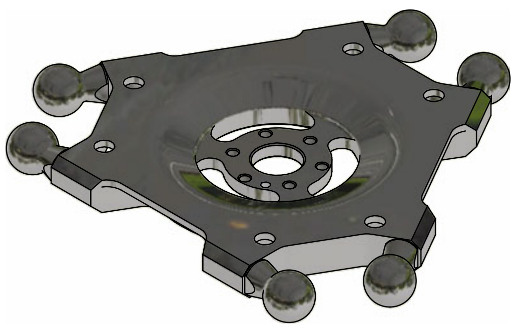
A-A (1 : 1)



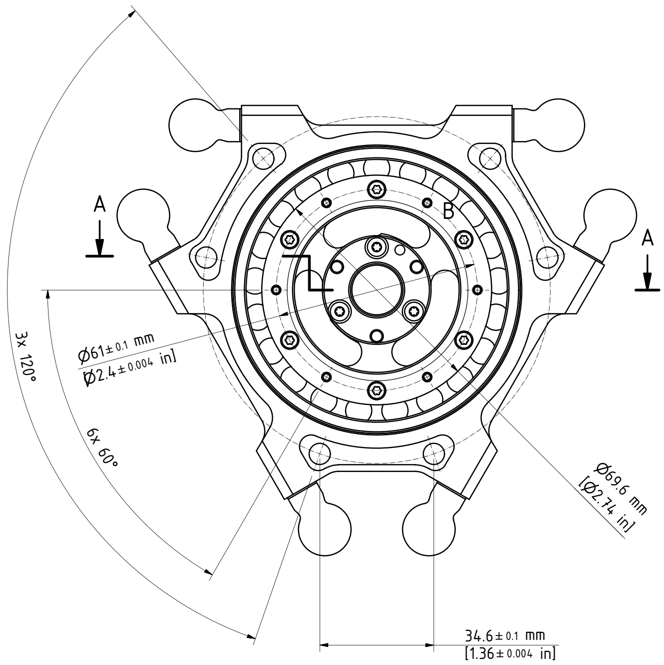
Bottom View (1 : 1)



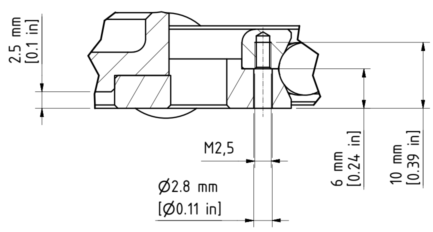
Top View (1 : 1)



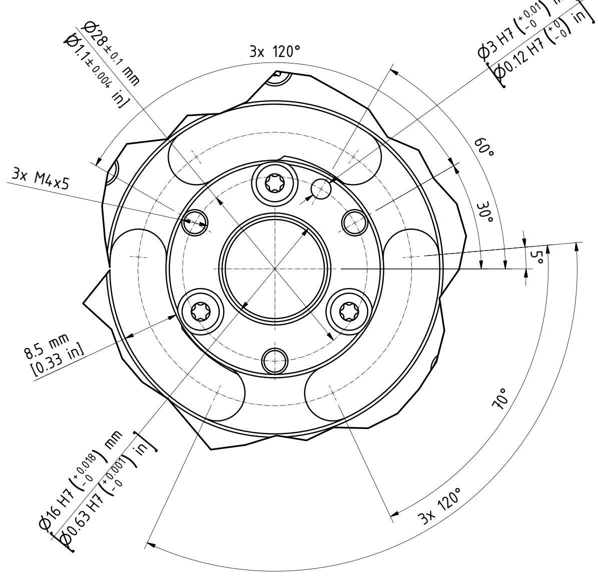
Flange Dimensions for Robots with a Rotational Axis



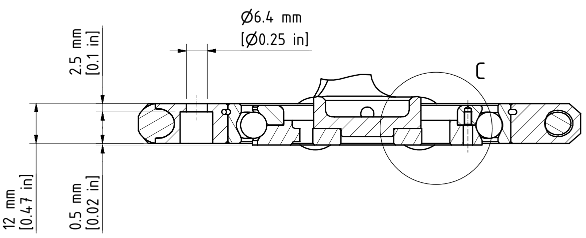
C (2 : 1)



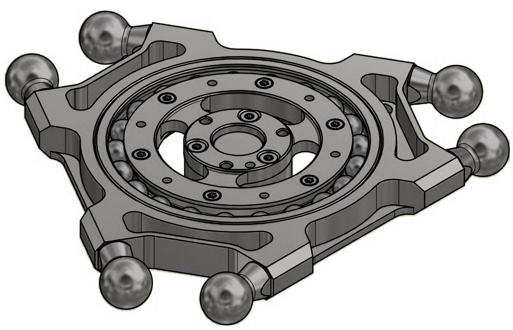
B (2 : 1)



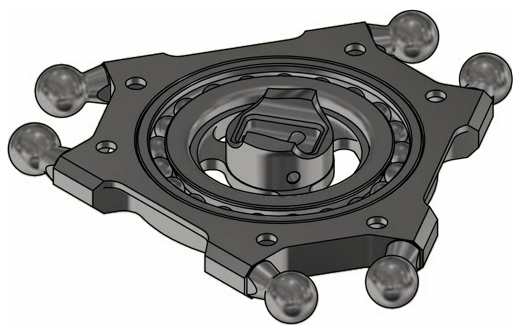
A-A (1 : 1)



Bottom View (1 : 1)



Top View (1 : 1)



Supply of the Gripper

Feeding the Media from the Robot Housing

NOTICE

LOSS OF IP65 DEGREE OF PROTECTION

Replace each sealing gasket every time you remove the media cover.

Failure to follow these instructions can result in equipment damage.

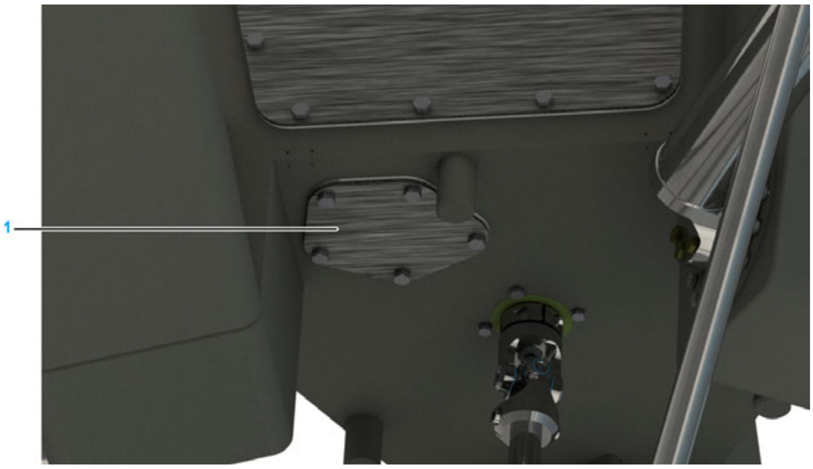
In the case of Standard and Flat variants, incorrect pressure can damage or otherwise compromise the gearbox lubricants.

NOTICE

INOPERABLE GEARBOX DUE TO COMPROMISED LUBRICATION

You must ensure that the pressure inside of the robot does not exceed the maximum permissible overpressure of 100 kPa (0.1 bar (1.45 psi)) when assembling a valve terminal inside the robot.

Failure to follow these instructions can result in equipment damage.

Step	Action
1	Only for VRKP2•••WD / VRKP2•••WF / VRKP4•••WD / VRKP4•••NO / VRKP4•••WF / VRKP5•••WF / VRKP6•••WF: Install parts of the media feed (for example, I/O module or valve terminal) in the interior of the robot. **NOTE:** In the delivery condition, the media cover does not have any openings.
2	Only for VRKP2•••WD / VRKP2•••WF / VRKP4•••WD / VRKP4•••NO / VRKP4•••WF / VRKP5•••WF / VRKP6•••WF: Drill holes into the removed media cover for the media glands.
3	Feed in the media through the media cover (1) on the bottom side of the robot. 
4	Mount the media cover. Tightening torque: 6 Nm (53 lbf-in).

Feeding the Media to the Gripper

⚠WARNING
DAMAGED ARMS Upper arms and lower arms must not be damaged by attaching additional media guide fasteners. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

NOTICE
HIGH WEAR AND/OR DAMAGED SPRINGS Distribute loads to lower arms in a way that minimizes the rotational forces on the arms. **Failure to follow these instructions can result in equipment damage.**

Step	Action
1	Feed in the media line from cables, hoses, and other media, via the upper and lower arms to the parallel plate. **NOTE:** Verify that the additional loads on the upper and lower arms are as small as possible. Distribute the additional loads to the different arms if possible. Attach the additional loads primarily to arms, which are not located in the robot main direction of motion. If possible, attach all additional loads to the lower arms to largely avoid damage to the arms due to dynamic forces. Arms must not be damaged by attaching additional media guide fasteners.
2	Feed in the media lines through the three apertures of the parallel plate to the gripper. 

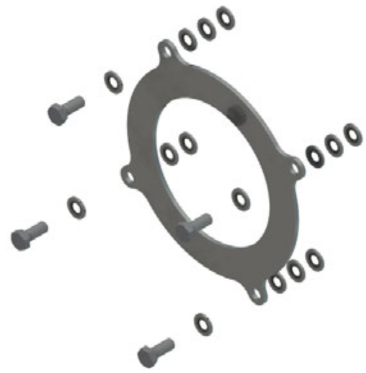
Optional Equipment

Impact Plate

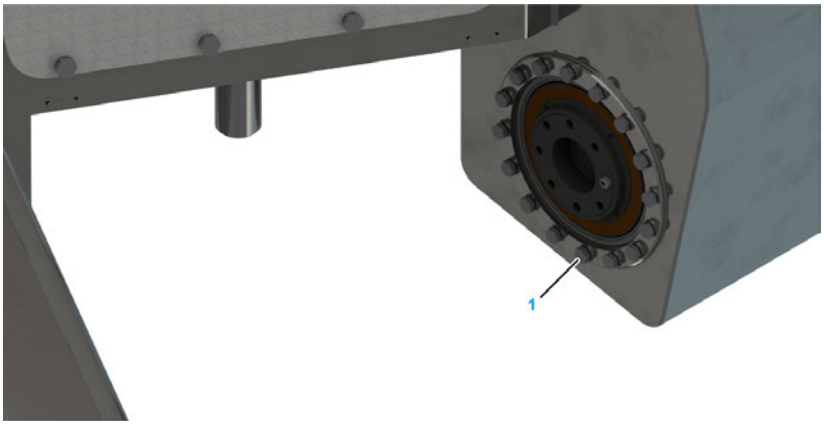
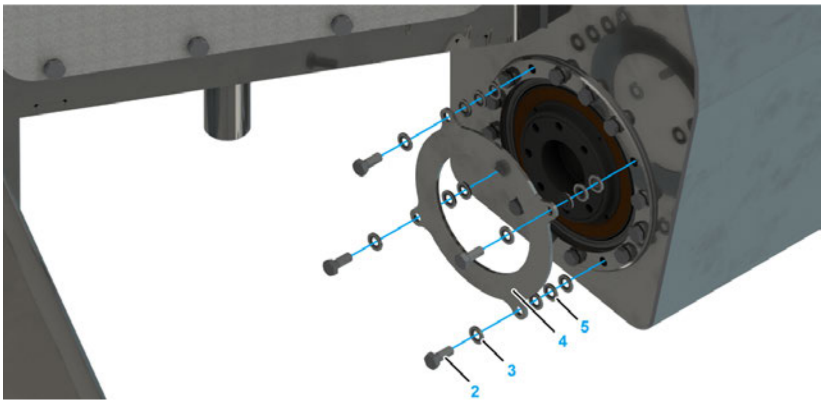
Product Overview of the Impact Plate

Some applications require protection of the gearbox sealings of the main axes so that certain cleaning methods can be applied (for example, cleaning with water jet cleaning equipment). For such applications, you can apply the Lexium P Impact Plate to the main axes of the robots VRKP2, VRKP4, VRKP5, and VRKP6. For applying the Lexium P Impact Plate to the main axes of the robots VRKP0 and VRKP1, contact your local Schneider Electric service representative.

The following figure shows the Lexium P Impact Plate – VRKPXYYYYY00035.



Mounting the Impact Plate

Step	Action
1	Remove the lower arms and the upper arms. For further information, refer to *Replacing the Lower Arms*, page 241 and *Replacing the Upper Arms*, page 259.
2	Remove four screws (1) at an angle of 90° from each of the three housing flanges. 
3	Place the Impact Plate (4) with three sealing washers (5) between the housing and the Impact Plate on each of the four holes. 
4	Fasten the Impact Plate with one screw (2) and one sealing washer (3) on each of the four holes. Tightening torque: 3.5 Nm (31 lbf-in)
5	Mount the upper arms and the lower arms. For further information, refer to *Replacing the Upper Arms*, page 259 and to *Mounting the Lower Arms*, page 155.
6	Calibrate the robot, page 272.

Gearbox Leakage Protection

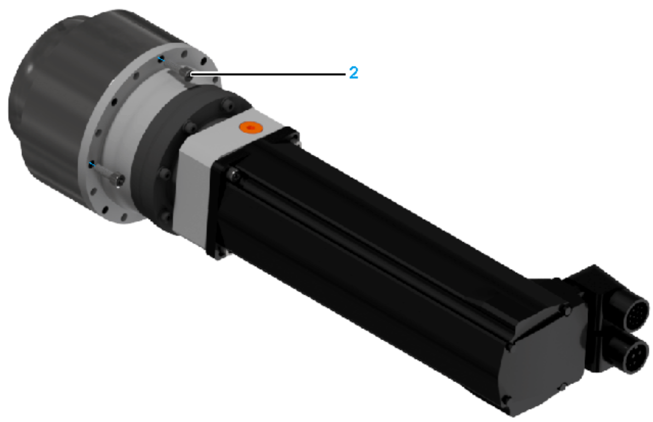
Product Overview of the Gearbox Leakage Protection

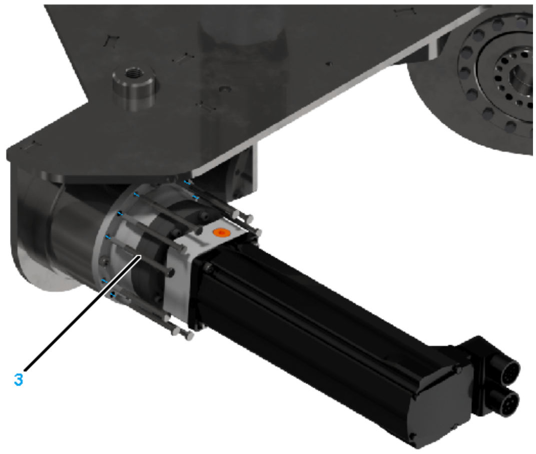
In some applications, the customer end products that are handled by robots must not get contaminated or polluted by the lubricating oil. For such applications, you can additionally apply the Lexium P Gearbox Leakage Protection to the main axes motors of robots VRKP2, VRKP4, VRKP5, and VRKP6. For applying the Lexium P Gearbox Leakage Protection to the main axes of the robots VRKP0 and VRKP1, contact your local Schneider Electric service representative.

The following figure shows the Lexium P Gearbox Leakage Protection – VRKPXYYYYY00031.

NOTE: When mounting the Gearbox Leakage Protection to the main axes motors of robots in the flat variant (VRKP••••WF) or in the standard housing variant (VRKP••••WD / VRKP••••NO), an extended motor cover (VRKPXYYYYY00036) must be used. For further information about the motor cover, refer to *Optional Equipment and Accessories*, page 290.

Mounting the Gearbox Leakage Protection

Step	Action
1	Attach the output-flange extension to the gearbox with the eight screws (1). Tightening torque: 14 Nm (124 lbf-in) 
2	Attach the protection box for the gearbox to the gearbox with four screws (2). Tightening torque: 4.7 Nm (42 lbf-in)  **NOTE:** Verify the position of the O-rings while you are attaching the protection box for the gearbox to the gearbox. The O-rings are premounted and have to be in place during assembly.

Step	Action
3	Attach the unit (motor, gearbox, and Gearbox Leakage Protection) in the specified orientation to the robot housing with the twelve screws (3). Tightening torque: 4.7 Nm (42 lbf-in)  For further information about the specified orientation, refer to the respective detail drawing in *Mechanical and Electrical Data*, page 33.
4	Clean the whole mounted unit.
5	Connect the motor as described in *Cabling the Motor and the Gearbox*, page 265.
6	Mount the upper arm as described in *Replacing the Upper Arms*, page 259.
7	Calibrate the robot mechanics, page 272.
8	Mount the motor cover, page 267

⚠WARNING

COLLISION OF COMPONENTS

Calibrate the robot mechanics after the replacement of an upper arm, a motor, or a gearbox.

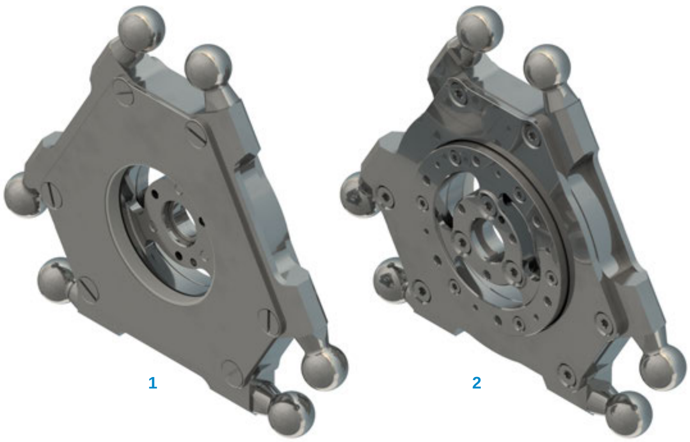
Failure to follow these instructions can result in death, serious injury, or equipment damage.

Parallel Plate Ball Bearing Protection

Product Overview of the Parallel Plate Ball Bearing Protection

For some applications in dry and dusty environments, the ball bearing of the parallel plate for robots with a rotational axis should be protected from dirt and dust. For such applications, you can additionally apply the Lexium P Parallel Plate Ball Bearing Protection to the parallel plate of Lexium P robots with a rotational axis.

The following figure shows the Lexium P Parallel Plate Ball Bearing Protection – VRKPXYYYYY00042.

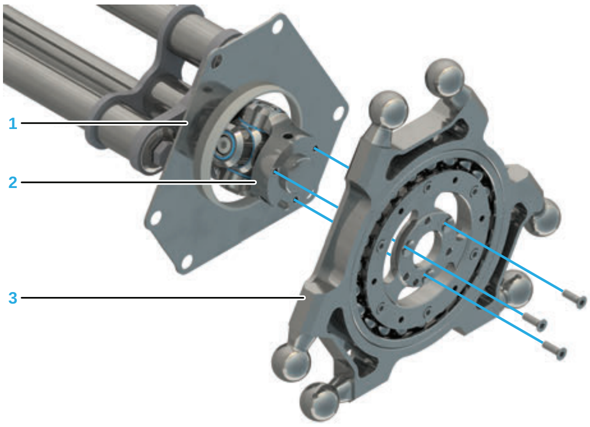
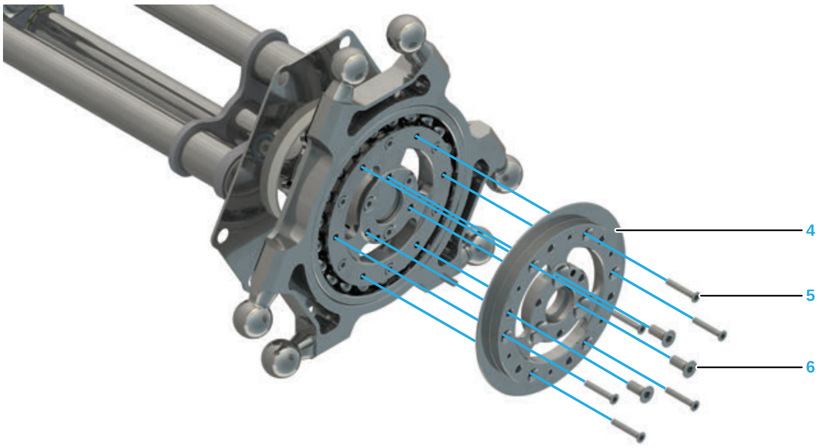


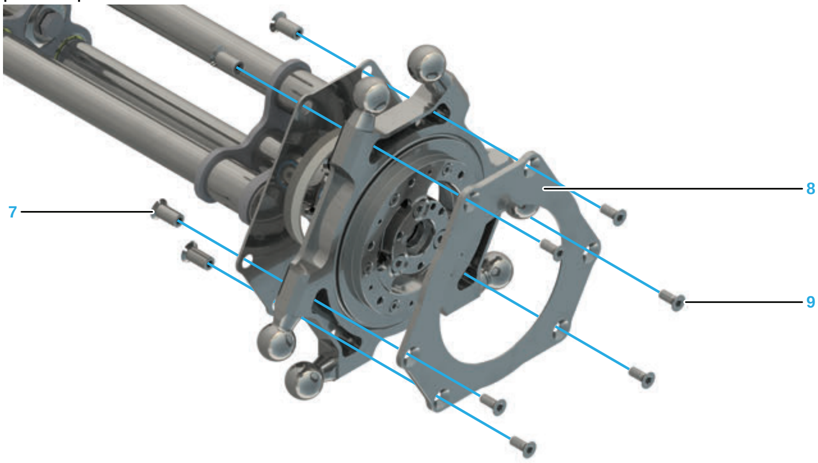
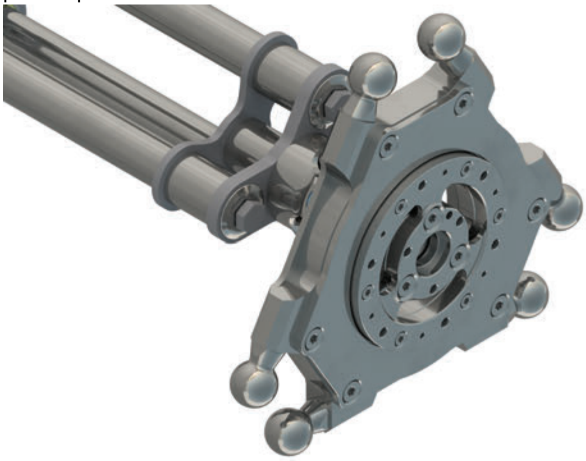
1 Top view

2 Bottom view

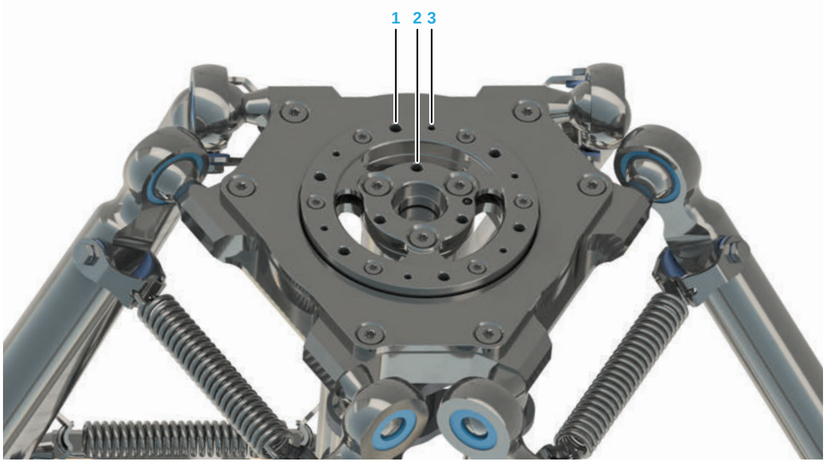
NOTE: When the Parallel Plate Ball Bearing Protection is mounted, the weight of the parallel plate increases. This may affect the performance of the robot.

Mounting the Parallel Plate Ball Bearing Protection

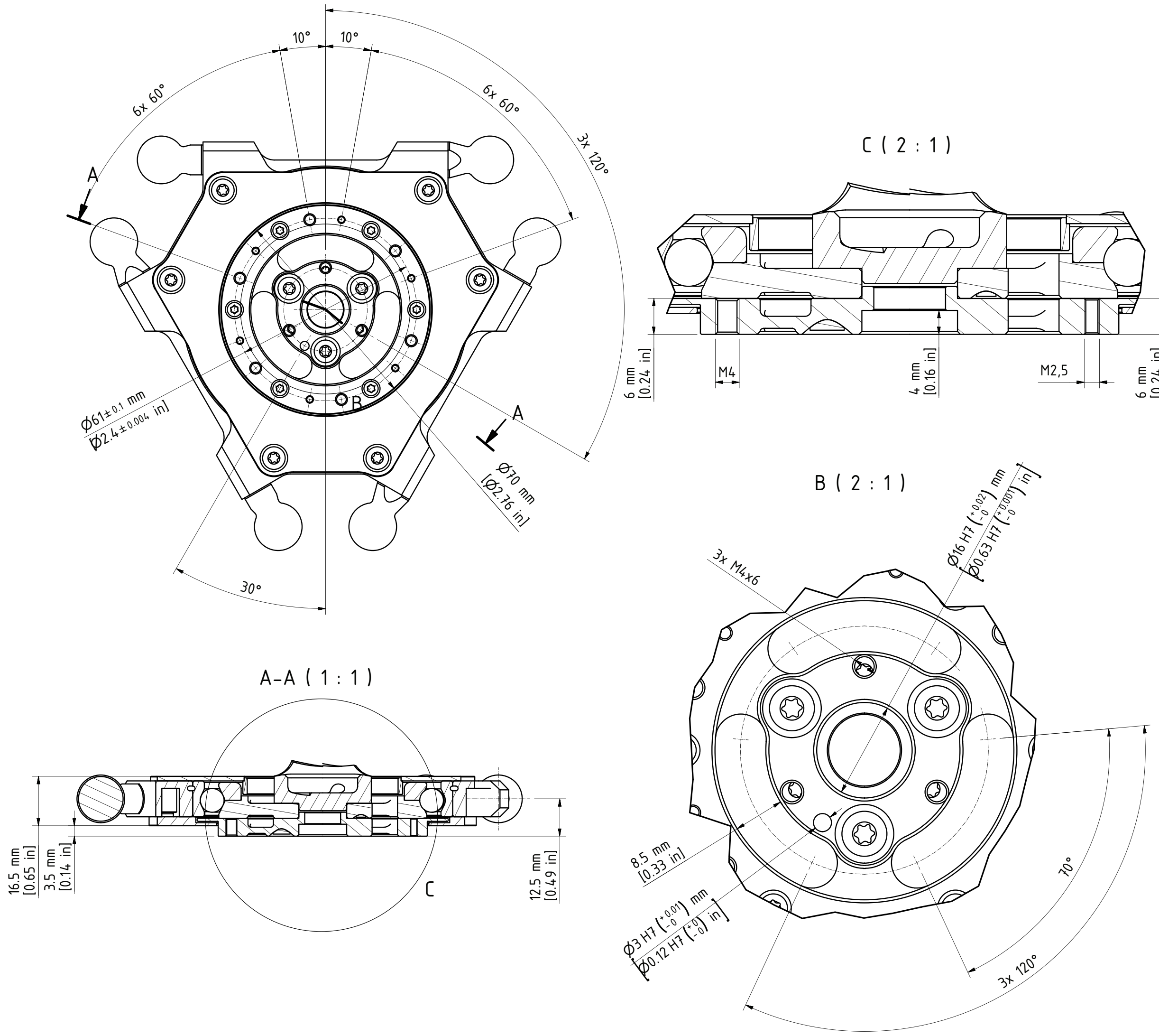
Step	Action
1	Remove the telescopic axis as described in *Replacing the Telescopic Axis*, page 241.
2	Remove the lower arms as described in *Replacing the Lower Arms*, page 254.
3	Slide the cover top side (1) over the lower universal joint (2) of the telescopic axis and then attach the parallel plate (3) to the universal joint by using the three countersunk screws that were removed previously. Use the high strength retaining compound Loctite 648 for this purpose. Tightening torque: 1 Nm (8.9 lbf-in)  **NOTE:** Apply the high strength retaining compound Loctite 648 into the tapped holes as opposed to applying it to the screws.
4	Fasten the flange offset ring (4) to the parallel plate with the three counter sunk screws M4x10 (6) and six counter sunk screws M2.5x16 (5). Use the medium strength threadlocking adhesive Loctite 243 for this purpose. Tightening torque: • For M4x10: 1.8 Nm (15.9 lbf-in) • For M2.5x16: 0.5 Nm (4.43 lbf-in)"  **NOTE:** Apply the medium strength threadlocking adhesive Loctite 243 into the tapped holes as opposed to applying it to the screws.

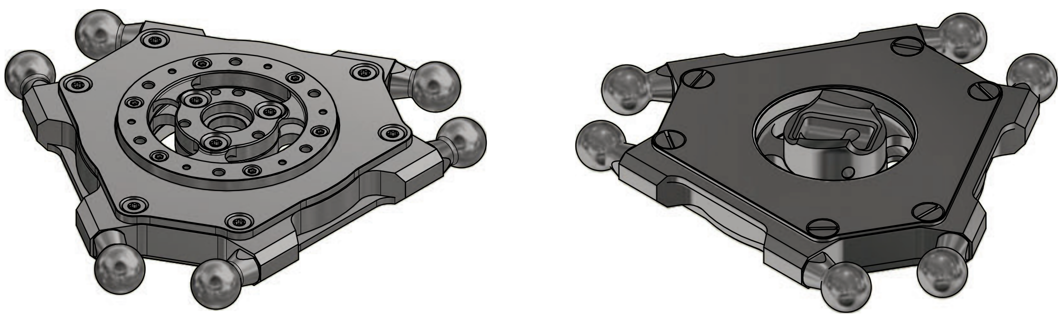
Step	Action
5	Insert the collar nuts (7) from above through the top cover and the six bores Ø6.4 of the parallel plate. 
6	Fasten the bottom cover (8) to the parallel plate with the six counter sunk screws M4x10 (9) and the collar nuts. Use the medium strength threadlocking adhesive Loctite 243 for this purpose. Tightening torque: 1.8 Nm (15.9 lbf-in) **NOTE:** Apply the medium strength threadlocking adhesive Loctite 243 into the tapped holes as opposed to applying it to the screws.
7	Check the ball bearing for ease of movement and grinding noises by rotating the parallel plate.  **NOTE:** The ball bearings should turn smoothly. There should be no grinding noises.
8	Mount the telescopic axis and the lower arms. For further information, refer to *Replacing the Telescopic Axis*, page 241 and *Replacing the Lower Arms*, page 254.

Mounting the Gripper to the Parallel Plate Ball Bearing Protection

Step	Action
1	Fasten the gripper to the mounting points provided for this purpose on the Parallel Plate Ball Bearing Protection: • Pitch circle diameter 61 mm (2.4 in): 6 x M2.5 (1), tightening torque: 0.5 Nm (4.4 lbf-in), strength class of the screw: at least A2-70 • Pitch circle diameter 61 mm (2.4 in): 6 x M4 (2), tightening torque: 1.8 Nm (16 lbf-in), strength class of the screw: at least A2-70 • Pitch circle diameter 28 mm (1.1 in): 3 x M4 (3), tightening torque: 1.8 Nm (16 lbf-in), strength class of the screw: at least A4-80  For further information, refer to *Flange Dimensions for Robots with a Rotational Axis and Parallel Plate Ball Bearing Protection*, page 178.
2	Calibrate the rotational axis if this has not yet been done before the mounting of the gripper. **NOTE:** • Observe the permissible weights and distances that result in the maximum tilting torque. • Maximum tilting torque on the bearing of the parallel plate for robots with a rotational axis: 20 Nm (177 lbf-in).

Flange Dimensions for Robots with a Rotational Axis and Parallel Plate Ball Bearing Protection





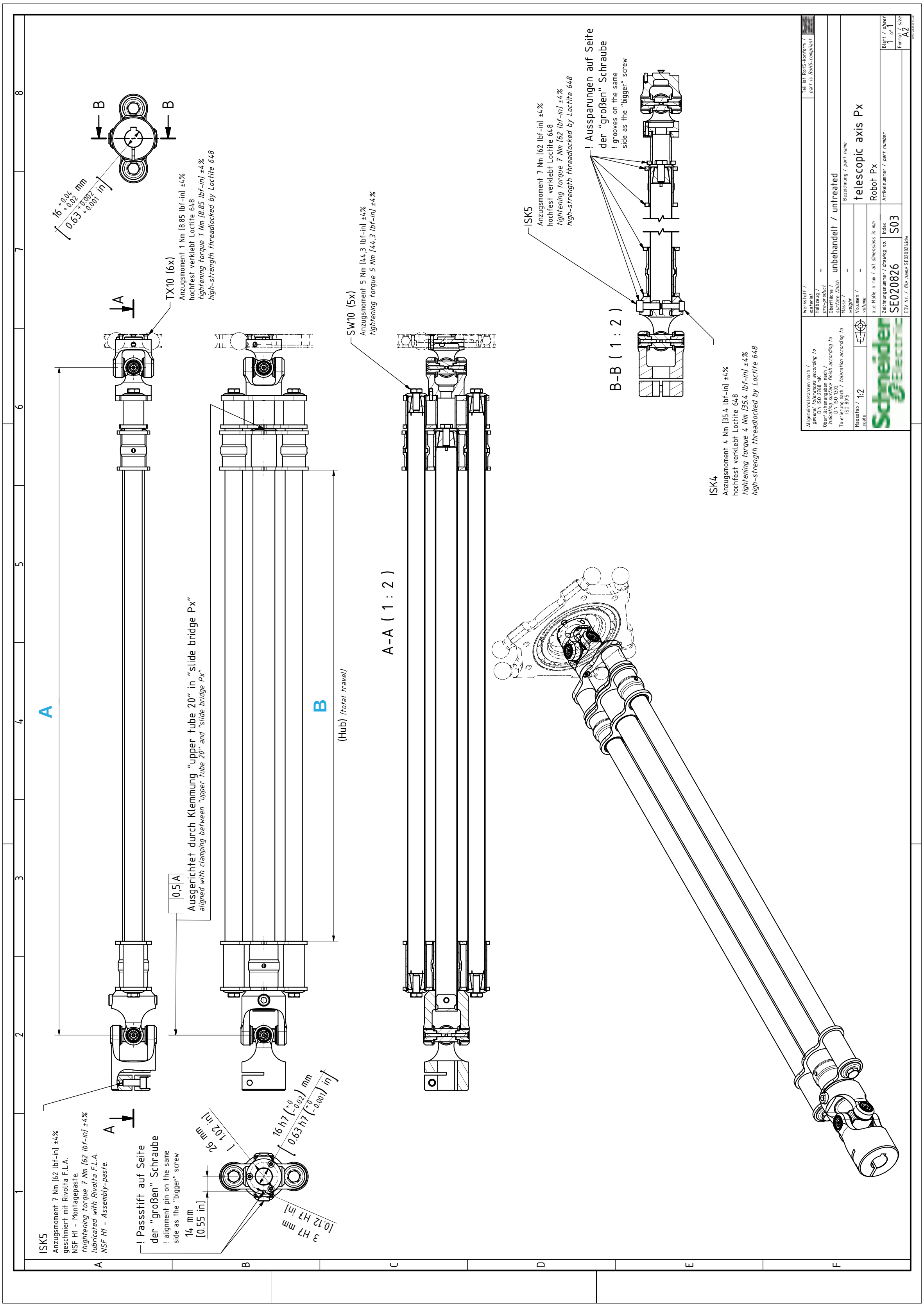
Telescopic Axis Double

Technical Data of the Telescopic Axis Double

Mechanical Data of the Telescopic Axis Double

Category	Parameter	Unit	VRKP• YYYYY00007
General data	Maximum torque of the rotational axis with the Telescopic Axis Double	Nm (lbf-in)	3 (26.6)

Detail Drawing of the Telescopic Axis Double



Dimension	Description	Unit	Robot type				
			VRKP2	VRKP4	VRKP5	VRKP6	VRKP6 •••••••E00
A	Minimum length	mm (in)	458.4 (18)	610.4 (24)	686.4 (27)	766.4 (30)	842.4 (33)
B	Stroke	mm (in)	278.6 (11)	430.6 (17)	506.6 (20)	586.6 (23)	662.6 (26)

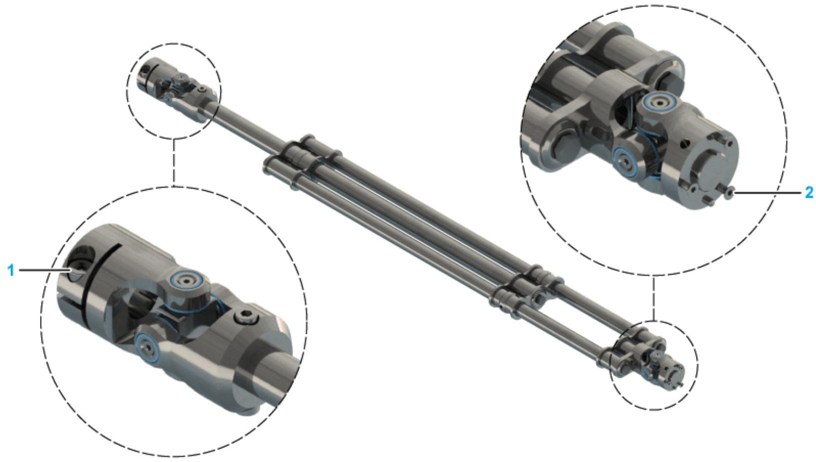
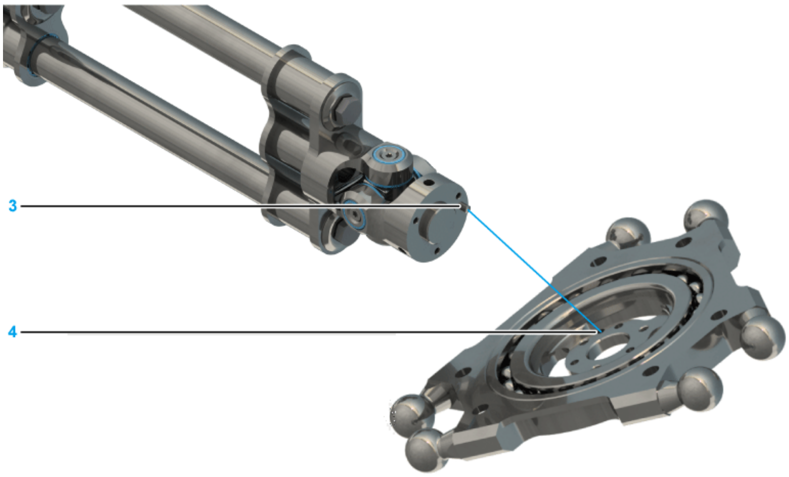
Mounting the Telescopic Axis Double

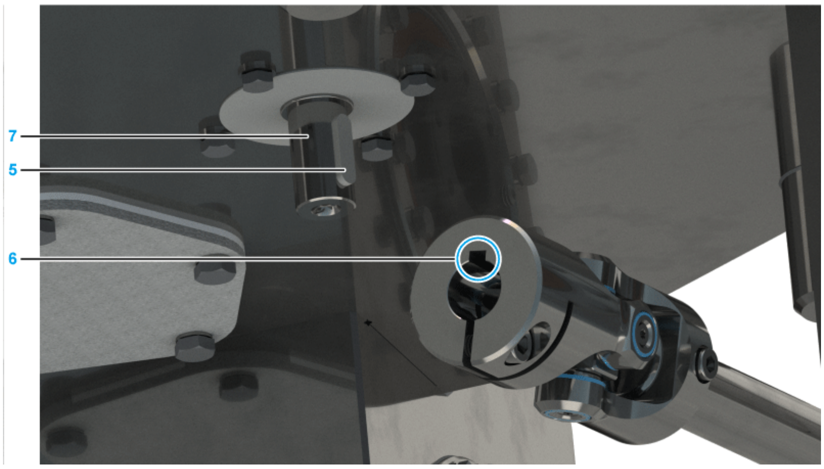
NOTICE

INSUFFICIENT PART CLEARANCE

Ensure that the universal joint does not touch the gearbox seal during assembly.

Failure to follow these instructions can result in equipment damage.

Step	Action
1	Extend the Telescopic Axis Double to its entire length, then retract the same and verify its resistance. **NOTE:** A light irregular resistance is normal and caused by the manufacturing tolerances of the tubes. The axis is run in during the first 100 hours of operation.
2	Loosen the clamping screw (1) at the top universal joint. 
3	Remove the three countersunk screws in the underside of the bottom universal joint (2).
4	Place the parallel plate on the bottom universal joint as shown in the following figure and ensure that the locating pin (3) is in alignment with the corresponding hole of the parallel plate (4).  **NOTE:** In the delivery condition, the index pin is located in the universal joint of the Telescopic Axis Double. During dismounting, it may be located in the parallel plate.
5	Attach the parallel plate to the universal joint by using the three countersunk screws that were removed previously. Use the high strength retaining compound Loctite 648 for this purpose. Tightening torque: 0.8 Nm (7.1 lbf-in) **NOTE:** Apply the high strength retaining compound Loctite 648 into the tapped holes as opposed to applying it to the screws.

Step	Action
6	Push the universal joint (6) over the shaft (7) protruding from the robot housing until the universal joint comes into its stop position on the gear shaft flange. In doing so, rotate the universal joint to ensure that the recess in the universal joint is located above the keyway (5).  **NOTE:** When using a plastic universal joint: as a result of frequent assembly and disassembly, the flange of the universal joint can be damaged so that the universal joint may touch the seal of the Telescopic Axis Double gearbox.
7	Tighten the clamping screw (1) that was loosened previously. Tightening torque: 4 Nm (35.4 lbf-in)

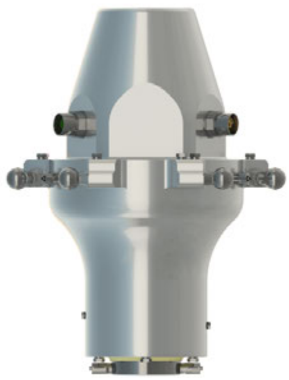
Rotational Modules

Product Overview of the Rotational Modules

Overview

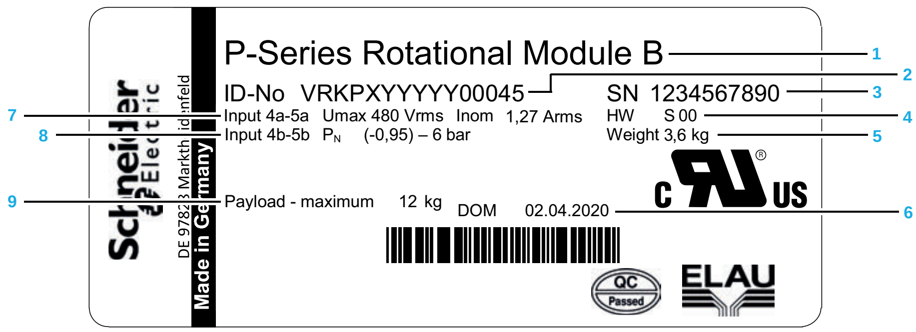
Some applications require the use of a rotational axis with an increased torque and/or a better position repeatability. For such applications, you can apply the Lexium P Rotational Module to the Lexium P Robot.

The following figure represents the Lexium P Rotational Module B – VRKPXYYYYYY00045 and the Lexium P Rotational Module HT-B – VRKPXYYYYYY00046.



Type Plate of the Rotational Modules

The type plate of the Rotational Modules is provided in the packaging. You can attach the type plate next to the type plate of the robot, page 30.



1	Device name	6	Date of manufacture
2	Type code	7	Voltage and current of the fourth and fifth axis
3	Serial number	8	Maximum operating pressure
4	Hardware code	9	Maximum Load
5	Weight of the module		

Technical Data of the Rotational Modules

Mechanical and Electrical Data of the Rotational Modules

Category	Parameter	Unit	VRKPXYY YYY00045	VRKPXYY YYY00046
General data	Rated load	kg (lb)	1.5 (3.3)	5 (11)
	Maximum load[1]	kg (lb)	12 (33)	12 (33)
	Allocation of auxiliary axes	–	4th	
	Maximum torque of the 4th axis[2]	Nm (lbf-in)	16 (142)[3]	
	Nominal torque of the 4th axis[2]	Nm (lbf-in)	4.5 (40)	12 (106)
	Position repeatability (ISO 9283)	–	Angle: +/-0.1°	
Electrical data	Mains voltage - 3-phase	Vac	480[4]	
	Control voltage (with brake)	Vdc	+24 (-10…+6%)	
	Motor 4th axis	–	SH30402P07F2000	
	Maximum current of 4th axis motor[5]	A	4.10	1.54
Mechanical data	Protection class	–	IP65	
	Gear ratio i	–	15/1	40/1
	Drive parameter *GearOut*	–	15	40
	Drive parameter *GearIn*	–	1	
	Maximum speed	1/min	600	225
	Software parameter *TcpPlateSize*	mm (in)	75 (2.95)[6]	
Pneumatic data	Number of pneumatic connections	–	2	
	Operating pressure	bar (psi)	-0.95…+6 (-13.8…+87)	
Working space	Rotation 4th axis	–	Unlimited	
Weight	–	kg (lb)	3.5 (7.7)	
Material	External casing	–	Aluminum, stainless steel 1.4301, steel nickel-plated, zinc nickel-plated, FPM, EPDM	

(1) Loads above the maximum load are possible with restrictions. If required, contact your local Schneider Electric service representative.

(2) When designing the gripper, be aware of any appearance of mass moments of inertia as well as friction, which could lead to exceeding the maximum torque and consequential damage.

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

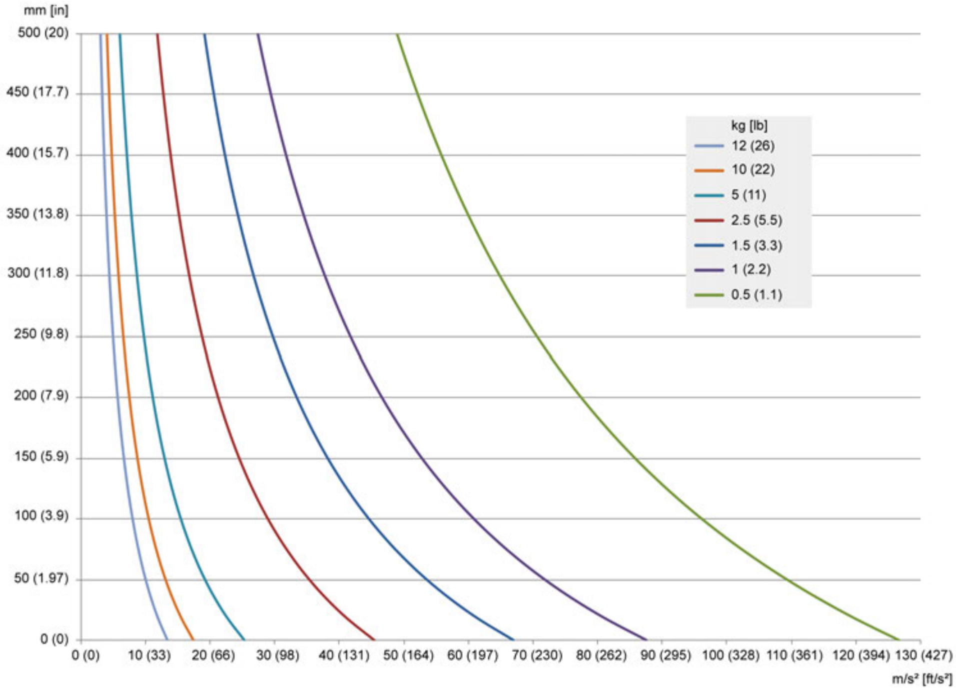
(4) Motor without brake.

(5) Use the drive parameter *UserDrivePeakCurrent* to adjust the maximum current.

(6) This value is the distance between the suspension points of the lower arms and the center of the flange plate.

Maximum Tilting Torque

The loading capacity of the Rotational Modules is limited by the maximum tilting torque at the ball pins level. The following diagram shows the possible vertical distance of the mass at its center of gravity of the payload to the FCP relative to the mass and the required maximum acceleration.



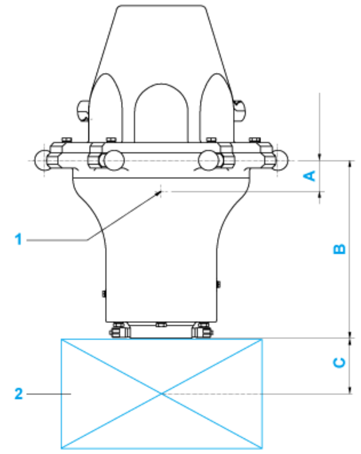
A maximum tilting torque of 20 Nm (177 lbf-in) is to be observed at the ball pins level.

Calculate the tilting torque with the following formula:

Tilting torque [Nm (lbf-in)] = total payload [kg (lb)] x maximum acceleration [m/s² (ft/s²)] x vertical distance [m (in)]

NOTE:

- Total payload [Nm (lbf-in)] = weight of the module + weight of the gripper + weight of the customer end product
- Vertical distance [m (in)] = distance from the ball pins level to the total mass center point = (weight of the module [kg (lb)] x vertical distance from the ball pins to the mass center point of the module (A) [m (in)] + weight of the gripper and the customer end product [kg (lb)] x (vertical distance from the FCP (flange center point) to the mass center point of the gripper and the customer end product (C) [m (in)] + vertical distance from the ball pins to the FCP (B) [m (in)])) / total payload [kg (lb)]



1 Mass center point of the module

2 Gripper and customer end product

Dimension	Description	Unit	VRKPXYYYYY00045	VRKPXYYYYY00046
A	Vertical distance from the ball pins to the mass center point of the module	mm (in)	25 (0.98)	25 (0.98)
B	Vertical distance from the ball pins to the FCP	mm (in)	141 (5.6)	141 (5.6)
C	Vertical distance from FCP to the mass center point of the gripper and the customer end product	mm (in)	Depends on the gripper and the customer end product	

Mounting the Rotational Modules

Step	Action
1	Hook in the lower arms on the Rotational Module. For further information, refer to *Hooking in the Lower Arms*, page 156. 

Cabling the Rotational Modules

Overview

For cabling the Rotational Module, use only Schneider Electric extension cables that are specifically designed for the robot application.

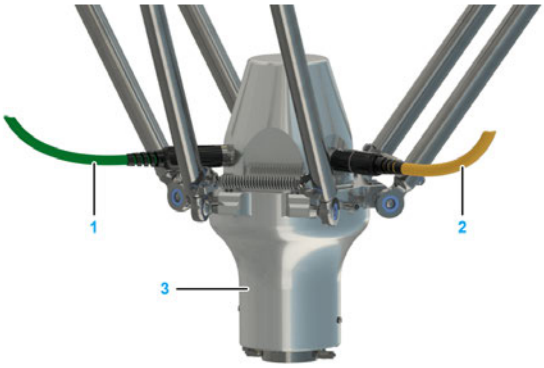
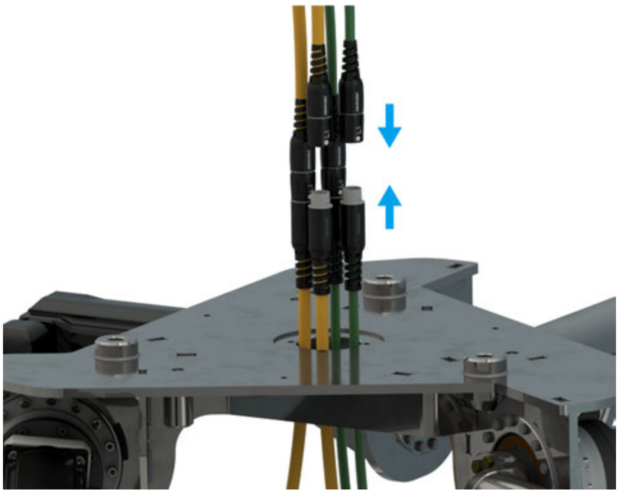
The following table presents the appropriate cable for each robot type.

Robot type	Cable length	Cable type	Order number
VRKP0 VRKP1 VRKP2 VRKP4	3 m (9.8 ft)	Encoder extension cable	VW3E2100R030
		Power extension cable	VW3E1168R030
VRKP5 VRKP6	4.3 m (14 ft)	Encoder extension cable	VW3E2100R043
		Power extension cable	VW3E1168R043

If other cable lengths are required, contact your local Schneider Electric service representative.

Cabling the Rotational Modules

Step	Action
1	Feed one encoder cable for SH3040 motors to the middle of the robot housing.
2	Feed one power cable for SH3040 motors to the middle of the robot housing. **NOTE:** For equipment that you are supplying that is not described in the present document, consult the documentation for those products.
3	Connect the encoder extension cable (VW3E2100R•••) (1) and the power extension cable (VW3E1168R•••) (2) to the Rotational Module (3) as described for the SH3040 motor in the *SH3 Servo motor Motor Manual*.

Step	Action
	 **NOTE:** For cabling the Rotational Module use only Schneider Electric extension cables that are specifically designed for the robot application.
4	Feed the encoder extension cable and the power extension cable from the Rotational Module via the lower and upper arms of the robot into the robot housing. **NOTE:** • Attach the cables to the lower and upper arms so that the cables have sufficient freedom of movement to reach with the TCP all positions in the working space. • Consider the bending radius for the respective cables: ◦ VW3E1168R••• – minimum bending radius: 69 mm (2.7 in) ◦ VW3E2100R••• – minimum bending radius: 63 mm (2.5 in)
5	Connect the cables in the robot housing with the cables from the Rotational Module.  **NOTE:** For the washdown robot references, contact your local Schneider Electric representative.
6	Verify the correct routing and fastening of the cables.

NOTICE

INCORRECT PAIRING OF POWER AND ENCODER CABLES

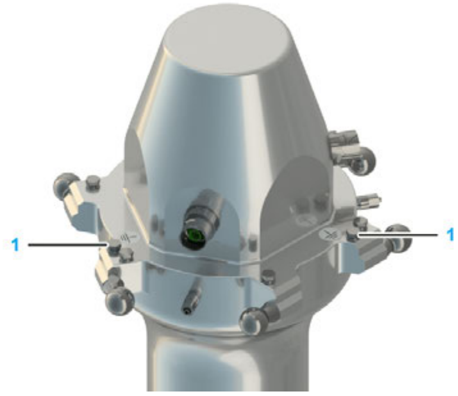
Label the power and associated encoder cables according to their pairing.

Failure to follow these instructions can result in equipment damage.

Grounding Robots with the Rotational Module

Ground those parts of the robot which are located where either contact with current carrying parts (cables) or an insulation error is probable.

Alternatively, protect the cables with insulation which withstands the mechanical, chemical, electrical, and thermal stresses that it can be subjected to during normal operating conditions.



Ground the Rotational Module via one of the screws (1) for protective ground (earth) if grounding via the protective ground conductor of the motor cable is insufficient. To ensure an ideal electrical connection, use a serrated lock washer between the housing and cable lug. The tightening torque of the screws is 2 Nm (17.7 lbf-in).

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.

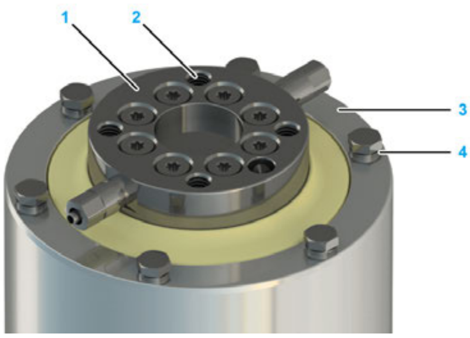
Mounting the Payload to the Rotational Modules

Overview

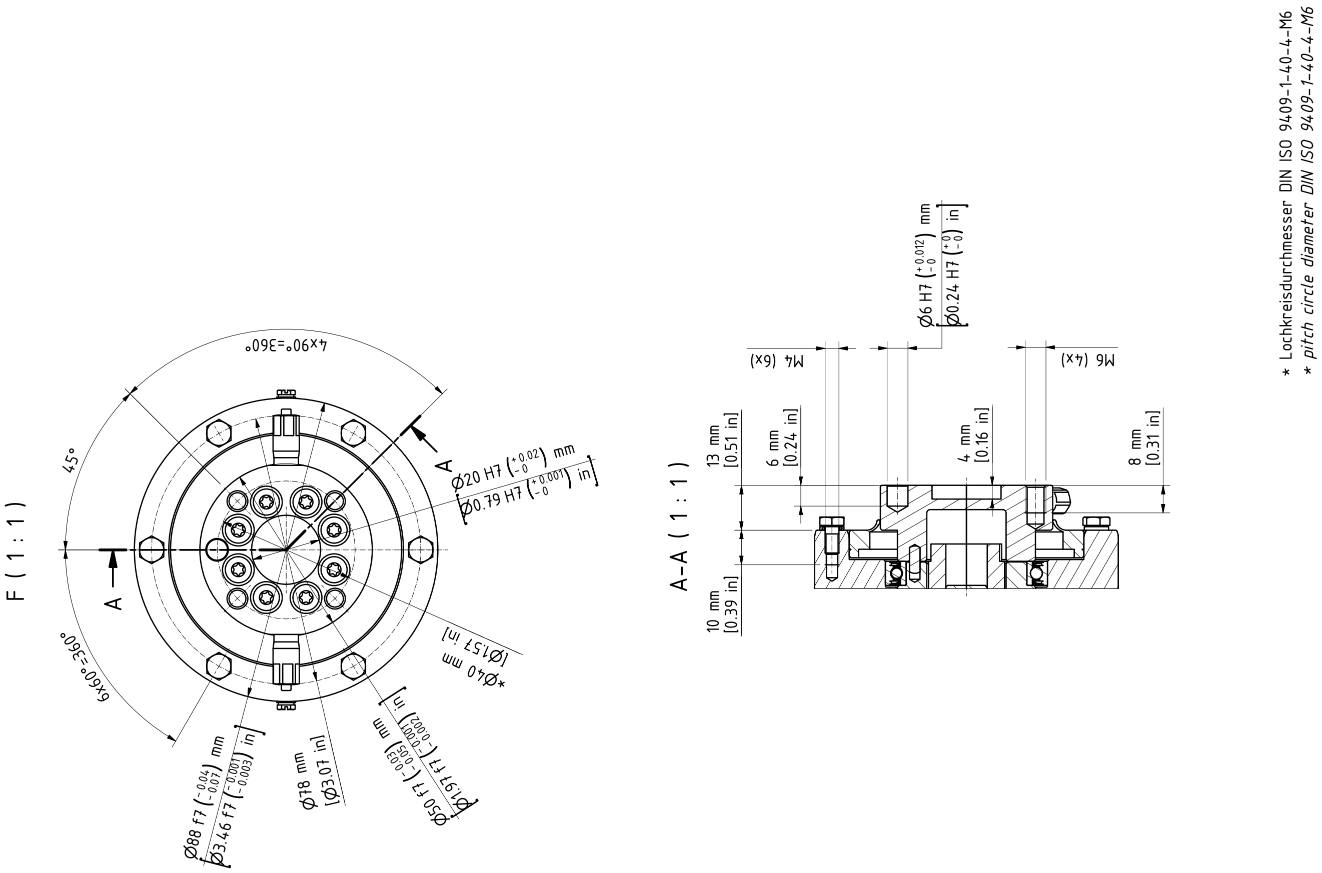
Here you will find the following information:

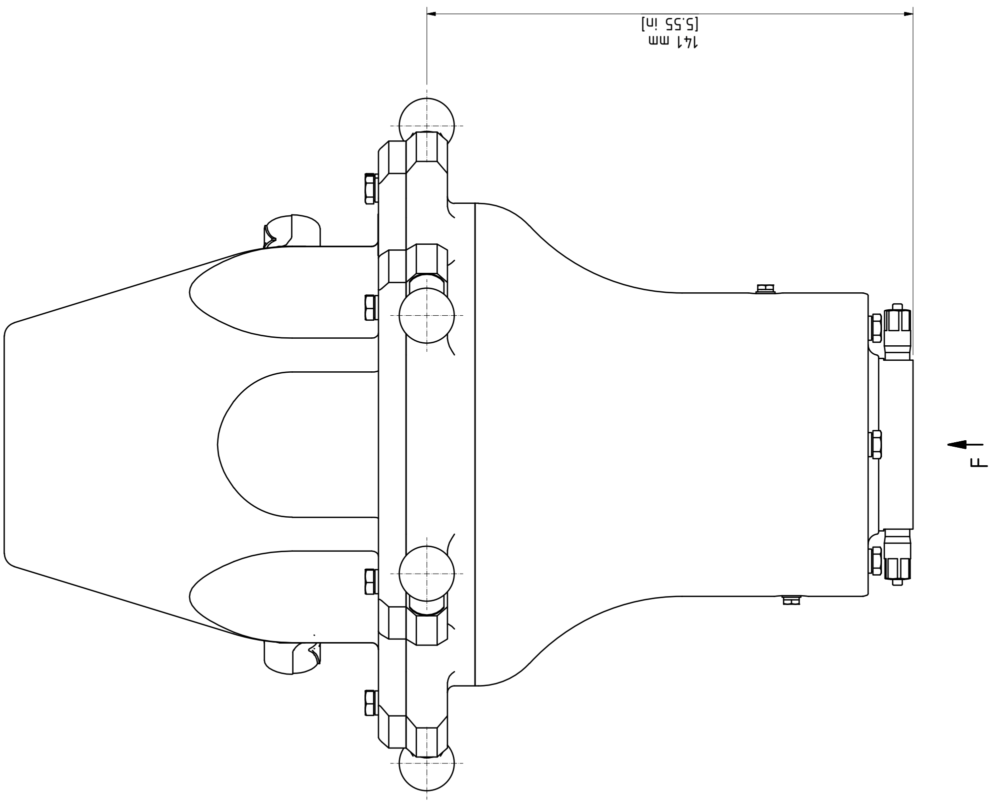
- Mounting the gripper to the Rotational Modules , page 191
- Flange dimensions for the Rotational Modules , page 192
- Supply of the gripper on the Rotational Modules, page 193

Mounting the Gripper to the Rotational Modules

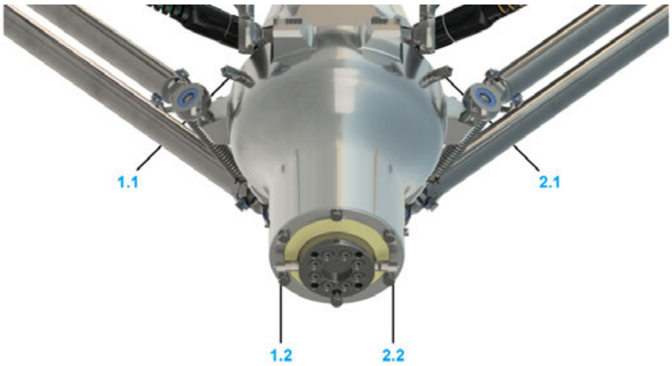
Step	Action
1	Fasten the gripper to the mounting points at the rotating flange (1) or on the fixed flange (3): • Pitch circle diameter DIN ISO 9409-1, 40 mm (1.57 in): 4 x M6 (2), tightening torque: 4.2 Nm (37 lbf-in), strength class of the screw: at least A2-70 • Pitch circle diameter 78 mm (3.07 in): 6 x M4 (4), tightening torque: 2 Nm (17.7 lbf-in), strength class of the screw: at least A2-70 For further information, refer to *Flange Dimensions for the Rotational Modules*, page 192. 
2	Calibrate the Rotational Module if this has not been done before mounting the gripper. For further information, refer to *Calibrating the Double Rotational Module and the Rotational Tilting Module*, page 276. **NOTE:** • Observe the permissible weights and distances that result in maximum tilting torque, page 186. • The maximum torque must not be exceeded. For the respective values, refer to *Mechanical and Electrical Data of the Rotational Modules*, page 185.

Flange Dimensions for the Rotational Modules





Supply of the Gripper on the Rotational Modules

Step	Action
1	Connect the media line to one of the pneumatic plug-in connections (1.1 or 2.1) of the Rotational Module. The plug-in connection has a diameter of 4 mm (0.0157 in).  For further information, refer to *Supply of the Gripper*, page 167.
2	Connect the media line of the gripper to one of the associated connections (1.2 or 2.2) on the rotational flange of the Rotational Module. Straight fitting diameter: 4 mm (0.157 in) **NOTE:** • Connection 1.1 is linked to connection 1.2 • Connection 2.1 is linked to connection 2.2

Tilting Modules

Product Overview of the Tilting Modules

Overview

Some applications require the use of a tilting axis. For such applications, you can apply the Lexium P Tilting Module B or the Lexium P Tilting Module HT-B-HD to the Lexium P Robot.

The following figure shows the Lexium P Tilting Module B – VRKPXYYYYY00053.

The following figure shows the Lexium P Tilting Module HT-B-HD – VRKPXYYYYY00052.

Type Plate of the Tilting Modules

The type plate of the Tilting Modules is provided in the packaging. You can attach the type plate next to the type plate of the robot.

The type plate design is the same as for the Rotational Module, page 184.

Technical Data of the Tilting Modules

Mechanical and Electrical Data of the Tilting Modules

Category	Parameter	Unit	VRKPXYYYYY00053	VRKPXYYYYY00052
General data	Maximum load without restrictions	kg (lb)	0.25 (0.55)	0.5 (1.1)
	Load with restrictions(1)	kg (lb)	0.25…2.5 (0.55…5.5)	0.5…5 (1.1…11)
	Allocation of auxiliary axes	–	4th	
	Maximum torque of the 4th axis(2)	Nm (lbf-in)	7.5 (66)	20 (177)
	Maximum holding torque of 4th motor	Nm (lbf-in)	5 (44)	20 (177)
	Position repeatability (ISO 9283)	–	Angle: +/-0.1°	
Electrical data	Mains voltage - 3-phase	Vac	480(3)	
	Control voltage (with brake)	Vdc	+24 (-10…+6%)	
	Motor 4th axis	–	SH30402P07F2000	
	Maximum current of 4th axis motor(4)	A	1.9	0.9
Mechanical data	Protection class	–	IP65	
	Gear ratio i	–	15/1	80/1
	Drive parameter *GearOut*	–	15	80
	Drive parameter *GearIn*	–	1	
	Maximum speed	1/min	600	112.5
	Software parameter *TcpPlateSize*	mm (in)	75 (2.95)(5)	
Pneumatic data	Number of pneumatic connections	–	0	
	Operating pressure	bar (psi)	–	
Working space	Tilting 4th axis	–	+/-100°	
Weight	–	kg (lb)	4.3 (9.5)	5 (11)
Material	External casing	–	Aluminum, stainless steel, steel nickel-plated, zinc nickel-plated, brass nickel-plated, FPM, EPDM	

(1) Loads above the maximum load are possible with restrictions. If required, contact your local Schneider Electric service representative.

(2) When designing the gripper, be aware of any appearance of mass moments of inertia as well as friction, which could lead to exceeding the maximum torque and consequential damage.

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

(4) Use the drive parameter *UserDrivePeakCurrent* to adjust the maximum current.

(5) This value is the distance between the suspension points of the lower arms and the center of the flange plate.

Maximum Tilting Torque

The loading capacity of the Tilting Modules is limited by the maximum tilting torque at the ball pins level.

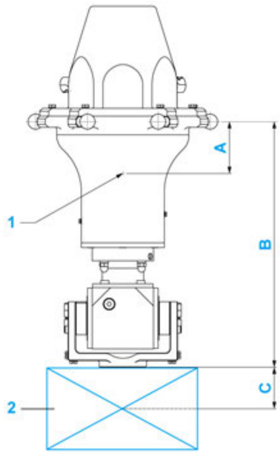
A maximum tilting torque of 20 Nm (177 lbf-in) is to be observed at the ball pins level.

Calculate the tilting torque with the following formula:

Tilting torque [Nm (lbf-in)] = total payload [kg (lb)] x maximum acceleration [m/s² (ft/s²)] x vertical distance [m (in)]

NOTE:

- Total payload [Nm (lbf-in)] = weight of the module + weight of the gripper + weight of the customer end product
- Vertical distance [m (in)] = distance from the ball pins level to the total mass center point = (weight of the module [kg (lb)] x vertical distance from the ball pins to the mass center point of the module (A) [m (in)] + weight of the gripper and the customer end product [kg (lb)] x (vertical distance from the FCP (flange center point) to the mass center point of the gripper and the customer end product (C) [m (in)] + vertical distance from the ball pins to the FCP (B) [m (in)])) / total payload [kg (lb)]



1 Mass center point of the module

2 Gripper and customer end product

Dimension	Description	Unit	Tilting Module B	Tilting Module HT-B-HD
A	Vertical distance from the ball pins to the mass center point of the module	mm (in)	54 (2.13)	55 (2.17)
B	Vertical distance from the ball pins to the FCP	mm (in)	228 (9)	264 (10.4)
C	Vertical distance from FCP to the mass center point of the gripper and the customer end product	mm (in)	Depends on the gripper and the customer end product	

Mounting the Tilting Modules

Step	Action
1	Hook in the lower arms on the Tilting Module. For further information, refer to *Hooking in the Lower Arms*, page 156. 

Cabling the Tilting Modules

The procedures for cabling and grounding the Tilting Modules are similar to the procedures for the Rotational Modules. Therefore, refer to *Cabling the Rotational Modules*, page 188 for further information.

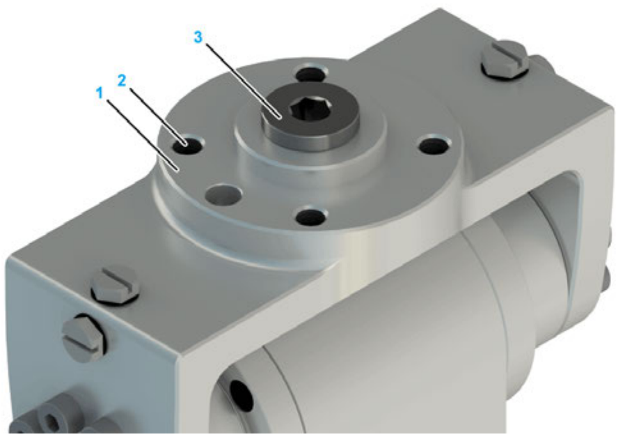
Mounting the Payload to the Tilting Modules

Overview

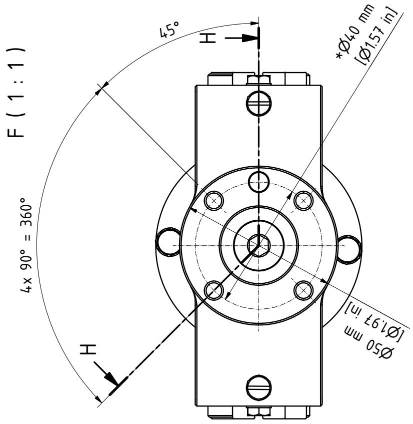
Here you will find the following information:

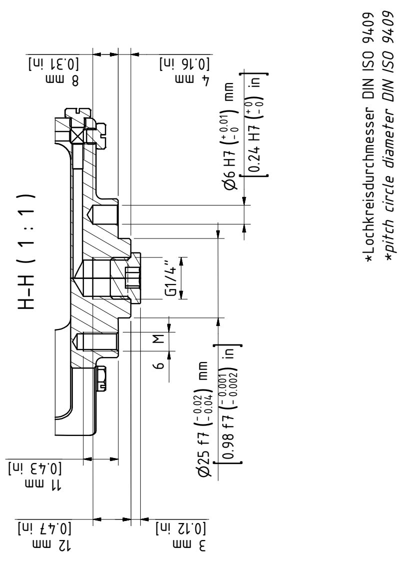
- Mounting the gripper to the Tilting Module B, page 198
- Flange dimensions for the Tilting Module B, page 199
- Mounting the gripper to the Tilting Module HT-B-HD, page 200
- Flange dimensions for the Tilting Module HT-B-HD, page 201

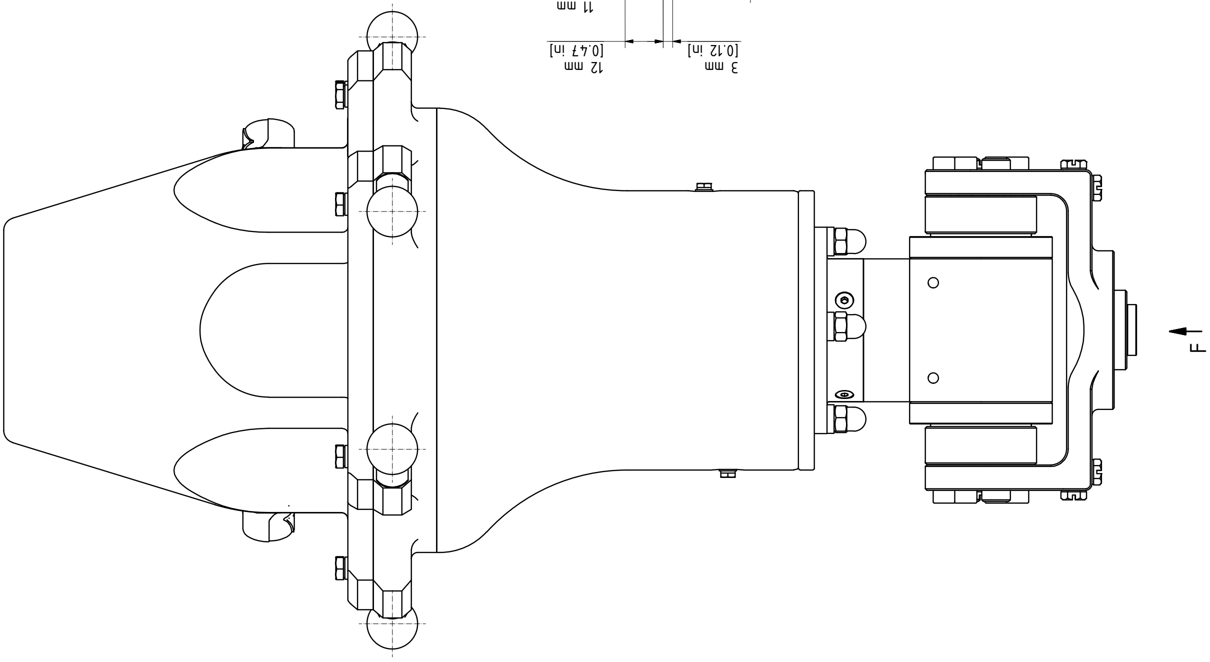
Mounting the Gripper to the Tilting Module B

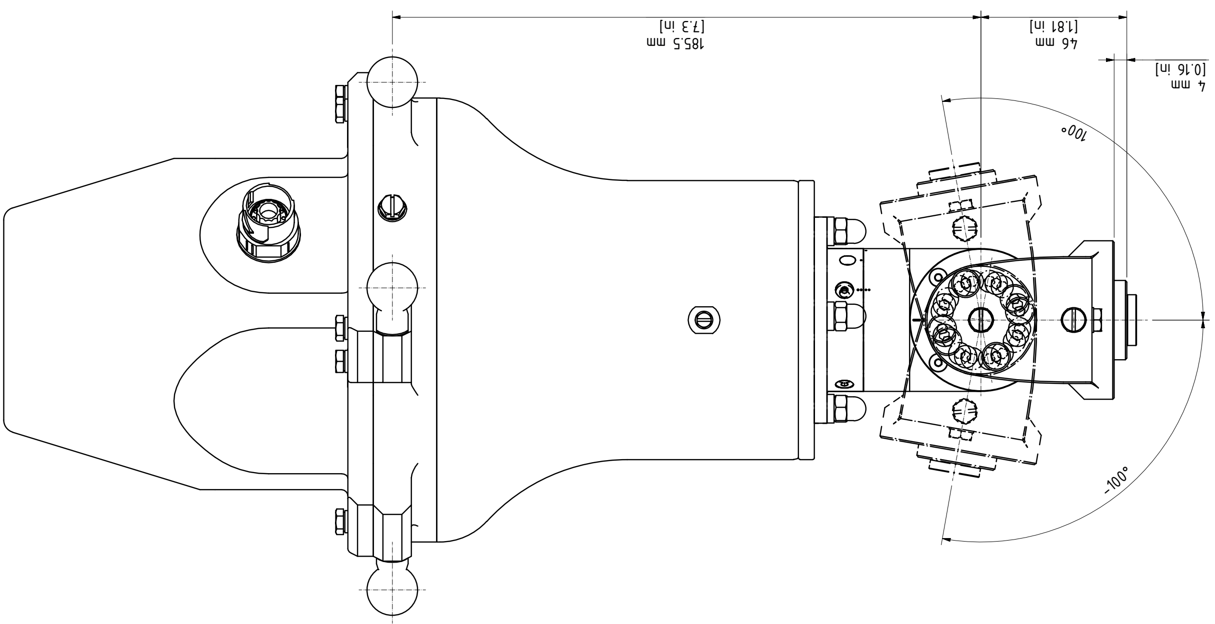
Step	Action
1	Fasten the gripper to the mounting points at the flange (1): • Pitch circle diameter DIN ISO 9409-1, 40 mm (1.57 in): 4 x M6 (2), tightening torque: 4.5 Nm (40 lbf-in), strength class of the screw: at least A2-70 • Thread for suction pads G1/4”: G1/4” x 12 mm (G1/4” x 0.47 in) (3), tightening torque: depends on your gripper. Closed with a screw plug as standard. For further information, refer to *Flange Dimensions for the Tilting Module B*, page 199. 
2	Calibrate the Tilting Module B if this has not been done before mounting the gripper. For further information, refer to *Calibrating the Tilting Module*, page 278. **NOTE:** • Observe the permissible weights and distances that result in the *maximum tilting torque*, page 195. • The maximum torque must not be exceeded. For the respective values, refer to *Mechanical and Electrical Data of the Tilting Modules*, page 195.

Flange Dimensions for the Tilting Module B

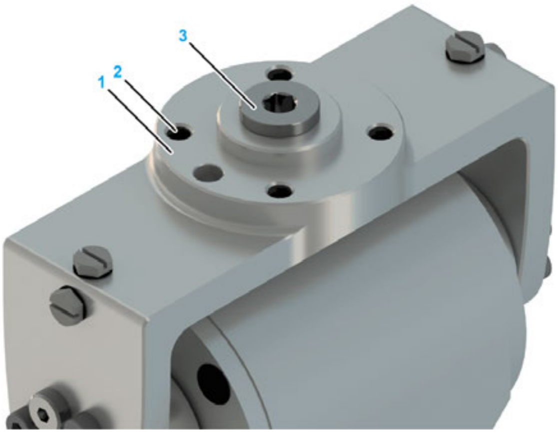




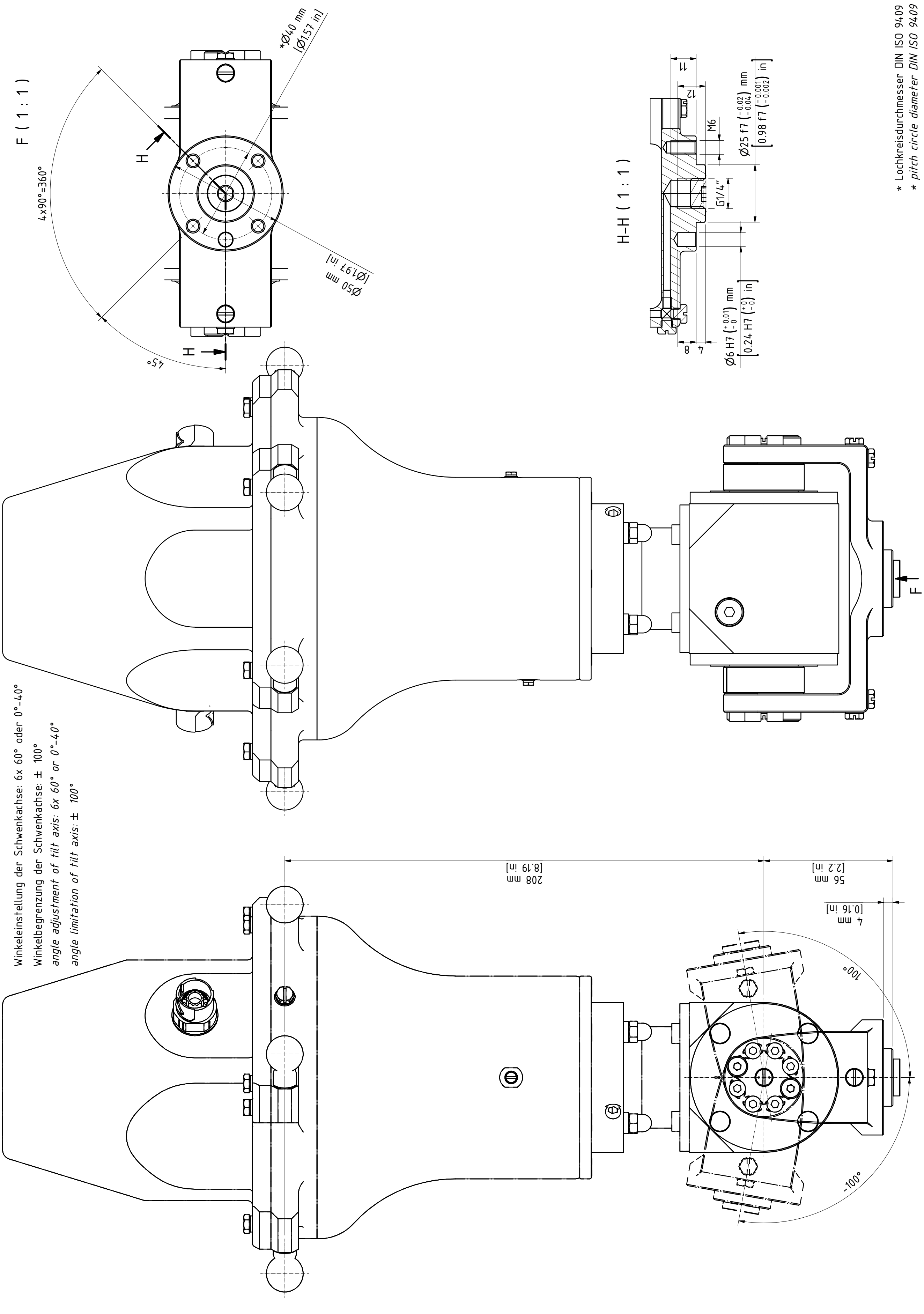




Mounting the Gripper to the Tilting Module HT-B-HD

Step	Action
1	Fasten the gripper to the mounting points at the flange (1): • Pitch circle diameter DIN ISO 9409-1, 40 mm (1.57 in): 4 x M6 (2), tightening torque: 4.5 Nm (40 lbf-in), strength class of the screw: at least A2-70 • Thread for suction pads G1/4”: G1/4” x 12 mm (G1/4” x 0.47 in) (3), tightening torque: depends on your gripper. Closed with a screw plug as standard. For further information, refer to *Flange Dimensions for the Tilting Module HT-B-HD*, page 201. 
2	Calibrate the Tilting Module HT-B-HD if this has not been done before mounting the gripper. For further information, refer to *Calibrating the Tilting Module*, page 278. **NOTE:** • Observe the permissible weights and distances that result in the *maximum tilting torque*, page 195. • The maximum torque must not be exceeded. For the respective values, refer to *Mechanical and Electrical Data of the Tilting Modules*, page 195.

Flange Dimensions for the Tilting Module HT-B-HD



Double Rotational Modules

Product Overview of the Double Rotational Modules

Overview

Some applications require the use of a further drive axis for the gripper. For such applications, you can apply the Lexium P Double Rotational Module to the Lexium P Robot.

The following figure shows the Lexium P Double Rotational Module – VRKPXYYYYY00038.

The following figure shows the Lexium P Double Rotational Module HD – VRKPXYYYYY00049.

Motion of the Tilting Axis

NOTE: The motors of the Double Rotational Modules are not equipped with a brake.

⚠ CAUTION

UNINTENDED MOTION OF THE AXES

Ensure that powering down the motor poses no subsequent risk in the zone of operation.

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

Type Plate of the Double Rotational Modules

The type plate of the Double Rotational Module is provided in the packaging. You can attach the type plate next to the type plate of the robot, page 30.

The type plate design is the same as for the Rotational Module, page 184.

Technical Data of the Double Rotational Modules

Mechanical and Electrical Data of the Double Rotational Modules

Category	Parameter	Unit	VRKPXYY YYY00038	VRKPXYY YYY00049
General data	Maximum load without restrictions	kg (lb)	1.5 (3.3)	3 (6.6)
	Load with restrictions(1)	kg (lb)	1.5…10.0 (3.3…22)	3…10 (6.6…22)
	Allocation of auxiliary axes	–	4th and 5th	
	Maximum torque of the 4th axis(2)	Nm (lbf-in)	9 (80)	10 (89)
	Maximum torque of the 5th axis(2)	Nm (lbf-in)	7.5 (66)	10 (89)
	Position repeatability (ISO 9283)	–	Angle: +/-0.1°	
Electrical data	Mains voltage - 3-phase	Vac	480(3)	
	Motor 4th and 5th axis	–	SH30401P07A2000(4)	
	Maximum current of 4th axis motor(5)	A	(6)	2.7
	Maximum current of 5th axis motor(5)	A	(6)	1.6
Mechanical data	Protection class	–	IP65	
	Gear ratio i of the 4th axis	–	440/36	704/36
	Drive parameter *GearOut* of the 4th axis motor	–	440	704
	Drive parameter *GearIn* of the 4th axis motor	–	36	
	Gear ratio i of the 5th axis motor	–	10/1	32/1
	Drive parameter *GearOut* of the 5th axis motor	–	10	32
	Drive parameter *GearIn* of the 5th axis motor	–	1	
	Maximum speed of the 4th axis	1/min	800	460
	Maximum speed of the 5th axis	1/min	900	280
	Software parameter *TcpPlateSize*	mm (in)	75 (2.95)(7)	
Pneumatic data	Number of pneumatic connections	–	2	0
	Operating pressure	bar (psi)	-0.95…+6 (-13.8…+87)	–
Working space	Rotation 4th axis	–	Unlimited	
	Rotation 5th axis / tilting 5th axis	–	Unlimited	
Weight	–	kg (lb)	4 (8.8)	

Category	Parameter	Unit	VRKPXYY YYY00038	VRKPXYY YYY00049
Material	External casing	–	Aluminum, stainless steel 1.4301, steel nickel-plated, zinc nickel-plated, brass nickel-plated, FPM, EPDM	Aluminum, stainless steel 1.4301, steel nickel-plated, zinc nickel-plated, brass nickel-plated, FPM, EPDM, PE

(1) Loads above the maximum load are possible with restrictions. If required, contact your local Schneider Electric service representative.

(2) When designing the gripper, be aware of any appearance of mass moments of inertia as well as friction, which could lead to exceeding the maximum torque and consequential damage.

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

(4) Motor without brake.

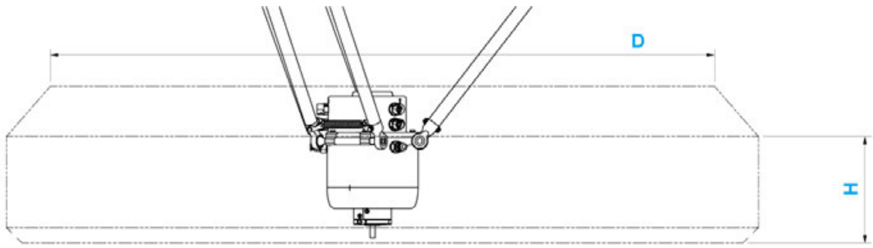
(5) Use the drive parameter *UserDrivePeakCurrent* to adjust the maximum current.

(6) See the limitation of the specific motor.

(7) This value is the distance between the suspension points of the lower arms and the center of the flange plate.

Interference of the Working Space with Double Rotational Modules

In the following figure are only those working space dimensions shown that are influenced by the Double Rotational Modules or the Rotational Tilting Modules, page 216. For further information about the working space, refer to *Mechanical and Electrical Data*, page 33.

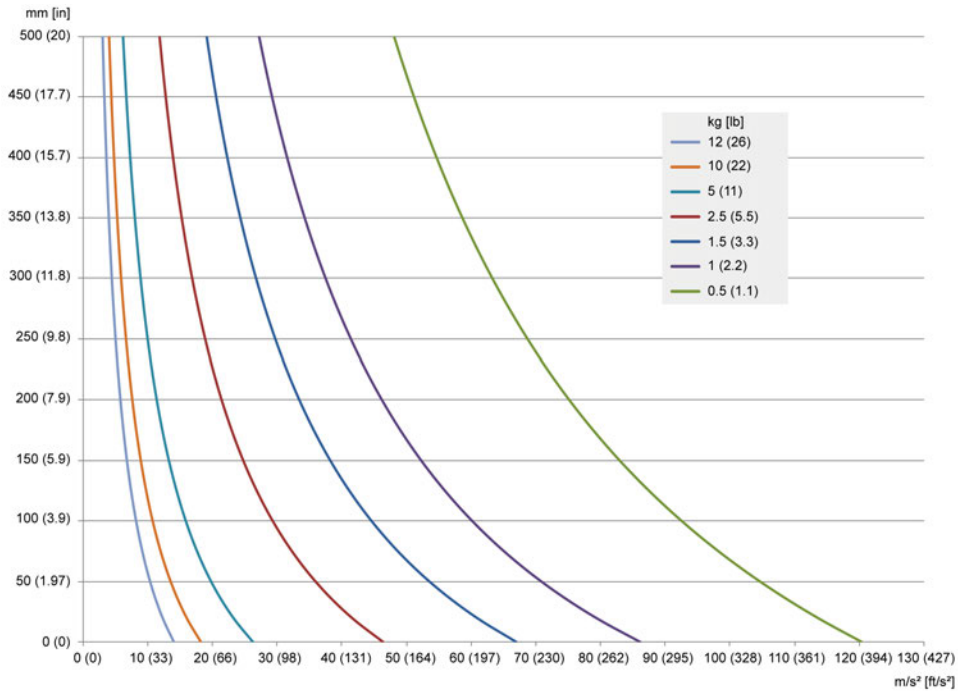


Dimension	Unit	Robot type						
		VRKP0	VRKP1	VRKP2	VRKP4	VRKP5	VRKP6	VRKP6 •••••••E00
H	mm (in)	–(1)	–(1)	–(1)	170	230	200	250
D	mm (in)	–(1)	–(1)	–(1)	Ø1060	Ø1310	Ø1440	Ø1280

(1) The working space is not influenced by the Double Rotational Modules, page 202 and Rotational Tilting Modules, page 216.

Maximum Tilting Torque

The loading capacity of the Double Rotational Modules is limited by the maximum tilting torque at the ball pins level. The following diagram shows the possible vertical distance of the mass at its center of gravity of the payload to the FCP relative to the mass and the required maximum acceleration.



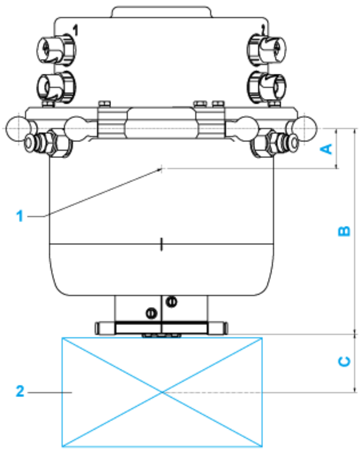
A maximum tilting torque of 20 Nm (177 lbf-in) is to be observed at the ball pins level.

Calculate the tilting torque with the following formula:

Tilting torque [Nm (lbf-in)] = total payload [kg (lb)] x maximum acceleration [m/s² (ft/s²)] x vertical distance [m (in)]

NOTE:

- Total payload [Nm (lbf-in)] = weight of the module + weight of the gripper + weight of the customer end product
- Vertical distance [m (in)] = distance from the ball pins level to the total mass center point = (weight of the module [kg (lb)] x vertical distance from the ball pins to the mass center point of the module (A) [m (in)] + weight of the gripper and the customer end product [kg (lb)] x (vertical distance from the FCP (flange center point) to the mass center point of the gripper and the customer end product (C) [m (in)] + vertical distance from the ball pins to the FCP (B) [m (in)])) / total payload [kg (lb)]



1 Mass center point of the module

2 Gripper and customer end product

Dimension	Description	Unit	Double Rotational Module	Double Rotational Module HD
A	Vertical distance from the ball pins to the mass center point of the module	mm (in)	25 (0.98)	25 (0.98)
B	Vertical distance from the ball pins to the FCP	mm (in)	132.5 (5.2)	130 (5.1)
C	Vertical distance from FCP to the mass center point of the gripper and the customer end product	mm (in)	Depends on the gripper and the customer end product	

Mounting the Double Rotational Modules

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Hook in the lower arms on the Double Rotational Module.
For further information, refer to Hooking in the Lower Arms, page 156.
</td></tr>
</table>

Cabling the Double Rotational Modules

Overview

For cabling the Rotational Module, use only Schneider Electric extension cables that are specifically designed for the robot application.

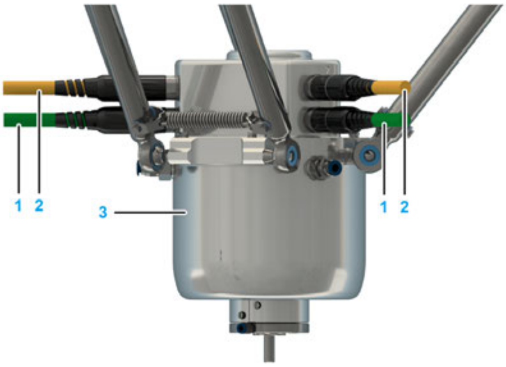
The following table presents the appropriate cable for each robot type.

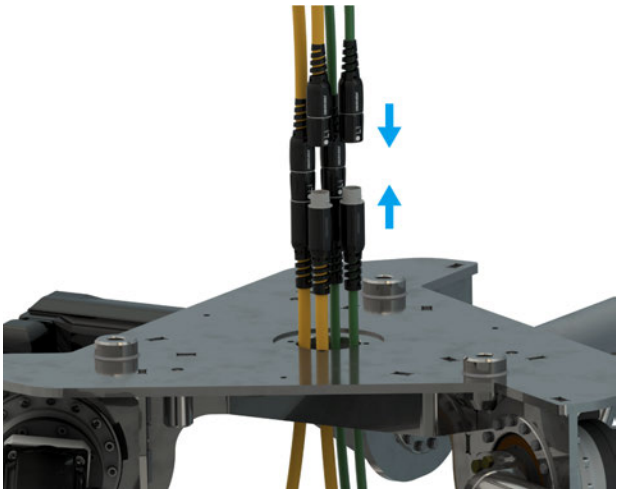
Robot type	Cable length	Cable type	Order number
VRKP0 VRKP1 VRKP2 VRKP4	3 m (9.8 ft)	Encoder extension cable	VW3E2100R030
		Power extension cable	VW3E1168R030
VRKP5 VRKP6	4.3 m (14 ft)	Encoder extension cable	VW3E2100R043
		Power extension cable	VW3E1168R043

If other cable lengths are required, contact your local Schneider Electric service representative.

Cabling the Double Rotational Module

Step	Action
1	Feed two encoder cables for SH3040 motors to the middle of the robot housing.
2	Feed two power cables for SH3040 motors to the middle of the robot housing. **NOTE:** For equipment that you are supplying that is not described in the present document, consult the documentation for those products.
3	Connect the two encoder extension cables (VW3E2100R•••) (1) and the two power extension cables (VW3E1168R•••) (2) to the Double Rotational Module (3) as described for the SH3040 motor in the *SH3 Servo motor Motor Manual*.

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td></td><td>

NOTE: For cabling the Double Rotational Module use only Schneider Electric extension cables that are specifically designed for the robot application.</td></tr>
<tr><td>4</td><td>Feed the two encoder extension cables and the two power extension cables from the Double Rotational Module via the lower and upper arms of the robot into the robot housing.
NOTE:
Attach the cables to the lower and upper arms so that the cables have sufficient freedom of movement to reach with the TCP all positions in the working space.
Consider the bending radius for the respective cables:
VW3E1168R••• – minimum bending radius: 69 mm (2.7 in)
VW3E2100R••• – minimum bending radius: 63 mm (2.5 in)</td></tr>
<tr><td>5</td><td>Connect the cables in the robot housing with the cables from the Double Rotational Module.

NOTE: For the washdown robot references, contact your local Schneider Electric representative.</td></tr>
<tr><td>6</td><td>Verify the correct routing and fastening of the cables.</td></tr>
</table>

NOTICE
INCORRECT PAIRING OF POWER AND ENCODER CABLES
Label the power and associated encoder cables according to their pairing.
Failure to follow these instructions can result in equipment damage.

Grounding Robots with the Double Rotational Module

Ground those parts of the robot which are located where either contact with current carrying parts (cables) or an insulation error is probable.

Alternatively, protect the cables with insulation which withstands the mechanical, chemical, electrical, and thermal stresses that it can be subjected to during normal operating conditions.

Ground the Double Rotational Module via one of the screws (1) for protective ground (earth) if grounding via the protective ground conductor of the motor cable is insufficient. To ensure an ideal electrical connection, use a serrated lock washer between the housing and cable lug. The tightening torque of the screws is 2 Nm (17.7 lbf-in).

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.

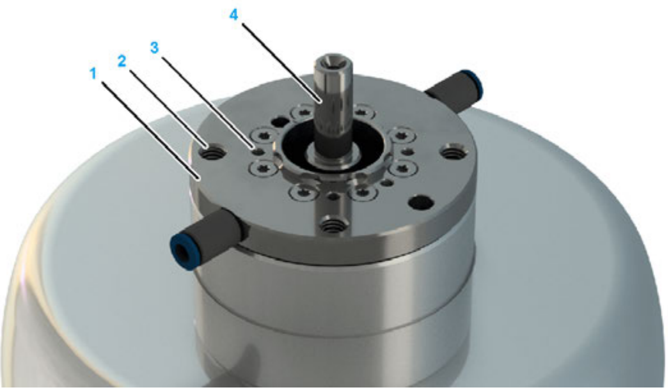
Mounting the Payload to the Double Rotational Modules

Overview

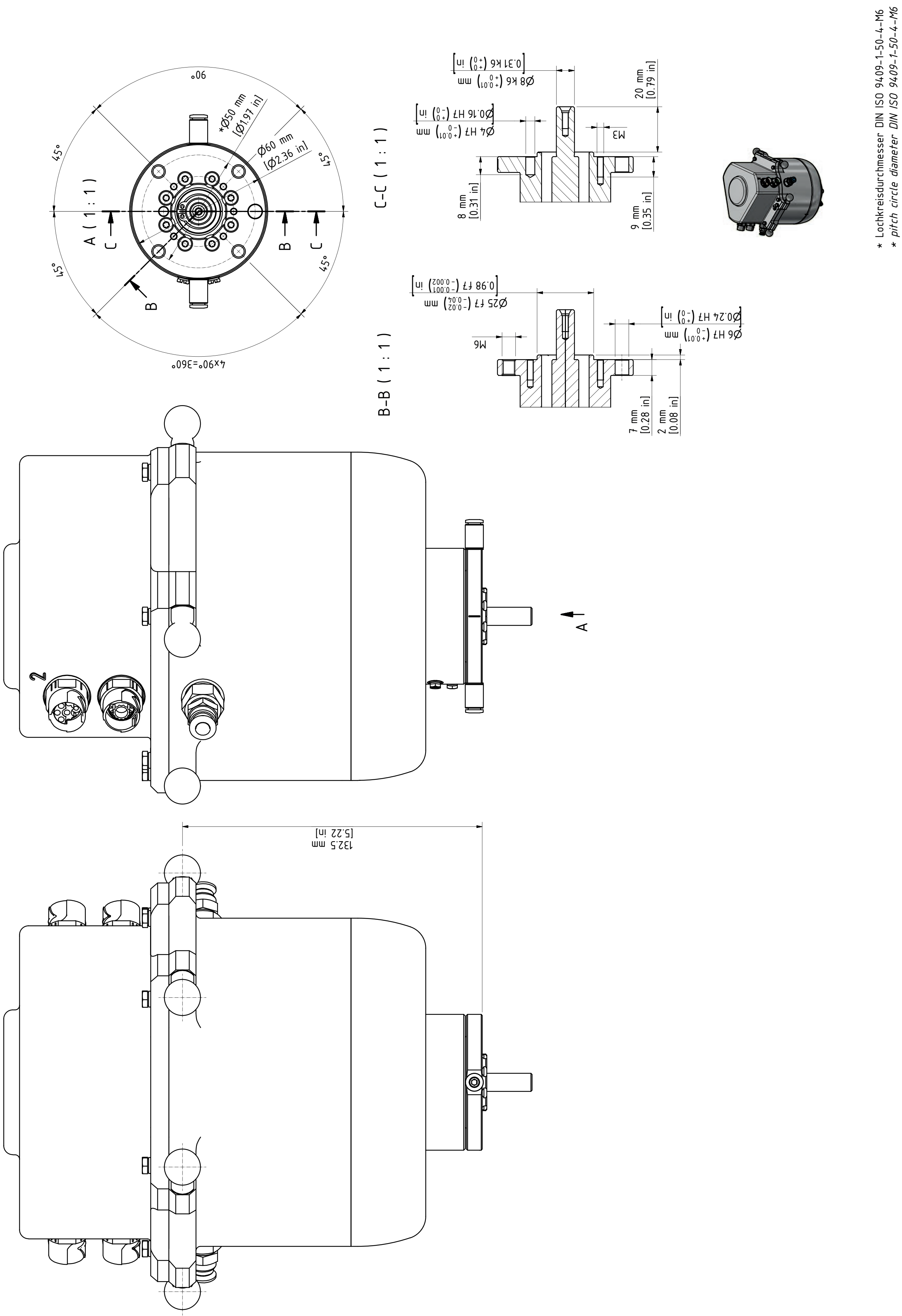
Here you will find the following information:

- Mounting the gripper to the Double Rotational Module, page 211
- Flange dimensions for the Double Rotational Module, page 212
- Supply of the gripper on the Double Rotational Module, page 213
- Mounting the gripper to the Double Rotational Module HD, page 214
- Flange dimensions for the Double Rotational Module HD, page 215

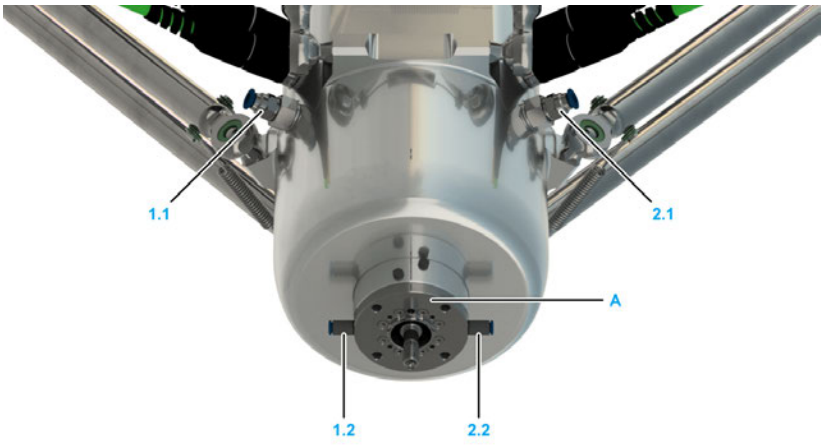
Mounting the Gripper to the Double Rotational Module

Step	Action
1	Fasten the gripper to the mounting points at the rotating flange (1): • Pitch circle diameter DIN ISO 9409-1, 50 mm (1.97 in): 4 x M6 (2), tightening torque: 4.5 Nm (40 lbf-in), strength class of the screw: at least A2-70 • Pitch circle diameter 31 mm (1.22 in): 5 x M4 (3), tightening torque: 1.4 Nm (12.4 lbf-in), strength class of the screw: at least A2-70 • Shaft diameter fifth axis 8 mm (0.315 in): 8 x 20 mm (0.315 x 0.79 in) (4) For further information, refer to *Flange Dimensions for the Double Rotational Module*, page 212. 
2	Calibrate the Double Rotational Module if this has not been done before mounting the gripper. For further information, refer to *Calibrating the Double Rotational Module and the Rotational Tilting Module*, page 276. **NOTE:** • Observe the permissible weights and distances that result in the *maximum tilting torque*, page 186. • The maximum torque must not be exceeded. For the respective values, refer to *Mechanical and Electrical Data of the Double Rotational Modules*, page 204.

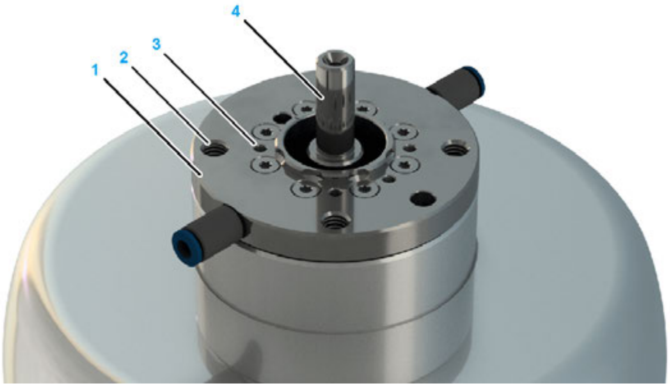
Flange Dimensions for the Double Rotational Module



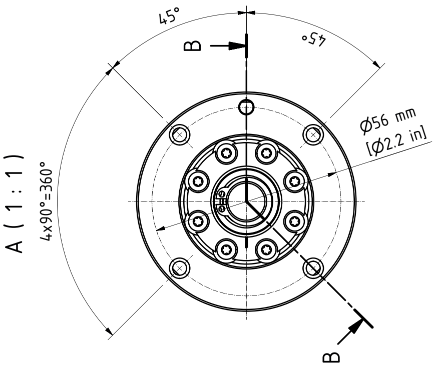
Supply of the Gripper on the Double Rotational Module

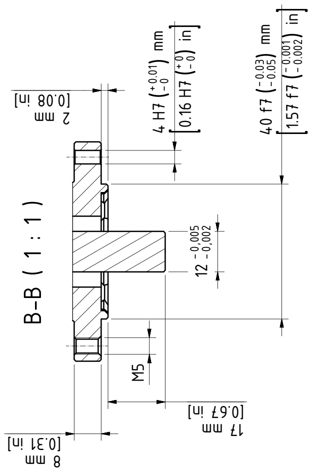
Step	Action
1	Connect the media line to one of the pneumatic plug-in connections (1.1 or 2.1) of the Double Rotational Module. The plug-in connection has a diameter of 6 mm (0.236 in).  For further information, refer to *Supply of the Gripper*, page 167.
2	Connect the media line of the gripper to the associated pneumatic plug-in connection (1.2 or 2.2) on the pneumatics rotary union (A). The plug-in connection has a diameter of 4 mm (0.157 in). **NOTE:** • Connection 1.1 is linked to connection 1.2 • Connection 2.1 is linked to connection 2.2

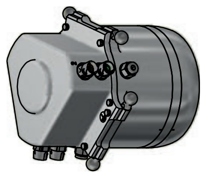
Mounting the Gripper to the Double Rotational Module HD

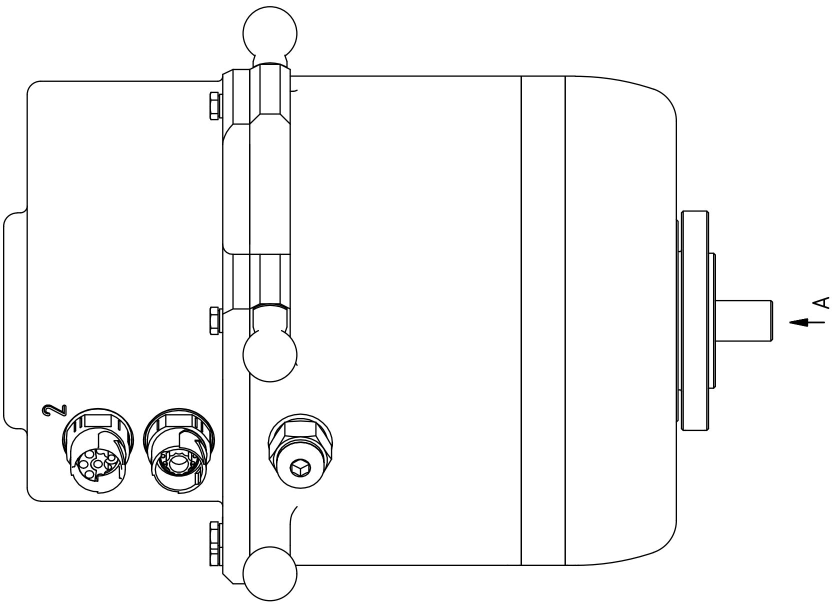
Step	Action
1	Fasten the gripper to the mounting points at the rotating flange (1): • Pitch circle diameter DIN ISO 9409-1, 56 mm (2.2 in): 4 x M5 (2), tightening torque: 3.5 Nm (31 lbf-in), strength class of the screw: at least A2-70 • Shaft diameter fifth axis 12 mm (0.47 in): 12 x 17 mm (0.47 x 0.67 in) (3) For further information, refer to *Flange Dimensions for the Double Rotational Module HD*, page 215. 
2	Calibrate the Double Rotational Module HD if this has not been done before mounting the gripper. For further information, refer to *Calibrating the Double Rotational Module and the Rotational Tilting Module*, page 276. **NOTE:** • Observe the permissible weights and distances that result in the *maximum tilting torque*, page 186. • The maximum torque must not be exceeded. For the respective values, refer to *Mechanical and Electrical Data of the Double Rotational Modules*, page 204.

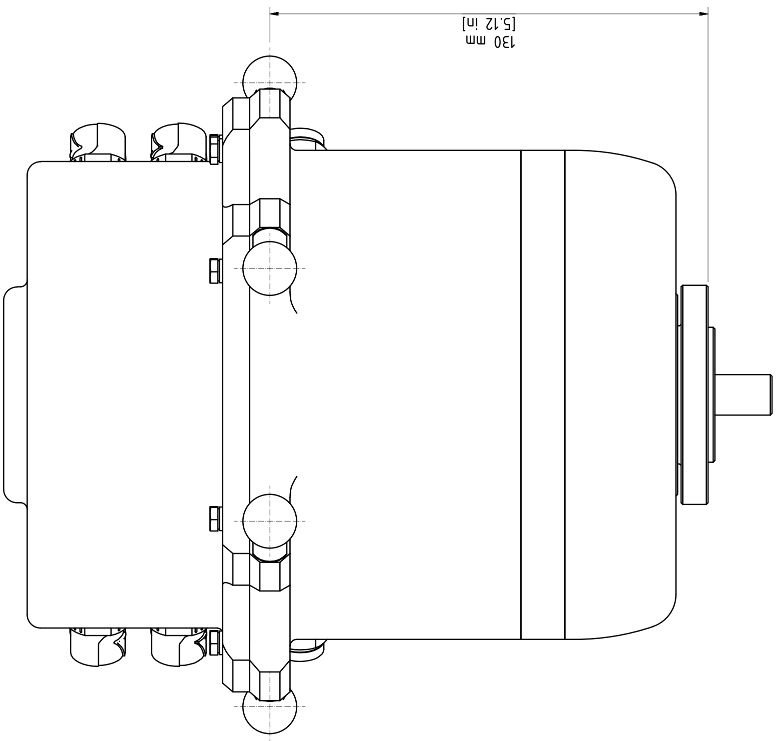
Flange Dimensions for the Double Rotational Module HD











Rotational Tilting Modules

Product Overview of the Rotational Tilting Modules

Overview

Some applications require the use of an additional tilting axis. For such applications, you can apply the Lexium P Rotational Tilting Module to the Lexium P Robot.

The following figure shows the Lexium P Rotational Tilting Module – VRKPXYYYYY00039.

The following figure shows the Lexium P Rotational Tilting Module HD – VRKPXYYYYY00041 and the Rotational Tilting Module HD-B – VRKPXYYYYY00050.

Motion of the Tilting Axis

NOTE: The motor of the tilting axis of the Rotational Tilting Module and Rotational Tilting Module HD is not equipped with a brake.

⚠CAUTION

UNANTICIPATED SWIVEL MOTION OF THE TILTING AXIS

Ensure that powering down the motor poses no subsequent risk in the zone of operation.

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

Type Plate of the Rotational Tilting Modules

The type plate of the Rotational Tilting Modules is provided in the packaging. You can attach the type plate next to the type plate of the robot, page 30.

The type plate design is the same as for the Rotational Module, page 184.

Technical Data of the Rotational Tilting Modules

Mechanical and Electrical Data of the Rotational Tilting Modules

Category	Parameter	Unit	VRKPXYYYY Y00039	VRKPXYYYY Y00041	VRKPXYYYY Y00050
General data	Maximum load without restrictions	kg (lb)	0.25 (0.55)	0.5 (1.1)	0.5 (1.1)
	Load with restrictions(1)	kg (lb)	0.25…2.5 (0.55…5.5)	0.5…5.0 (1.1…11)	0.5…5.0 (1.1…11)
	Allocation of auxiliary axes	–	4th and 5th		
	Maximum torque of the 4th axis(2)	Nm (lbf-in)	9 (80)	10 (89)	10 (89)
	Maximum torque of the 5th axis(2)	Nm (lbf-in)	7.5 (66)	20 (177)	20 (177)
	Maximum holding torque of 4th and 5th motor	Nm (lbf-in)	–	–	5 (44)
	Position repeatability (ISO 9283)	–	Angle: +/-0.1°		
Electrical data	Mains voltage - 3-phase	Vac	480(3)		
	Motor 4th and 5th axis	–	SH30401P07A2000(4)		SH30401P07-F2000
	Maximum current of 4th axis motor(5)	A	(6)	2.7	2.7
	Maximum current of 5th axis motor(5)	A	(6)	1.6	1.6
Mechanical data	Protection class	–	IP65		
	Gear ratio i of the 4th axis	–	440/36	704/36	704/36
	Drive parameter *GearOut* of the 4th axis motor	–	440	704	704
	Drive parameter *GearIn* of the 4th axis motor	–	36	36	36
	Gear ratio i of the 5th axis motor	–	10/1	64/1	64/1
	Drive parameter *GearOut* of the 5th axis motor	–	10	64	64
	Drive parameter *GearIn* of the 5th axis motor	–	1	1	1
	Maximum speed of the 4th axis	1/min	800	460	460
	Maximum speed of the 5th axis	1/min	900	140	140
	Software parameter *TcpPlateSize*	mm (in)	75 (2.95)(7)		
Pneumatic data	Number of pneumatic connections	–	2	0	0
	Operating pressure	bar (psi)	-0.95…+6 (-13.8…+87)	–	–
Working space	Rotation 4th axis	–	Unlimited		
	Rotation 5th axis / tilting 5th axis	–	+/-100°		
Weight	–	kg (lb)	4.8 (10.6)	5.4 (11.9)	5.7 (12.6)
Material	External casing	–	Aluminum, stainless steel 1.4301, steel nickel-plated, zinc nickel-plated, brass nickel-plated, FPM, EPDM, PE		

(1) Loads above the maximum load are possible with restrictions. If required, contact your local Schneider Electric service representative.

(2) When designing the gripper, be aware of any appearance of mass moments of inertia as well as friction, which could lead to exceeding the maximum torque and consequential damage.

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

(4) Motor without brake.

(5) Use the drive parameter *UserDrivePeakCurrent* to adjust the maximum current.

(6) See the limitation of the specific motor.

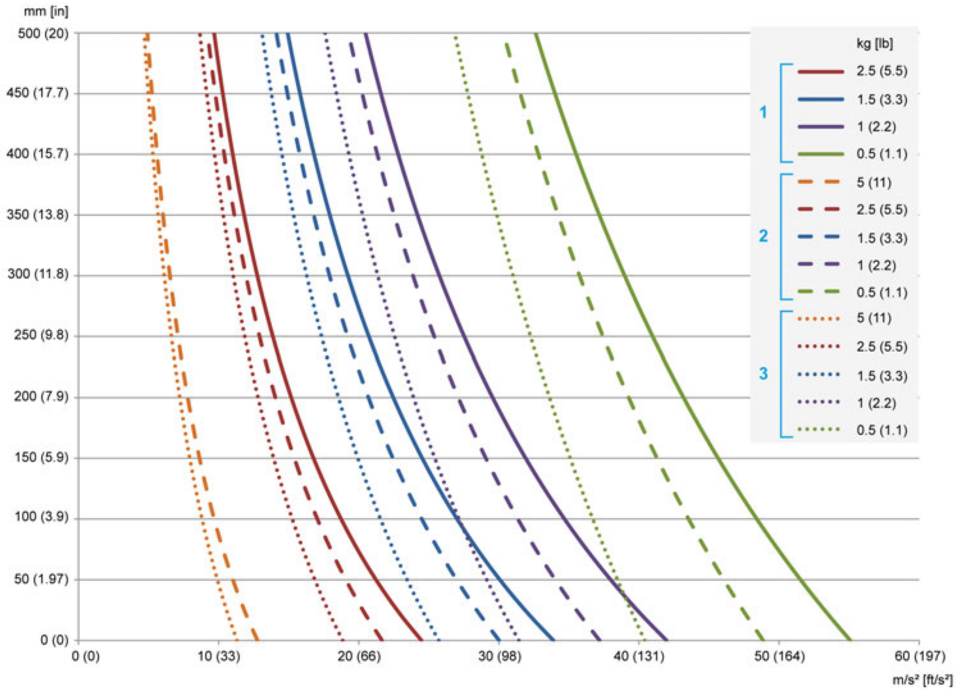
(7) This value is the distance between the suspension points of the lower arms and the center of the flange plate.

Interference of the Working Space with Rotational Tilting Modules

By using the Rotational Tilting Modules, the working space of the robot is influenced. This modified working space is the same as for the Double Rotational Module. Therefore, refer to *Interference of the Working Space with the Double Rotational Module*, page 205 for further information.

Maximum Tilting Torque

The loading capacity of the Rotational Tilting Modules is limited by the maximum tilting torque at the ball pins level. The following diagram shows the possible vertical distance of the mass at its center of gravity of the payload to the FCP relative to the mass and the required maximum acceleration.



1 Rotational Tilting Module

2 Rotational Tilting Module HD

3 Rotational Tilting Module HD-B

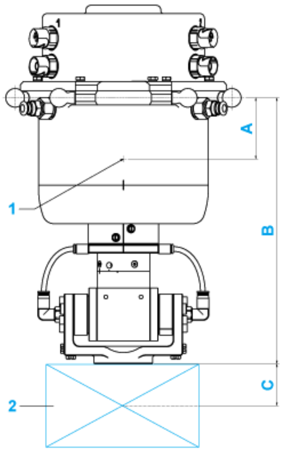
A maximum tilting torque of 20 Nm (177 lbf-in) is to be observed at the ball pins level.

Calculate the tilting torque with the following formula:

Tilting torque [Nm (lbf-in)] = total payload [kg (lb)] x maximum acceleration [m/s² (ft/s²)] x vertical distance [m (in)]

NOTE:

- Total payload [Nm (lbf-in)] = weight of the module + weight of the gripper + weight of the customer end product
- Vertical distance [m (in)] = distance from the ball pins level to the total mass center point = (weight of the module [kg (lb)] x vertical distance from the ball pins to the mass center point of the module (A) [m (in)] + weight of the gripper and the customer end product [kg (lb)] x (vertical distance from the FCP (flange center point) to the mass center point of the gripper and the customer end product (C) [m (in)] + vertical distance from the ball pins to the FCP (B) [m (in)])) / total payload [kg (lb)]



1 Mass center point of the module

2 Gripper and customer end product

Dimen-sion	Description	Unit	Rotational Tilting Module	Rotational Tilting Module HD	Rotational Tilting Module HD-B
A	Vertical distance from the ball pins to the mass center point of the module	mm (in)	52 (2.05)	52 (2.05)	62 (2.44)
B	Vertical distance from the ball pins to the FCP	mm (in)	227 (9)	257 (10.1)	283 (11.1)
C	Vertical distance from FCP to the mass center point of the gripper and the customer end product	mm (in)	Depends on the gripper and the customer end product		

Mounting the Rotational Tilting Modules

Step	Action
1	Hook in the lower arms on the Rotational Tilting Module. For further information, refer to *Hooking in the Lower Arms*, page 156. 

Cabling the Rotational Tilting Modules

Overview

The procedures for cabling and grounding the Rotational Tilting Modules are similar to the procedures for the Double Rotational Modules. Therefore, refer to *Cabling the Double Rotational Module*, page 208 for further information.

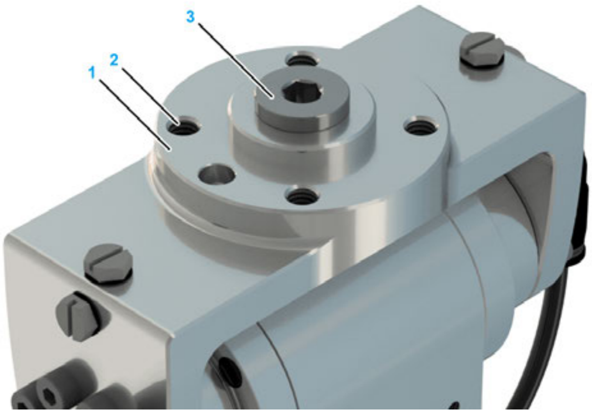
Mounting the Payload to the Rotational Tilting Modules

Overview

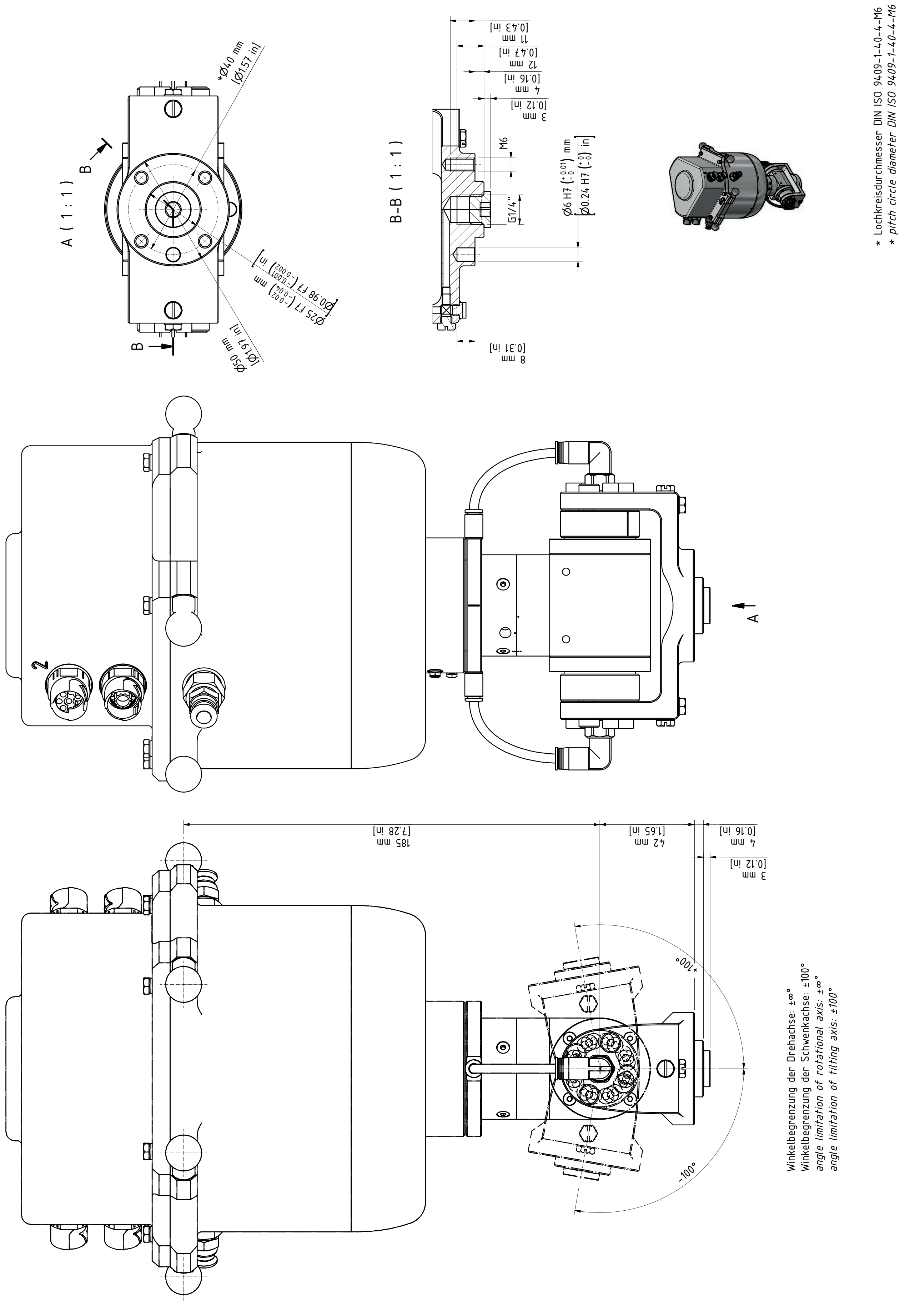
Here you will find the following information:

- Mounting the gripper to the Rotational Tilting Module, page 222
- Flange dimensions for the Rotational Tilting Module , page 223
- Mounting the gripper to the Rotational Tilting Module HD / HD-B, page 224
- Flange dimensions for the Rotational Tilting Module HD, page 225
- Flange dimensions for the Rotational Tilting Module HD-B, page 225
- Supply of the gripper on the Rotational Tilting Module, page 227

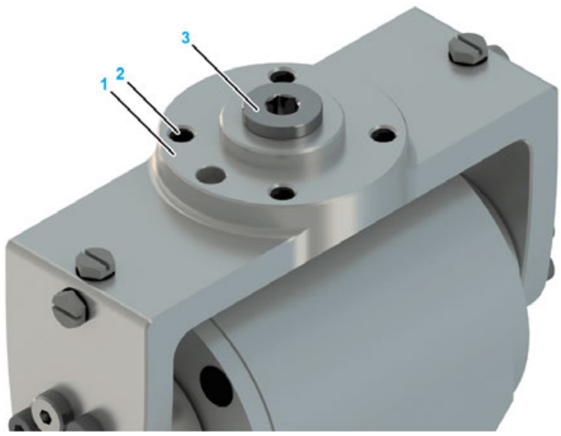
Mounting the Gripper to the Rotational Tilting Module

Step	Action
1	Fasten the gripper to the mounting points at the flange (1): • Pitch circle diameter DIN ISO 9409-1, 40 mm (1.57 in): 4 x M6 (2), tightening torque: 4.5 Nm (40 lbf-in), strength class of the screw: at least A2-70 • Thread for suction pads G1/4”: G1/4” x 12 mm (G1/4” x 0.47 in) (3), tightening torque: depends on your gripper. For further information, refer to *Flange Dimensions for the Rotational Tilting Module*, page 223. 
2	Calibrate the Rotational Tilting Module if this has not been done before mounting the gripper. For further information, refer to *Calibrating the Double Rotational Module and the Rotational Tilting Module*, page 276 **NOTE:** • Observe the permissible weights and distances that result in the *maximum tilting torque*, page 219. • The maximum torque must not be exceeded. For the respective values, refer to *Mechanical and Electrical Data of the Rotational Tilting Modules*, page 218.

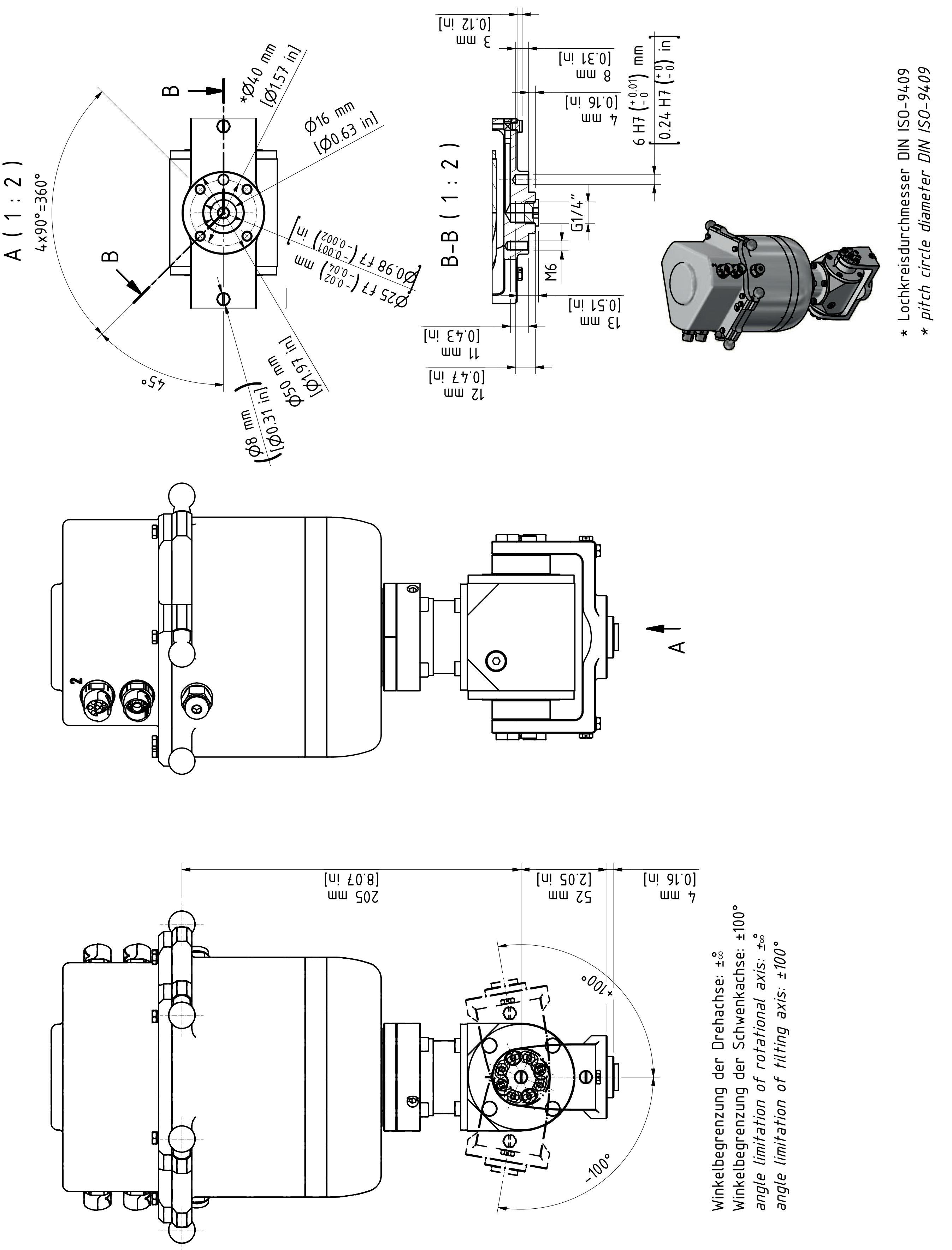
Flange Dimensions for the Rotational Tilting Module



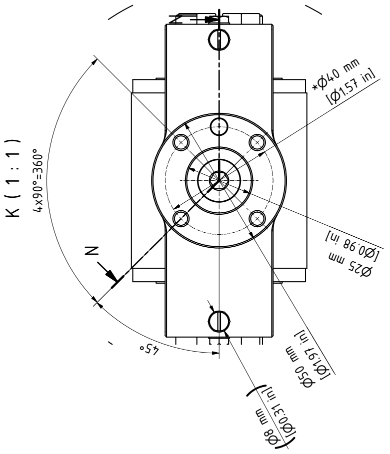
Mounting the Gripper to the Rotational Tilting Module HD / HD-B

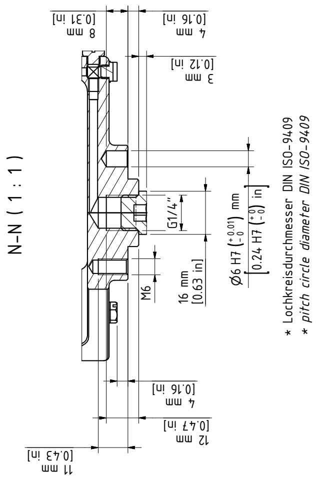
Step	Action
1	Fasten the gripper to the mounting points at the flange (1): • Pitch circle diameter DIN ISO 9409-1, 40 mm (1.57 in): 4 x M6 (2), tightening torque: 4.5 Nm (40 lbf-in), strength class of the screw: at least A2-70 • Thread for suction pads G1/4”: G1/4” x 12 mm (G1/4” x 0.47 in) (3), tightening torque: depends on your gripper. Closed with a screw plug as standard. For further information, refer to *Flange Dimensions for the Rotational Tilting Module HD*, page 224. 
2	Calibrate the Rotational Tilting Module HD if this has not been done before mounting the gripper. For further information, refer to *Calibrating the Double Rotational Module and the Rotational Tilting Module*, page 276. **NOTE:** • Observe the permissible weights and distances that result in the *maximum tilting torque*, page 219. • The maximum torque must not be exceeded. For the respective values, refer to *Mechanical and Electrical Data of the Rotational Tilting Modules*, page 218.

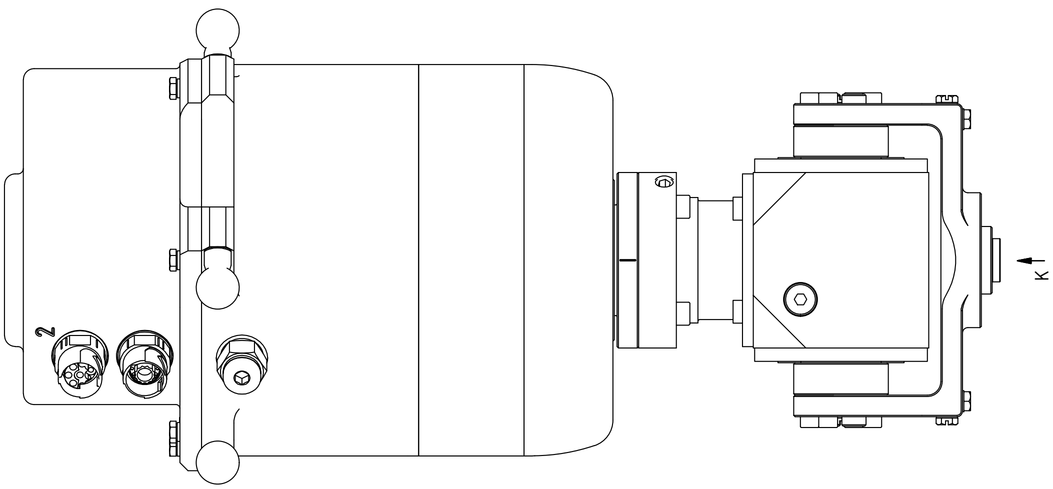
Flange Dimensions for the Rotational Tilting Module HD

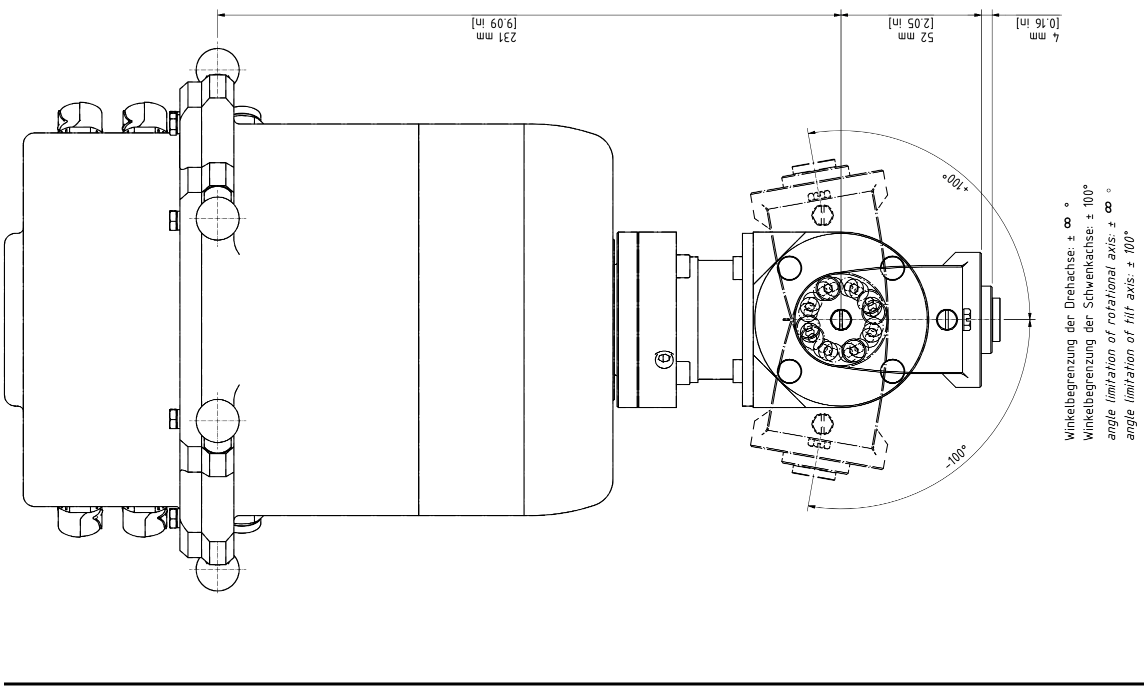


Flange Dimensions for the Rotational Tilting Module HD-B







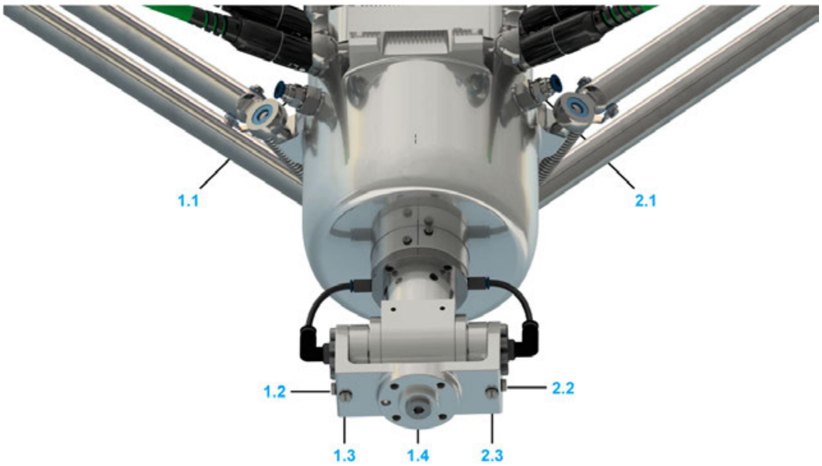


Supply of the Gripper on the Rotational Tilting Module

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Connect the media line to one of the pneumatic plug-in connections (1.1 or 2.1) of the Double Rotational Module. The plug-in connection has a diameter of 6 mm (0.236 in).

For further information, refer to Supply of the Gripper, page 167.</td></tr>
<tr><td>2</td><td>When using a standard suction cup:

Remove the plug screw (1.4) and mount the suction cup directly into the thread.

Thread for suction cup: G1/4” x 12 mm (G1/4” x 0.47 in)
NOTE: Connection 1.1 is linked to connection 1.4
</td></tr>
<tr><td>3</td><td>When using any of the other connections:

Remove one of the plug screws of the associated connection (1.2, 1.3, 2.2, or 2.3) and mount your pneumatic connector.

Thread size for the attachment: M5 x 4 mm (M5 x 0.157 in)
NOTE:
Connection 1.1 is linked to connection 1.2 and 1.3
Connection 2.1 is linked to connection 2.2 and 2.3</td></tr>
</table>

Maintenance and Repair

Maintenance, Repair, and Cleaning

General Information About Maintenance, Repair, and Cleaning

Overview

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

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

DANGER

ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

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

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.

Servicing

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

- Type plate information (type, identification number, serial number, DOM)

- Detailed description of the issue
- Previous and associated circumstances

Maintenance Plan

Overview

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

For procedures to replace the different parts, refer to *Replacing Parts*, page 240.

Maintenance Schedule

Intervals	Action
Every 150 hours of operation or weekly	• Verify the robot by visual inspection for any damage or missing parts, especially for moving parts and parts at risk for collisions such as grippers, upper arms, lower arms, springs, telescopic axis, or parallel plates. • Replace the arms if these are bent or dented. • Clean the robot mechanics.
Every 300 hours of operation or every two weeks	• Verify the slide films, ball sockets, universal joints, and rolls for wear and replace them if necessary. • Only for an optionally mounted VRKPXYYYYY00038, VRKPXYYYYY00039, VRKPXYYYYY00041, VRKPXYYYYY00045, VRKPXYYYYY00046, VRKPXYYYYY00049, VRKPXYYYYY00050, VRKPXYYYYY00052, or VRKPXYYYYY00053: Verify the cables for wear and replace them if these are damaged or worn out
Every 1,000 hours of operation or every three months	• Verify all moving parts for bolted connections. • Verify the output shaft sealing of gearboxes for deposits of dirt and clean. • Verify the sealing gaskets at maintenance covers, media covers and motor covers by visual inspection for any damage and replace them if necessary.
Every 2,000 hours of operation	• Replace the springs and spring rolls of the lower arms. • Replace the ball sockets. • Replace the slide films of the telescopic axis. • Verify the universal joints on the telescopic axis and replace them if these are appreciably worn.
Every 5,000 hours of operation	• Verify the ball pins and replace them if necessary.
Annually	• Verify the brake function during operation.
Every 20,000 hours of operation	• Replace the main gearboxes and motors. • Replace the four-axis parallel plate (with rotational axis bearing). • Only for VRKP2•••WD / VRKP4•••WD / VRKP4•••NO / VRKP4•••WF / VRKP5•••WF / VRKP6•••WF robot: Verify the fans for operation and replace them if necessary. • When using an optionally mounted VRKPXYYYYY00038, VRKPXYYYYY00039, VRKPXYYYYY00041, VRKPXYYYYY00045, VRKPXYYYYY00046, VRKPXYYYYY00049, VRKPXYYYYY00050, VRKPXYYYYY00052, or VRKPXYYYYY00053: Replace the module.
Every 40,000 hours of operation	• Replace the gearboxes and motors of the rotational axis. • Replace the upper arms.
Every 1,000 emergency stop situations	• Replace the upper arms.
Each removal of the covers	• Replace the sealing gasket of any cover you remove.

NOTE:

- The gearbox has been lubricated for life.
- Do **not** lubricate the ball sockets.

Maintaining the Telescopic Axis

Overview

The wear of the telescopic axis becomes noticeable over time by an increasing backlash in the mechanics which comprises the backlash of the slide films and the backlash of the universal joints.

Maintaining the Telescopic Axis

Step	Action
1	Verify whether the slide films have backlash, page 233.
2	Verify whether the universal joints have backlash, page 235.

Maintaining the Springs

Overview

Periodically verify and replace the springs in accordance with the maintenance schedule.

Replace the springs and spring rolls at the latest when the ball sockets are worn.

For further information, refer to *Maintaining the Ball Sockets*, page 234.

⚠ WARNING

INCREASED WEAR OR COLLISION OF COMPONENTS

Only use springs approved by Schneider Electric.

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

NOTE: In order to help prevent the arms from becoming dislocated, use suitable springs which can be purchased from Schneider Electric as replacement equipment.

⚠ WARNING

COLLISION OF ROBOT COMPONENTS

Perform continuous maintenance by inspecting springs for cracks or signs of elongation due to exceeded elastic limits (overstretch).

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

Maintaining the Slide Films

Overview

The slide films on the telescopic axis wear with time so that backlash starts to occur on the telescopic axis.

How fast slide films wear depends on the following:

- Load applied
- Paths traveled
- Movement speeds and transverse accelerations
- Quantity and type of contamination
- Material of the slide films

Verifying the Wear of the Slide Films

Step	Action
1	Measure the circumferential backlash of the slide films.
2	If the backlash is greater than +/-0.5° or no longer sufficient for the application, replace the slide films, page 247.
3	Verify the total operating hours of the robot according to the maintenance plan, page 230 and replace the slide films if necessary, page 247.

Maintaining the Rolls on the Spring Pack of the Lower Arm

Overview

Periodically verify and replace rolls in accordance with the maintenance schedule, page 230.

NOTE: Roll wear increases the wear of the springs.

Maintaining the Rolls on the Spring Pack of the Lower Arm

⚠WARNING

COLLISION OF COMPONENTS

- Replace rolls frequently.
- Always replace rolls and springs together.
- After replacing the rolls, verify them for free rotatability.

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

Step	Action
1	Verify whether the rolls can move by more than 0.5 mm (0.0197 in) in radial direction.
2	If the rolls can move by more, replace the rolls, page 257 and the springs, page 256.

Maintaining the Ball Sockets

Overview

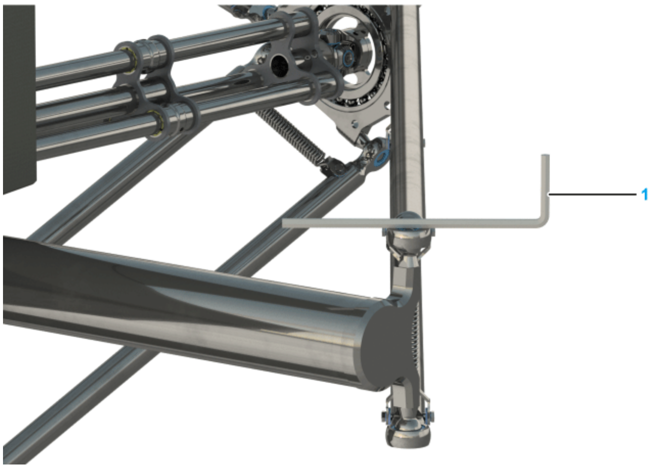
Periodically verify and replace the ball sockets in accordance with the maintenance schedule, page 230.

NOTE: A collection of dirt and debris in the sockets may cause squeaking noises.

Clean the ball sockets at regular intervals.

Verifying the Wear of the Ball Sockets

NOTE: Do **not** remove the robot arm for this verification.

Step	Action
1	Place a level object, for example, a hex key (1), on the outside of the respective lower arm head of the ready-to-operate robot. **NOTE:** The ball sockets can be verified in the working space when the robot is installed and in random position. 
2	If the level object is not laying plane on the lower arm head and is in contact with the ball pin, replace the ball socket, page 255.

Maintaining the Universal Joints

Overview

The universal joints on the telescopic axis wear with time so that backlash starts to occur on the telescopic axis.

Maintaining the Universal Joints

Step	Action
1	Verify whether the wear of the plain bearings of the universal joints exceeds the limit value of the application.
2	Replace the plain bearings, page 244 if necessary. **NOTE:** When using plastic universal joints, replace the universal joints, page 242.

Maintaining the Ball Pins

Overview

Periodically verify and replace the ball pins in accordance with the maintenance schedule, page 230.

NOTE: A collection of dirt and debris at the pins may cause squeaking noises.

Clean the ball pins at regular intervals.

Maintaining the Ball Pins

Step	Action
1	Verify the ball pins visually for any damages (for example scratches or dents). **NOTE:** An immoderate abrasion of one ball socket may indicate a damage of the ball pins.
2	If there is a damage, replace the ball pins, page 268.

Maintaining the Fans

Step	Action
1	Verify that the fans are working correctly. **NOTE:** The fans take air from the central area of the housing and blow it out through the slit in the motor covers.
2	If the fans do not work correctly, replace the fans, page 269.

Maintaining the Motor (Optional Equipment)

For information about maintaining the motor, record the motor reference on the type plate and refer to the corresponding motor manual.

Maintaining the Gearbox

Step	Action
1	Verify the gearbox by visual inspection for leakages and deposits of dirt on the gearbox output shaft sealing periodically in accordance with the maintenance schedule, page 230.
2	Carefully remove deposits. Use lint-free cloths to clean the gearbox. **NOTE:** In case of a leakage, contact your local Schneider Electric service representative.

NOTICE

DAMAGED GEARBOXES DUE TO INAPPROPRIATE CLEANING OF THE GEARBOX

- Use lint-free cloth for cleaning.
- Do not clean dry deposits using compressed air.
- Do not use solvents; for example, trichloroethylene, tetrachloromethane, or hydrocarbons nor sharp-edged objects, emery cloth, or emery paper.
- Minimize the mechanical impacts when cleaning.

Failure to follow these instructions can result in equipment damage.

Cleaning

Overview

Care must be taken with cleaning products as some active agents may have harmful effects on plastics and stainless steel.

NOTICE
CORROSION CAUSED BY CLEANING AGENTS
• Perform a compatibility test in relation to the cleaning agent and the component affected before using a cleaning agent. • Do not use alkaline detergent in the interior of the mechanics. • Do not use any chloride-containing cleaning agents. • Do not use any sulphuric acid containing detergent.
Failure to follow these instructions can result in equipment damage.

For further information about the material properties of your components, refer to *Mechanical and Electrical Data*, page 33.

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

Cleaning the Robot

Step	Action
1	Use cleaning processes appropriate to the degree of protection, page 33 of the robot.
2	Allow the cleaning agent to act for a short time.
3	Thoroughly rinse the robot with water.
4	Clean the robot on a weekly basis in order to help to avoid that abrasions accumulate and pass into production.

Cleaning the Bearing of the Parallel Plate on Robots with a Rotational Axis (VRKP•••R)

Clean the bearing according to the maintenance plan, page 230 and additionally in case of visible contamination.

Clean the bearing more frequently than specified if the robot is operated in a dusty environment.

NOTE: The bearing is a special bearing for dry operation. Slight squeaking noises are normal for this type of ball bearing.

Cleaning the Universal Joints

If contamination is visible, wet clean universal joints by washing or dry clean them by blowing out.

NOTE: Slide films are subject to abrasion which may accumulate.

Cleaning the Ball Sockets

If contamination is visible, wet clean ball sockets by washing or dry clean them by blowing out/wiping off.

NOTE: Do **not** lubricate the ball sockets; this increases the tendency to form accumulations of impurities in the bearing.

Cleaning the Gearbox

NOTE: Particularly in the first hours of operation, a slight sweating of the gearboxes may occur. This is a result of the manufacturing process and does not constitute damage on the gearboxes.

Only clean the gearbox flanges and seals by using wiping with lint-free clothes or wash-down at low pressure. For further information, refer to *Maintaining the Gearbox*, page 236.

Repairing After Collisions

Overview

Components may be damaged as a result of a collision.

⚠WARNING

FALLING OR EJECTED PARTS

- Thoroughly inspect all components of the robot and all components attached to the robot, including the motor and the gearbox, for damage after a collision.
- Do not use the robot if any of the components are damaged or suspected to be damaged.

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

Verifying the Robot After a Collision

⚠WARNING

COLLISION OF COMPONENTS

Replace upper and/or lower arms if dents or cracks are observed or otherwise detected.

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

Step	Action
1	Verify the components for completeness. If any components are missing, locate the same and remove them from the surrounding machinery.
2	Replace damaged or missing components.
3	Verify the upper and lower arms for visible dents or cracks. Dents reduce the strength of the arms and may cause component breakdown.
4	Verify the calibration, page 272 by moving the upper arms on the calibration bolts. **NOTE:** If the tolerance requirements for calibration are not met, replace the upper arms.
5	Verify the lower arms for straightness.
6	Release the brakes and manually move the robot to verify the ease of operation.
7	Close the brakes and verify that there is a small backlash in the gearboxes and no cracking noises.
8	Only for robots with a rotational axis (VRKP•••R): Rotate the telescopic axis in order to verify that the bearing in the parallel plate runs evenly and smoothly. **NOTE:** If the bearing cannot be rotated evenly and/or produces noises during the rotation of the axis, proceed as follows: 1. Wash out the bearing in order to remove any foreign objects. 2. Verify the bearing again. **NOTE:** If the ceramic rolling elements of the hybrid bearing are damaged, replace the parallel plate.

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

Replacing Parts

Information About Replacing Parts

Overview

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

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

DANGER

ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

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

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

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

The metal surfaces of the robot may exceed 70 °C (158 °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*, page 18.

Replacing the Telescopic Axis

Overview

The following procedures describe the replacement of the telescopic axis as an example. The steps for the Telescopic Axis Double are similar.

Procedure Overview

Perform the following procedures to replace the telescopic axis:

- Removing the telescopic axis, page 241
- Mounting the telescopic axis, page 241

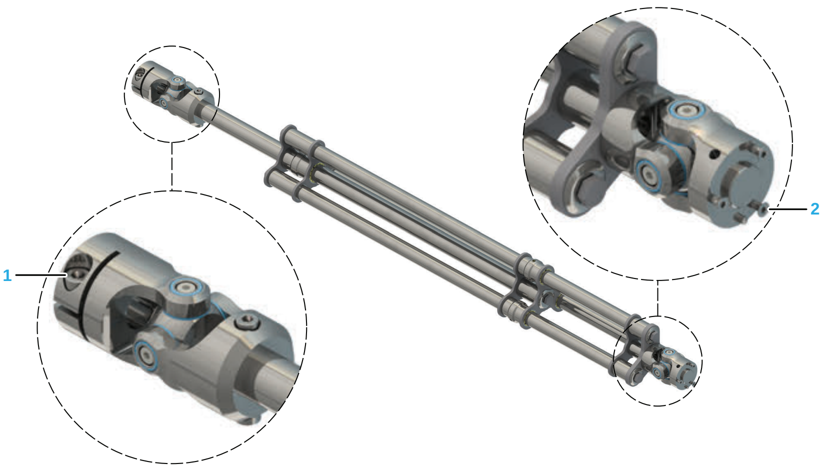
Removing the Telescopic Axis

⚠ CAUTION

HOT TELESCOPIC AXIS

- Allow the guides of the telescopic axis to cool down before touching them.
- Do not exceed the number of the prescribed extension and retraction manipulations to help avoid any melting of the slide bearings.

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

Step	Action
1	Remove the three countersunk screws (2) at the lower universal joint, which are located on the underside of the parallel plate. 
2	Loosen the clamping bolt (1) at the upper universal joint.
3	Remove the telescopic axis from the robot.

Mounting the Telescopic Axis

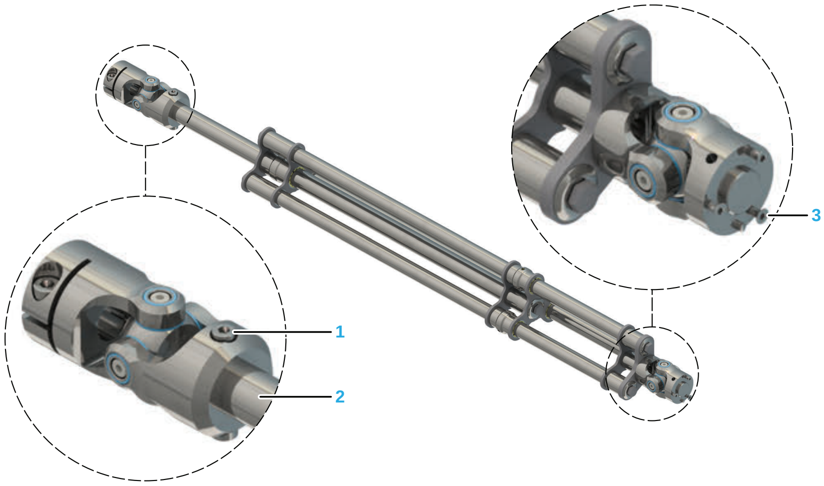
Step	Action
1	Mount the new telescopic axis, page 153. **NOTE:** When using a Telescopic Axis Double, refer to *Mounting the Telescopic Axis Double*, page 182.
2	Calibrate the telescopic axis, page 275.

Replacing the Universal Joints

Overview

The following procedures describe the replacement of the universal joints of the telescopic axis as an example. The steps for the Telescopic Axis Double are similar.

Replacing the Upper Universal Joint

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Remove the telescopic axis as described in Replacing the Telescopic Axis, page 241.</td></tr>
<tr><td>2</td><td>Remove the two mounting screws (1) and remove the universal joint from the upper tube (2).
</td></tr>
<tr><td>3</td><td>Attach the new universal joint to the upper tube.</td></tr>
<tr><td>4</td><td>Insert and tighten the two screws into the universal joint. Verify that the locating pin in the lower universal joint is in alignment with the screw M6 of the upper universal joint and the larger bore of the upper tube. Use the high strength retaining compound Loctite 648 for this purpose.

Tightening torque:
• For M6: 7 Nm (62 lbf-in)
• For M5: 4 Nm (35.4 lbf-in)
For further information, refer to Telescopic Axis, page 91.
NOTE: Tightening torque when using the Telescopic Axis Double:
• For M6: 5 Nm (44 lbf-in)
• For M5: 3.5 Nm (31 lbf-in)
For further information, refer to Detail Drawing of the Telescopic Axis Double, page 179.</td></tr>
</table>

Replacing the Lower Universal Joint

Step	Action
1	Remove the telescopic axis as described in *Replacing the Telescopic Axis*, page 241.
2	Remove the three screws (3) at the top of the lower universal joint and pull off the joint from the footbridge.

Step	Action
3	Attach the new universal joint to the footbridge.
4	Insert and tighten the three screws into the universal joint. Verify that the locating pin in the lower universal joint is in alignment with the screw M6 of the upper universal joint and the larger bore of the upper tube. Use the high strength retaining compound Loctite 648 for this purpose. Tightening torque: 1 Nm (8.9 lbf-in) **NOTE:** Apply the high strength retaining compound Loctite 648 into the tapped holes as opposed to applying it to the screws. For further information, refer to *Telescopic Axis*, page 91. **NOTE:** Tightening torque when using the Telescopic Axis Double: 0.8 Nm (7.1 lbf-in) For further information, refer to *Detail Drawing of the Telescopic Axis Double*, page 179.

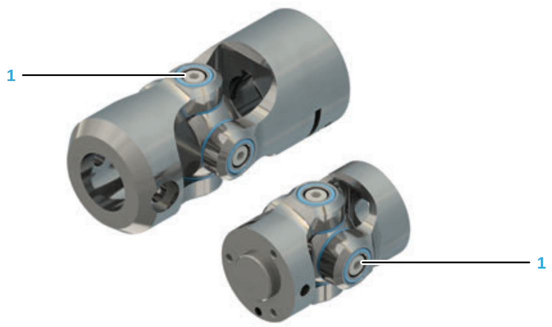
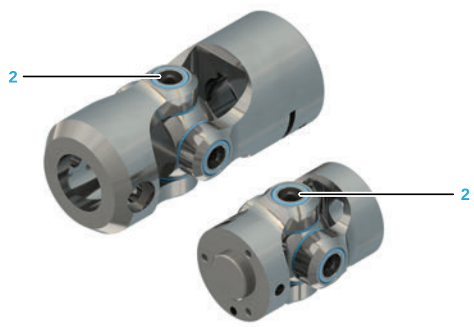
Replacing the Plain Bearings

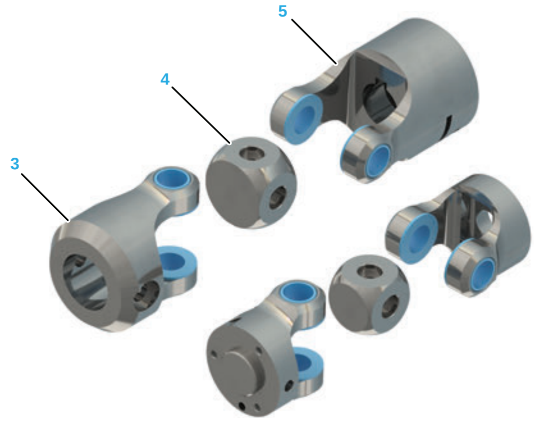
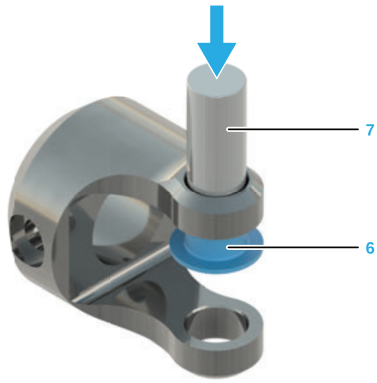
Procedure Overview

Perform the following procedures to replace the plain bearings:

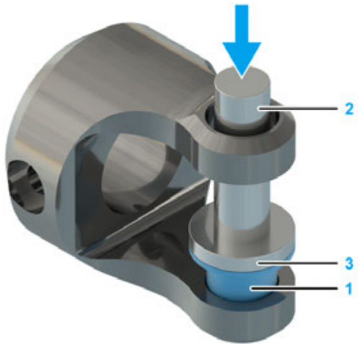
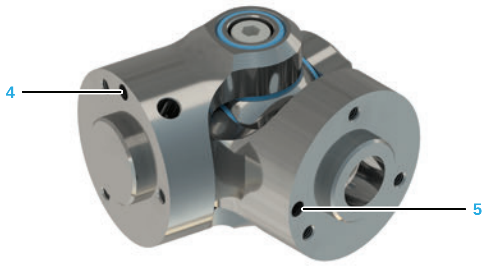
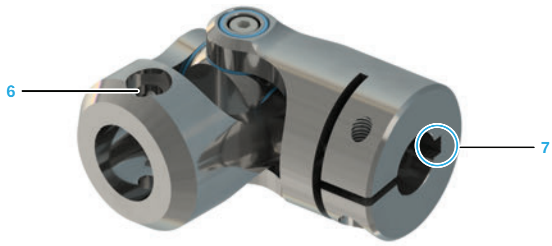
- Removing the plain bearings, page 244
- Mounting the new plain bearings, page 246

Removing the Plain Bearings

Step	Action
1	Remove the telescopic axis, page 241.
2	Remove the upper and the lower universal joint from the telescopic axis as described in *Replacing the Universal Joints*, page 242.
3	Remove the four screws and the four lock washers (1) from the axle bolts in each universal joint. 
4	Remove the four axle bolts (2) from each universal joint.  **NOTE:** If the axle bolts do not drop out, loosen the axle bolts by slightly screwing and moving a M5 screw into the axle bolt.

Step	Action
5	Pull apart the two forks, (3) and (5), from each universal joint and remove the axis cuboids (4). 
6	Press out the plain bearings (6) from the forks by using a cylindrical bolt (7) with a diameter of 11…11.5 mm (0.43…0.45 in). 

Mounting the New Plain Bearings

Step	Action
1	Press in the new plain bearings (1) into the forks by using a cylindrical bolt (2) with a maximum diameter of 9.5 mm (0.374 in) and a plane disc (3). Ensure that the plain bearings are fully seated. 
2	Reassemble the universal joints in reverse order and verify that the orientation of the two forks is the same as shown in the figures below. Tightening torque for the screws: 3 Nm (26.6 lbf-in)  **NOTE:** At the lower universal joint, the fitting hole of the fork (4) must face to the top and the fitting hole of the fork (5) must face to the left.  **NOTE:** At the upper universal joint, the hole for the larger screw M6 of fork (6) must face to the top and the hub of the fitted key of fork (7) must face to the right.
3	Mount the universal joints to the telescopic axis as described in *Replacing the Universal Joints*, page 242. Verify that the locating pin in the lower universal joint is in alignment with the screw M6 of the upper universal joint or also the larger bore of the upper tube.
4	Mount the telescopic axis as described in *Mounting the Telescopic Axis*, page 153.
5	Calibrate the telescopic axis depending on the necessary angle precision of the application. For further information, refer to *Calibrating the Rotational Axis*, page 275.

Replacing the Slide Films

Overview

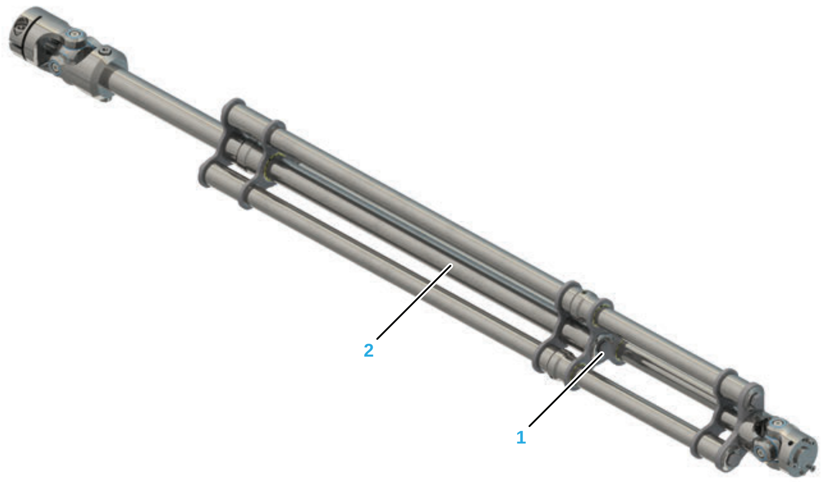
The following procedures describe the replacement of the slide films at the telescopic axis as an example. The steps for the Telescopic Axis Double are similar. Note the two lower tubes when handling the Telescopic Axis Double.

Procedure Overview

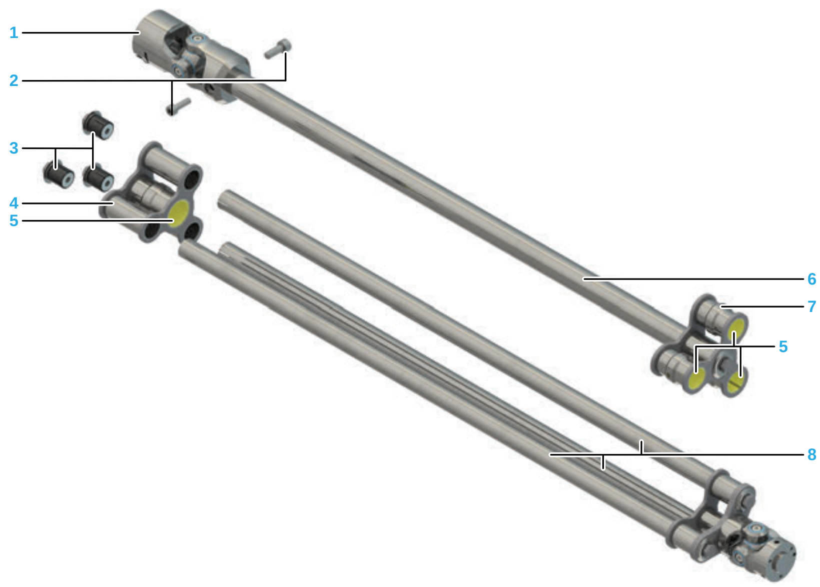
Perform the following procedures to replace the slide films:

- Removing the telescopic axis (refer to *Replacing the Telescopic Axis*, page 241)
- Disassembling the telescopic axis, page 247
- Replacing the slide films, page 249

Disassembling the Telescopic Axis



NOTE: When disassembling the telescopic axis, do not loosen or remove the bottom bolt (1) on the upper tube (2). This may allow the upper tube to be freely rotated. This causes the position of the gripper to be no longer in congruence with the previous position after the replacement of the slide film. In addition, this may cause a change in the position of the universal joints relative to one another. Both universal joints must be located exactly at the same position as shown in the detail drawing of the *Telescopic Axis*, page 91.

Step	Action
1	Remove both mounting screws (2) at the upper universal joint (1) in order to be able to separate the upper tube (6) and the universal joints. 
2	Remove the upper universal joint.
3	Remove the clamping on the three lower tubes (8) of the closure bridge (4) and release the self-blocking of the clamping sets by slightly tapping on the three clamping bolts (3).
4	Remove the closure bridge from the tubes.
5	Pull off the upper tube and the slide bridge (7) from the three outer tubes.

NOTICE

UNINTENDED GRIPPER POSITION

- Perform a renewed calibration of the rotational axis if the bottom bolt on the upper tube has been loosened or removed.
- Following the replacement of the slide films, do not join the upper tube and the lower tubes when these are twisted out of position by 180°.

Failure to follow these instructions can result in equipment damage.

Replacing the Slide Films

Step	Action
1	Remove all four slide films (5) from the bearing points of the bridges and clean the bearing points if necessary. 
2	Insert the new slide films into the bearings. Ensure that the index lugs located on the films engage correctly in the corresponding recesses of the bearing points.
3	Verify that the slide films are fully inserted into the bearing bores.
4	Assemble the telescopic axis in reverse order and ensure that the universal joints are orientated correctly in relation to one another. The locating pin in the lower universal joint is in alignment with the larger screw (2) of the upper universal joint or also the larger bore of the upper tube (6). For further information about the necessary torques, refer to *Telescopic Axis*, page 91. **NOTE:** When using the Telescopic Axis Double, refer to *Detail Drawing of the Telescopic Axis Double*, page 179.
5	Mount the telescopic axis and calibrate it depending on the necessary angle precision of the application. For further information, refer to *Replacing the Telescopic Axis*, page 241 and *Calibrating the Robot Mechanics*, page 272.

Replacing the Motor or the Gearbox on the Rotational Axis

Overview

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

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

⚠⚠ DANGER
ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH • Disconnect all power from all equipment including connected devices prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires except under the specific conditions specified in the appropriate hardware guide for this equipment. • Always use a properly rated voltage sensing device to confirm the power is off where and when indicated. • Operate electrical components only with a connected protective ground (earth) cable. • Verify the secure connection of the protective ground (earth) cable to all electrical devices to ensure that connection complies with the connection diagram. • Do not touch the electrical connection points of the components when the module is energized. • Provide protection against indirect contact. • Insulate any unused conductors on both ends of the motor cable. **Failure to follow these instructions will result in death or serious injury.**

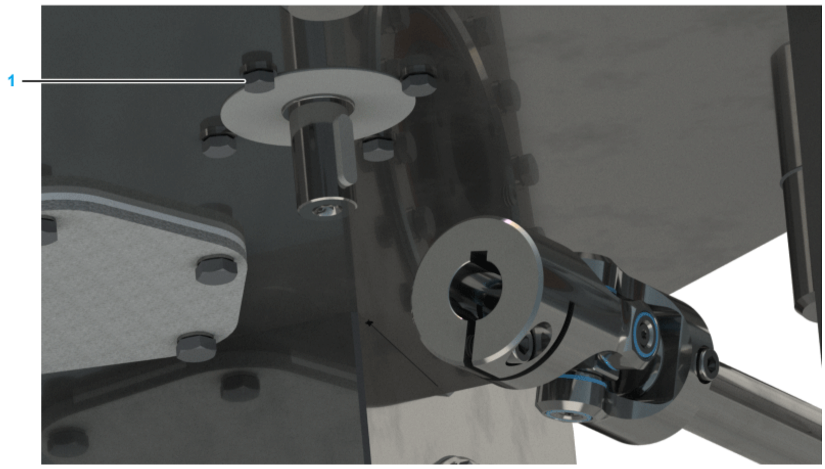
Procedure Overview

Perform the following procedures to replace the motor or the gearbox on the rotational axis:

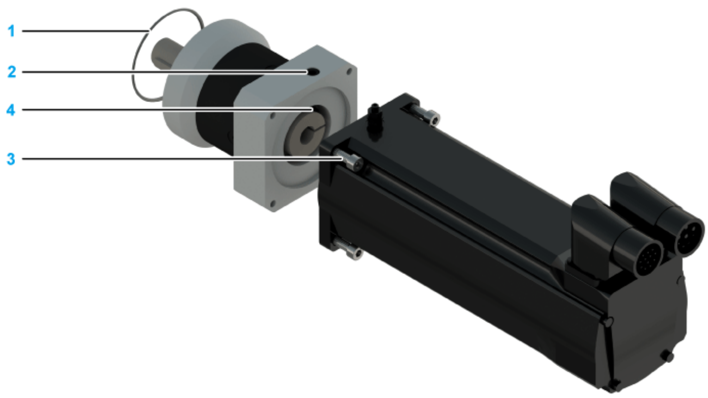
- Removing the motor and the gearbox, page 250
- Removing the motor from the gearbox, page 251
- Mounting the new motor and/or the new gearbox, page 252
- Cabling the motor and the gearbox, page 252
- Calibrating the robot and closing the housing, page 253

Removing the Motor and the Gearbox

NOTICE
LOSS OF IP65 DEGREE OF PROTECTION Replace each sealing gasket every time you remove the media cover. **Failure to follow these instructions can result in equipment damage.**

Step	Action
1	Remove the telescopic axis as described in *Replacing the Telescopic Axis*, page 241.
2	Remove the maintenance cover at the end of motor A. For further information on the position of the motor, refer to the detail drawing of the main body in *Mechanical and Electrical Data*, page 33.
3	Disconnect the motor supply cable. For further information, observe the respective operating instructions of the motors: • VRKP0 / VRKP1: *MH3 Servo motor Motor Manual* • VRKP2S0 / VRKP4S0 / VRKP5S0 / VRKP6S0: *SH3 Servo motor Motor Manual* • VRKP2L0 / VRKP4L0 / VRKP5L0 / VRKP6L0: *Lexium 62 ILM Hardware Guide*
4	Remove the hexagon cap from the ground connection at the motor.
5	Disconnect the ground cable.
6	Remove the four bolts (1) on the underside of the robot housing around the output shaft of the gearbox. 
7	Carefully pull the motor and the gearbox upwards.
8	Remove the motor and the gearbox from the robot housing.

Removing the Motor from the Gearbox

Step	Action
1	Remove the O-ring (1) from the gearbox flange. 
2	Remove the plug screw (2) from the gearbox flange.
3	Remove the four screws (3) at the motor by means of which the motor is attached to the gearbox.
4	Carefully rotate the motor until the screw (4) on the clamping ring appears in the aperture of the plug screw.

Step	Action
5	Loosen this screw.
6	Carefully remove the motor from the gearbox.

Mounting the New Motor and/or the New Gearbox

Step	Action
1	Ensure that the gearbox and the housing are at the same temperature, as otherwise - in the case of a temperature difference - the gearbox may not fit into the aperture provided.
2	Attach the motor to the gearbox according to the specifications of the manufacturer: • Tightening torque of the motor: 3.5 Nm (31 lbf-in) • Screw on the clamping ring: 4.5 Nm (40 lbf-in) **NOTE:** Position the motor and the gearbox vertically during mounting if possible.
3	Insert the plug screw into the gearbox flange.
4	Place a new O-ring to the gearbox.
5	Attach the motor/gearbox combination in the orientation specified to the robot housing. Tightening torque: 3.5 Nm (31 lbf-in) For further information, refer to the detail drawing in *Mechanical and Electrical Data*, page 33.
6	Use new sealing washers in order to maintain the leak tightness of the housing.

DANGER

ELECTRIC SHOCK CAUSED BY INSUFFICIENT CONDUCTIVITY

Only use the bolts and bolt seals specified in order to maintain electric conductivity.

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

NOTICE

DAMAGE TO MOTOR AND GEARBOX

Only fasten motor and gearbox with all components at the same ambient temperature.

Failure to follow these instructions can result in equipment damage.

Cabling the Motor and the Gearbox

Step	Action
1	Attach the ground strap to the motor. Tightening torque: 2.5 Nm (22 lbf-in) **NOTE:** When routing the cables, ensure that the grounding cap remains on the ground connection of the motors.
2	Put the hexagon cap on the ground connection at the motor. For further information, observe the respective operating instructions of the motors: • VRKP0 / VRKP1: *MH3 Servo motor Motor Manual* • VRKP2S0 / VRKP4S0 / VRKP5S0 / VRKP6S0: *SH3 Servo motor Motor Manual* • VRKP2L0 / VRKP4L0 / VRKP5L0 / VRKP6L0: *Lexium 62 ILM Hardware Guide*
3	Attach the motor supply cables and lock them in position.

Step	Action
4	Mount the telescopic axis as described in *Replacing the Telescopic Axis*, page 241.
5	Calibrate the robot mechanics, page 272.

DANGER

ELECTRIC SHOCK DUE TO DAMAGED CABLES

Verify that the grounding cap is placed correctly on the grounding connection of the motor.

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

Calibrating the Robot and Closing the Housing

NOTICE

LOSS OF IP65 DEGREE OF PROTECTION

Replace each sealing gasket every time you remove the maintenance cover(s).

Failure to follow these instructions can result in equipment damage.

Step	Action
1	Mount the telescopic axis as described in *Replacing the Telescopic Axis*, page 241.
2	Calibrate the robot mechanics, page 272.
3	Mount the maintenance cover. **NOTE:** Use a new seal in order to maintain the leak tightness of the housing. For further information, refer to the detail drawing in *Mechanical and Electrical Data*, page 33.

WARNING

COLLISION OF COMPONENTS

Calibrate the robot mechanics after the replacement of an upper arm, a motor, or a gearbox.

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

Replacing the Lower Arms

Step	Action
1	Grip one lower arm as close as possible to the ball socket and, for removal, pull the lower arm off the ball pin against the force of the spring.
2	Pull off the opposite arm from the ball pin.
3	Repeat the above steps for all lower arms.
4	Mount the new lower arms, page 155.

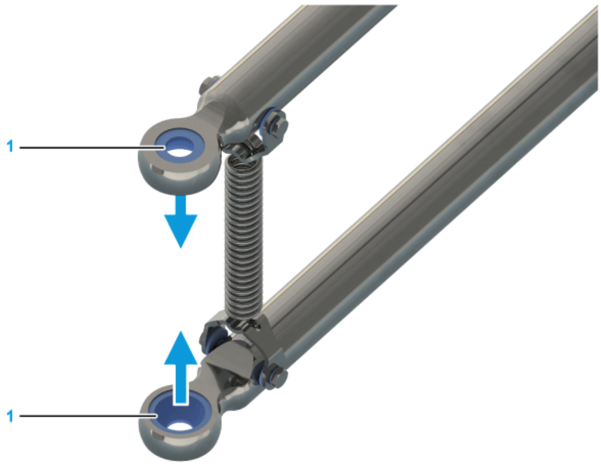
NOTICE

INOPERABLE EQUIPMENT

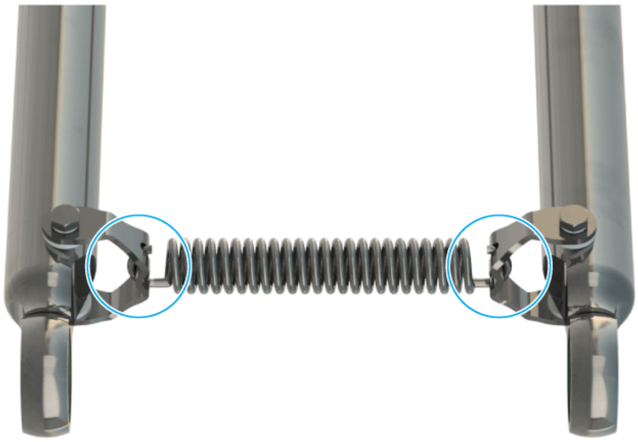
- For removing the lower arms, hold tight the parallel plate as this parallel plate may move as a result of the removal of one arm.
- Never grip lower arms in their center as otherwise the arms are bent during extension and must be replaced.

Failure to follow these instructions can result in equipment damage.

Replacing the Ball Sockets

Step	Action
1	Remove the lower arms as described in *Replacing the Lower Arms*, page 254.
2	Press the ball sockets (1) in the direction of the arrow, and from the rear, out of the lower arm head. 
3	Remove any abrasions from the lower arm head and the ball pin.
4	Press in a new ball socket from the front.
5	Replace the ball joints of the parallel plate and the upper arm if these show any damaged sections.
6	Verify after the replacement whether the lower arms are seated on the ball pins without any backlash. **NOTE:** If there is some backlash on the lower arms, verify that the ball pin is evenly round and does not show any strongly run-in surface areas.
7	**NOTE:** Springs are also subject to wear. When replacing the ball sockets, replace also the springs and the rolls. For further information on the springs, refer to *Maintaining the Springs*, page 232 and *Replacing the Springs*, page 256. For further information on the rolls, refer to *Maintaining the Rolls on the Spring Pack of the Lower Arm*, page 233.
8	Mount the lower arms, page 155.

Replacing the Springs

Step	Action
1	Remove the lower arms, page 254.
2	Push the springs off the spring brackets until the eyes have been unhooked.
3	Place the lower arms side by side.
4	With the open side of the eye, join the spring to the respective spring bracket.
5	Push the eyes of the springs into the spring brackets to completely embed the springs into the spring brackets. 

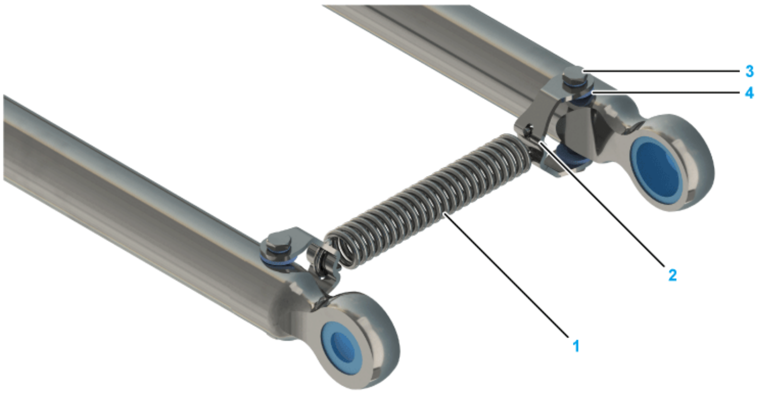
Replacing the Rolls on the Lower Arms

Procedure Overview

Perform the following procedures to replace the rolls on the lower arms:

- Removing the rolls, page 257
- Mounting the new rolls, page 257

Removing the Rolls

Step	Action
1	Remove the lower arms as described in *Replacing the Lower Arms*, page 254.
2	Unhook each spring (1) by pushing the spring against the direction of tension over a spring bracket (2). 
3	Remove the spring brackets, the bolts (3), and the rolls (4). For further information, refer to *Replacing the Springs*, page 256.

Mounting the New Rolls

NOTICE

EJECTED PARTS

Comply with the torques of the bolts so that the arms do not disengage from the robot.

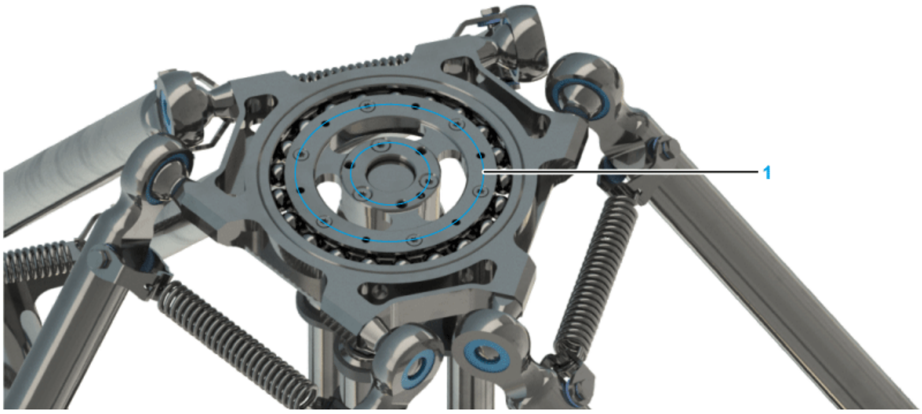
Failure to follow these instructions can result in equipment damage.

Step	Action
1	Replace the rolls.
2	Tighten the spring brackets and the bolts. Tightening torque: 1 Nm (8.9 lbf-in)
3	Push the new springs to the spring brackets.
4	Mount the lower arms, page 155.

Replacing the Parallel Plate

Overview

The following figure shows the correct position of the parallel plate with bottom mounting points (1):



Replacing the Parallel Plate

Step	Action
1	Only for robots with a rotational axis (VRKP•••R): Remove the telescopic axis as described in *Replacing the Telescopic Axis*, page 241.
2	Remove the lower arms as described in *Replacing the Lower Arms*, page 254.
3	Hook in the new parallel plate with the lower arms. Ensure that the mounting side for the gripper is located at the underside, as shown in the figure above. **NOTE:** The mounting can be recognized by its threaded holes.
4	Only for robots with a rotational axis (VRKP•••R): Mount the telescopic axis as described in *Replacing the Telescopic Axis*, page 241. **NOTE:** The parallel plate can be rotated by n x 120°. Proceed with particular care in such cases to refit the parallel plate in its original position.
5	Only for robots with a rotational axis (VRKP•••R): Move the parallel plate slowly and verify the position of the gripper.

Replacing the Upper Arms

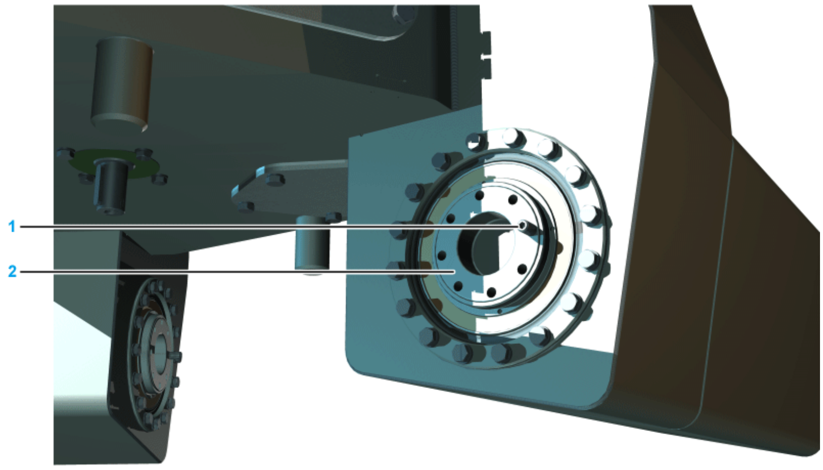
Procedure Overview

Perform the following procedures to replace an upper arm:

- Replacing the upper arm, page 259
- Calibrating and Reassembling robot, page 260

Replacing the Upper Arm

⚠WARNING
FALLING HEAVY UPPER ARM
Secure in place the upper arm when loosening and removing the bolts.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

Step	Action
1	Remove the telescopic axis and the lower arms. For further information, refer to *Replacing the Telescopic Axis*, page 241 and *Replacing the Lower Arms*, page 254.
2	Remove the bolts at the upper arm.
3	Pull off the upper arm.
4	Verify whether the threaded pin (1) is in the hole of the gearbox. If there is no threaded pin, insert a new threaded pin at the position shown in the figure.  For further information, refer to the detail drawing of the main body in *Mechanical and Electrical Data*, page 33.
5	Verify whether the flange surfaces of the gearbox (2) and of the upper arm are free from grease and oil. If necessary, remove grease and oil residues from the upper arm.
6	Attach the new upper arm to the gearbox. Tightening torque: • For VRKP0 / VRKP1: 5 Nm (44.3 lbf-in) • For VRKP2 / VRKP4 / VRKP5 / VRKP6: 14 Nm (124 lbf-in)

NOTICE

INOPERABILITY OF UPPER ARM

Remove all grease and oil residues from the gearbox flange and the upper arm.

Failure to follow these instructions can result in equipment damage.

⚠WARNING

COLLISION OF COMPONENTS

Only use the bolts that are prescribed by Schneider Electric.

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

For further information on stud torques, bolt locking devices and installation notes, see the dimensional drawing in *Mechanical and Electrical Data*, page 33.

NOTE: To order the appropriate screws, contact your local Schneider Electric service representative.

Calibrating and Reassembling the Robot

Step	Action
1	Calibrate the robot mechanics, page 272.
2	Mount the telescopic axis and the lower arms. For further information, refer to *Replacing the Telescopic Axis*, page 241 and *Replacing the Lower Arms*, page 254.

⚠WARNING

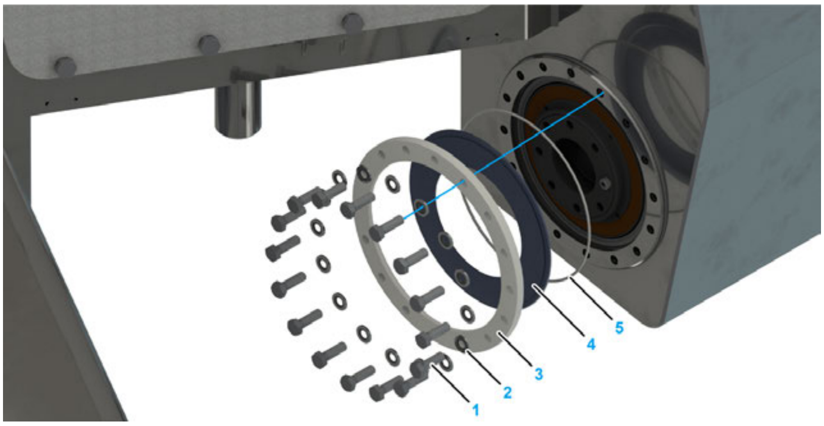
COLLISION OF COMPONENTS

Calibrate the robot mechanics after the replacement of an upper arm, a motor, or a gearbox.

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

Replacing the Protector Cap

NOTICE
INSUFFICIENT PART CLEARANCE
Ensure that the protector cap does not touch the gearbox output shaft during assembly.
Failure to follow these instructions can result in equipment damage.

Step	Action
1	Remove the lower arms and the upper arms. For further information, refer to *Replacing the Lower Arms*, page 241 and *Replacing the Upper Arms*, page 259.
2	Remove the 16 screws (1) and washers (2) and then remove the supporting ring (3), the protector cap (4), and the O-ring (5) from each of the three housing flanges. 
3	Insert the new O-ring to the intended bevel edge of the new protector cap.
4	Place the protector cap with the O-ring to the new supporting ring.
5	Place the entire unit over the gearbox output shaft on the robot and fasten it with the new screws and the new sealing washers. **NOTE:** Ensure that the protector cap does not come into contact with the gearbox output shaft before tightening the screws. Tightening torque: 3.5 Nm (31 lbf-in)
6	Mount the upper arms and the lower arms. For further information, refer to *Replacing the Upper Arms*, page 259 and to *Mounting the Lower Arms*, page 155.
7	Calibrate the robot, page 272.

Replacing the Motor or the Gearbox on the Main Axis

Overview

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

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

DANGER

ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

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

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

Procedure Overview

Perform the following procedures to replace the motor or the gearbox on the main axis:

- Removing the motor and the gearbox, page 262
- Removing the motor from the gearbox, page 264
- Mounting the new motor and/or the new gearbox, page 265
- Cabling the motor and the gearbox, page 265
- Mounting the motor cover, page 267

Removing the Motor and the Gearbox

Certain variants have a protective motor cover in place that must be removed. The motor cover is heavy (approximately 5 kg (11 lb)), and could cause damage or injury if it were to fall during removal.

⚠WARNING

FALLING HEAVY LOAD

Support the motor and gearbox while removing.

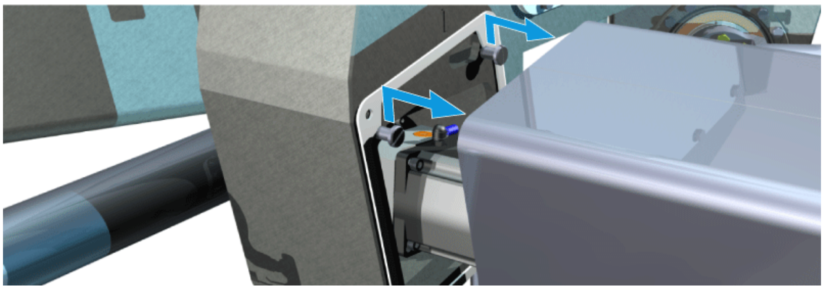
Failure to follow these instructions can result in death, serious injury, or equipment damage.

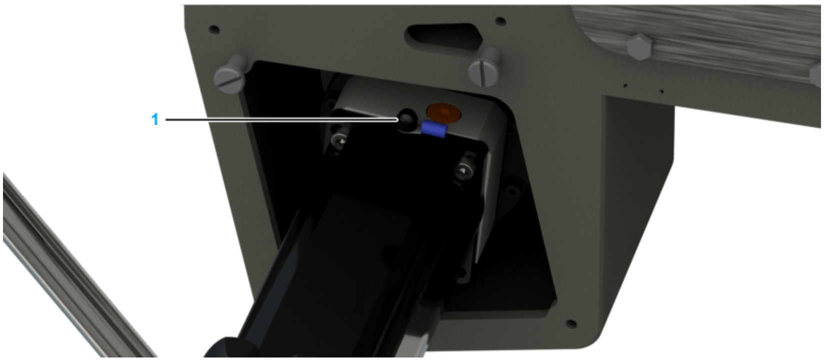
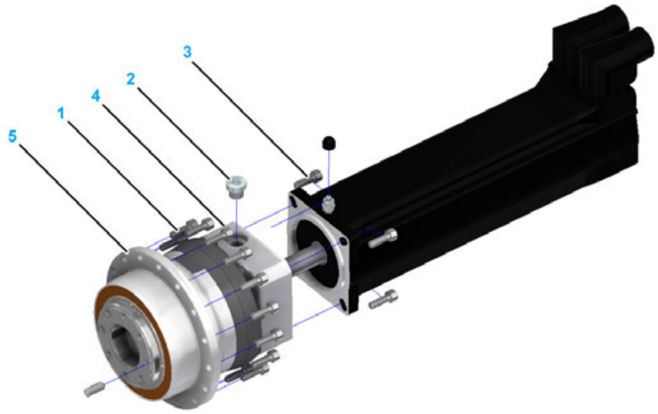
⚠CAUTION

FALLING MOTOR COVER

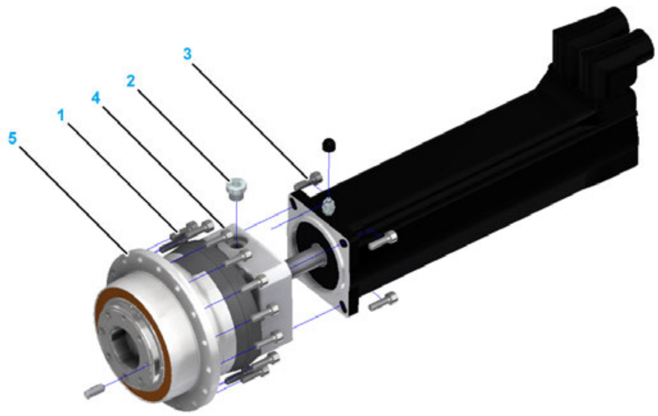
Hold the motor cover in place while loosening the screws.

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

Step	Action
1	Remove the upper arm as described in *Replacing the Upper Arms*, page 259.
2	Loosen the four threaded rods (1) at the rear end of the motor cover. 
3	Lift the motor cover slightly and remove to the rear. 
4	• For robots with an SH3 motor (VRKP•S): Disconnect and remove the two motor supply cables. • For robots with an ILM motor (VRKP•L): Lift up the locking device slightly of the hybrid cable and then remove the cable.

Step	Action
5	Remove the hexagon cap (1) from the ground connection at the motor. 
6	Disconnect and remove the ground cable from the motor.
7	Remove the bolts (1) by means of which the gearbox is bolted to the robot housing. 
8	Carefully remove the motor and the gearbox (5) from the housing in rearward direction. **NOTE:** To prevent a damage of the precision hole in the robot housing, do not tilt the gearbox.

Removing the Motor from the Gearbox

Step	Action
1	Remove the plug screw (2) on the gearbox flange. 
2	Remove the four screws (3) on the motor which connect the motor to the gearbox.
3	Carefully rotate the motor until the screw (4) on the clamping flange appears in the aperture of the plug screw.

Step	Action
4	Loosen this screw.
5	Carefully remove the motor from the gearbox.

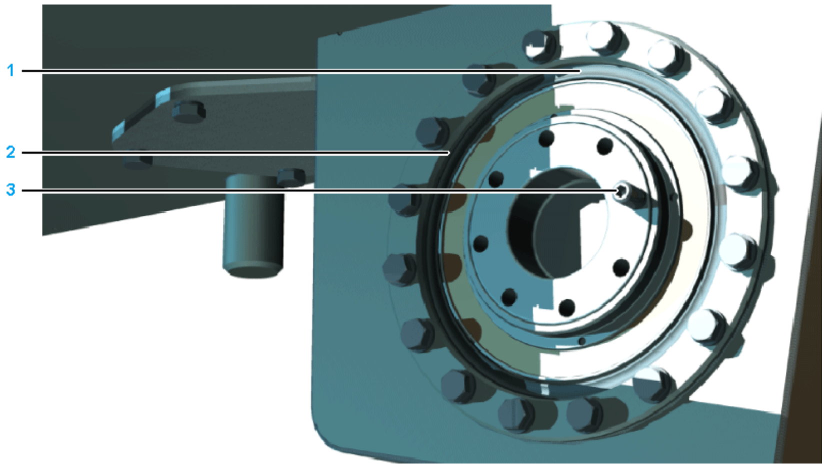
Mounting the New Motor and/or the New Gearbox

Step	Action
1	Ensure that the gearbox and the housing are at the same temperature, as otherwise - in the case of a temperature difference - the gearbox may not fit into the aperture provided.
2	Attach the motor to the gearbox according to the specifications of the manufacturer: • Tightening torque of the clamping hub: ◦ For VRKP0 / VRKP1: 5 Nm (44 lbf-in) ◦ For VRKP2 / VRKP4 / VRKP5 / VRKP6: 9.5 Nm (84 lbf-in) • Tightening torque of the motor screws: 3.5 Nm (31 lbf-in) **NOTE:** Position the motor and the gearbox vertically during mounting if possible.
3	Insert the plug screw into the gearbox flange.
4	Attach the motor/gearbox combination in the orientation specified to the robot housing. Tightening torque: • For VRKP0 / VRKP1: 3 Nm (26 lbf-in) • For VRKP2 / VRKP4 / VRKP5 / VRKP6: 4.7 Nm (42 lbf-in) For further information, refer to the detail drawing in *Mechanical and Electrical Data*, page 33.

NOTICE
DAMAGE TO MOTOR AND GEARBOX Only fasten motor and gearbox with all components at the same ambient temperature. **Failure to follow these instructions can result in equipment damage.**

Cabling the Motor and the Gearbox

Step	Action
1	Attach the ground strap to the motor. Tightening torque: 2.5 Nm (22 lbf-in) **NOTE:** When routing the cables, ensure that the grounding cap remains on the ground connection of the motors.
2	Put the hexagon cap on the ground connection at the motor. For further information, observe the respective operating instructions of the motors: • VRKP2S0 / VRKP4S0 / VRKP5S0 / VRKP6S0: *SH3 Servo Motor User Guide* • VRKP2L0 / VRKP4L0 / VRKP5L0 / VRKP6L0: *Lexium 62 ILM Hardware Guide*
3	Attach the motor supply cables and lock them in position.
4	Attach a new seal (quad ring) on the front between gearbox and housing by exercising light pressure to press the seal between the housing and the gearbox. **NOTE:** Do not use any sharp-edged tools so as not to damage the seal.

Step	Action
5	Verify that the seal (1) does not stand out over the gearbox or the housing. 
6	When using a new gearbox: Mount the threaded pin (3) as otherwise it may not be possible to mount the upper arm. For further information, refer to the detail drawing in *Mechanical and Electrical Data*, page 33.
7	Mount the upper arm as described in *Replacing the Upper Arms*, page 259.
8	Calibrate the robot mechanics, page 272.

DANGER

ELECTRIC SHOCK DUE TO DAMAGED CABLES

Verify that the grounding cap is placed correctly on the grounding connection of the motor.

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

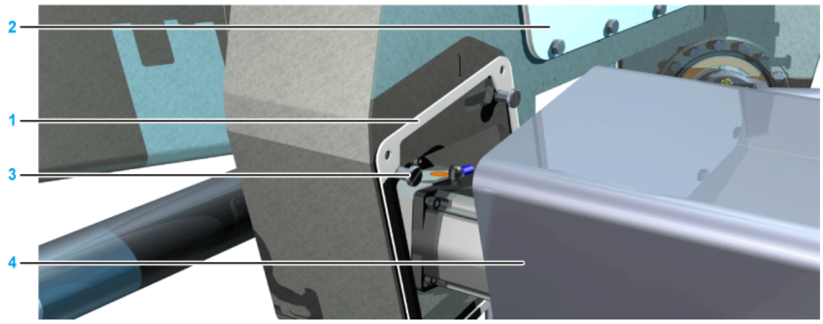
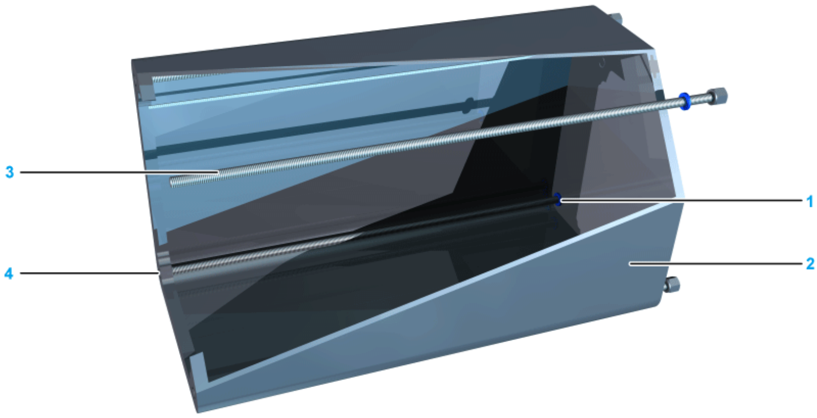
WARNING

COLLISION OF COMPONENTS

Calibrate the robot mechanics after the replacement of an upper arm, a motor, or a gearbox.

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

Mounting the Motor Cover

Step	Action
1	Attach a new seal (1) on the capture screws (3) for the motor cover (4), as the old seal may cause leakages to occur between the housing and the motor cover. 
2	Verify the position of the captive washers (1). The captive washers should be located in the rear of the motor cover (2) on the threaded rods (3). **NOTE:** The captive washers should be placed so that the threaded rods can not drop out from the aperture of the motor cover (4). 
3	Correct the position of the captive washers on the threaded rod if necessary.
4	Verify whether any open cables exist and remove them, if any.
5	Hook the motor cover on the capture screws and tighten the four threaded rods at the motor cover. Tightening torque: 6 Nm (53.1 lbf-in)
6	Mount the telescopic axis and the lower arms. For further information, refer to *Replacing the Telescopic Axis*, page 241 and *Mounting the Lower Arms*, page 155.

Replacing the Ball Pins

Step	Action
1	Remove the lower arms as described in *Replacing the Lower Arms*, page 254.
2	Unscrew the ball pins from the parallel plate and/or the upper arm.
3	Clean the holes.
4	Mount the new ball pins to the parallel plate and/or the upper arm. Use the medium strength threadlocking adhesive Loctite 243 for this purpose. Tightening torque: 8.6 Nm (75 lbf-in).
5	Mount the lower arms as described in *Replacing the Lower Arms*, page 254.

⚠ WARNING

COLLISION OF ROBOT COMPONENTS

- Verify the flush fitting with the contact surface and the correct use of the bolt locking device.
- Maintain the correct tightening torque.

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

Replacing the Fans

Procedure Overview

Perform the following procedures to replace the fans:

- Removing the fans, page 269
- Mounting the new fans, page 269

Removing the Fans

Step	Action
1	Remove the maintenance cover and the motor cover as described in *Opening the* Robot, page 127.
2	Disconnect the fan wires from the internal strip.
3	Remove the four fastening clips by putting them out from main motor side.
4	Remove the fans from the robot housing.

Mounting the New Fans

Step	Action
1	Insert the fans into the robot housing. For further information about the position of the fans, refer to the detail drawings in *Mechanical and Electrical Data*, page 33.
2	Fasten the fastening clips to the robot housing.
3	Connect the fan wires to the internal strip. For further information, refer to the cabling definition in *Electrical Installation*, page 127.
4	Mount the maintenance cover and motor cover as described in *Closing the* Robot, page 146.

Replacing the Gearbox Leakage Protection (Optional Equipment)

Step	Action
1	Remove the motor/gearbox combination from the robot housing, page 262.
2	Remove the threaded pin from the gearbox flange.
3	Mount the Gearbox Leakage Protection, page 172.
4	Connect the motor as described in *Cabling the Motor and the Gearbox*, page 265.
5	Mount the upper arm as described in *Replacing the Upper Arms*, page 259.
6	Calibrate the robot mechanics, page 272.
7	Mount the motor cover, page 267.

⚠ WARNING

COLLISION OF COMPONENTS

Calibrate the robot mechanics after the replacement of an upper arm, a motor, or a gearbox.

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

Replacing the Motorized Module

Step	Action
1	Remove the lower arms as described in *Replacing the Lower Arms*, page 254.
2	Mount the new module with the lower arms. When hooking in the module, ensure that the mounting for the gripper is located on the underside, as shown in the figure below. **NOTE:** The Rotational Module, the Tilting Module, the Double Rotational Module, and the Rotational Tilting Module can be rotated by n x 120°. Mount the respective module in its original position. See important information below this table. 
3	Move the module slowly and verify the position of the gripper.

Mounting the module in other than the original position will lead to inaccurate positioning.

NOTICE
DAMAGE DUE TO INCORRECT POSITIONING
Verify that the mounting position of the module is consistent with the original position. **Failure to follow these instructions can result in equipment damage.**

Calibration

Calibration of the Robot Mechanics

Overview

The robot has been calibrated in the factory and the data/positions of the axes can be read from the motor encoders. A further alignment is not necessary. However, in a service case, calibration via the control panel may become necessary in order to restore the intended operation.

Carry Out the Calibration

Carry out the calibration in the following cases:

- Following the replacement of a component (motor, gearbox, upper arm).
- Following deletion or overwriting of the calibration data.

Calibrating the robot mechanics must be carried out by Schneider Electric personnel or qualified personnel only, as this requires an expert level of knowledge of the PacDrive System.

For this purpose, the `SchneiderElectricRobotics` library contains an interface that has the necessary modes and parameters.

⚠WARNING

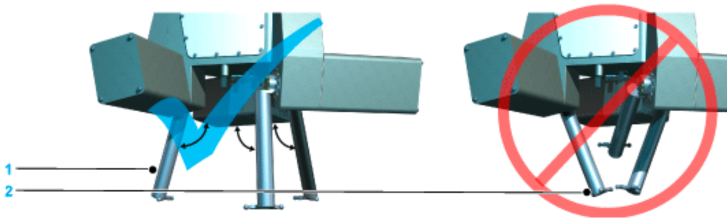
UNINTENDED EQUIPMENT OPERATION

- Calibrating the robot mechanics must be carried out by qualified personnel only.
- Conduct the calibration procedures exactly in the manner and in the order described in the present documentation.
- Use the `SchneiderElectricRobotics` library in conjunction with the calibration of robot mechanics.

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

Calibrating the Main Axes

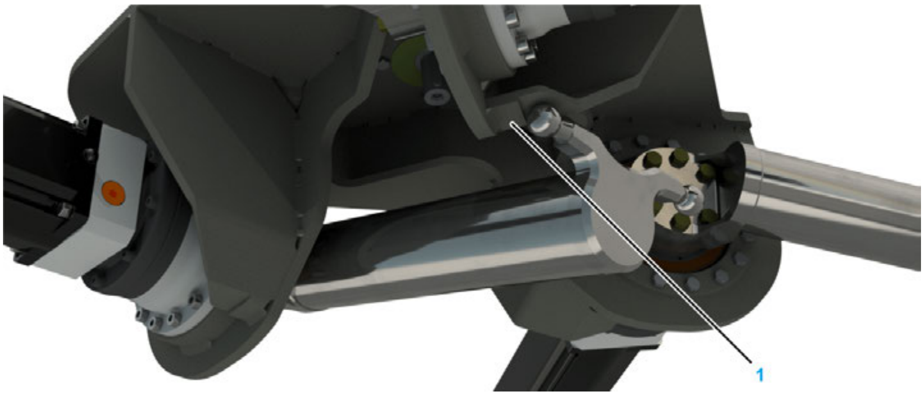
Preparing the Robot Mechanics for a Calibration Movement

Step	Action
1	Remove the rotational axis (if present), the lower arms, and the parallel plate. For further information, refer to *Replacing the Telescopic Axis*, page 241, *Replacing the Lower Arms*, page 254, and *Replacing the Parallel Plate*, page 258.
2	Do not move the upper arms beyond their vertical downward position (1) in order to prevent the individual robot arms from colliding with one another during their calibration travel (2). 

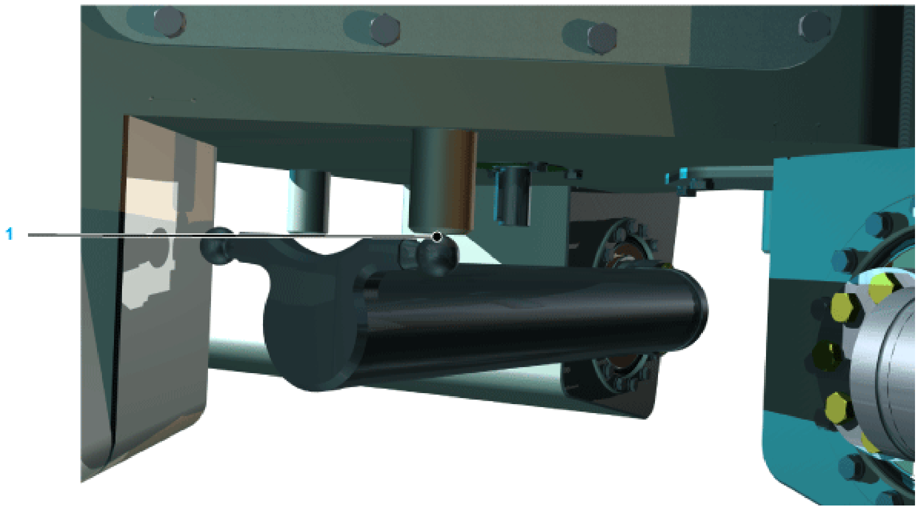
Sequence of the Calibration Process

Calibrate each of the three main axis motors by using the function *HomeOnTorque* for moving the ball pin of the upper arm to the calibration bolts (1).

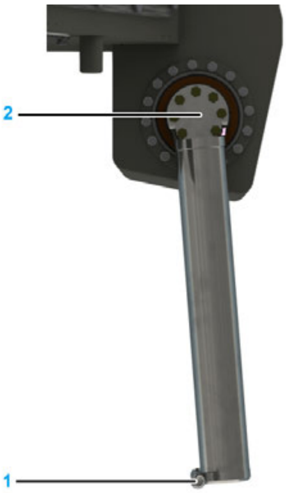
The following figure shows the upper arm of the robot VRKP1/VRKP2 at the calibration position:



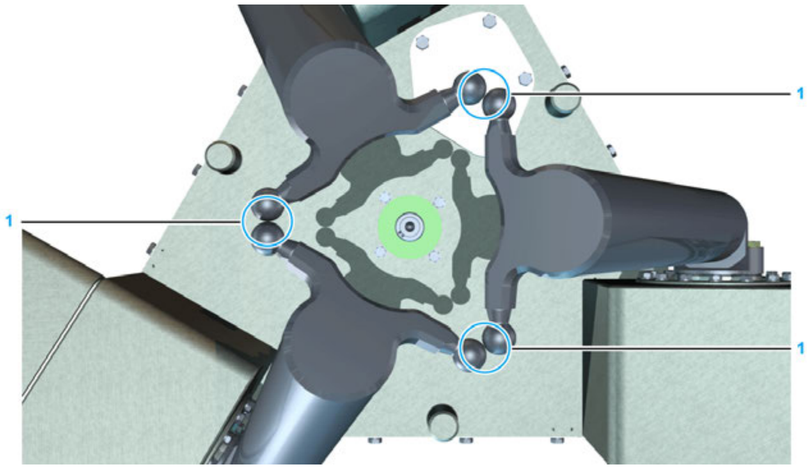
The following figure shows the upper arm of the robot VRKP0/VRKP4/VRKP5/VRKP6 at the calibration position:



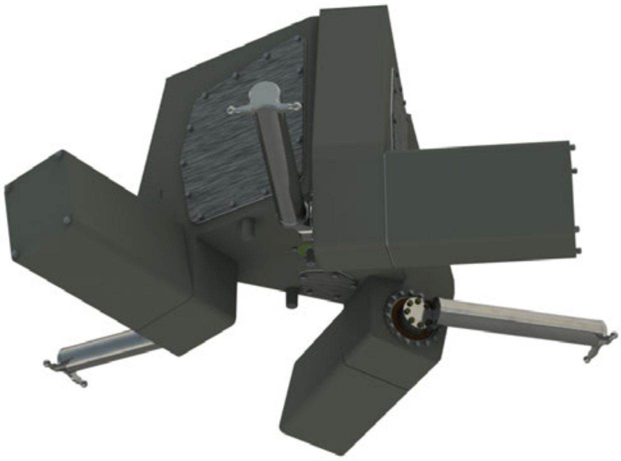
NOTE: Due to the preset offset, the calibration travel ends with the upper arms being in a vertical and downward-oriented position. Here, the ball pin (1) and not the tube of the upper arm are in vertical alignment with the center (2) of the gearbox (see the figure below).



Verifying the Calibration

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Move all three upper arms to the following angle in order to verify the calibration:
For VRKP0: -119.57°
For VRKP1: -112.72°
For VRKP2: -113.49°
For VRKP4: -119.76°
For VRKP5: -127.85°
For VRKP6: -123.35°</td></tr>
<tr><td>2</td><td>Measure whether the gap between the ball pins (1) of the individual upper arms is larger than 0.6 mm (0.236 in).


If the gap is larger than required or ball pins collide, proceed as follows:
Verify that all parameters (motor direction of rotation, gearbox factor) are correctly set in the controller configuration and correct these parameters if necessary.
Verify that the following components are not damaged and replace any damaged parts if necessary:
Upper arms (for example, bent, twisted, dented)
Drives (for example, damaged gearbox, loose clamping hub between gearbox and motor, damaged motor encoder)
Repeat the calibration travel.</td></tr>
</table>

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>3</td><td>Perform one of the following actions:
Move the upper arms - within the permitted angle position - into a basic position (for example, 0°, see the following figure)
Release the brakes and move the arms into the required position.

Result: The robot is now calibrated.</td></tr>
<tr><td>4</td><td>Mount the lower arms, the parallel plate, and the telescopic axis if applicable.

For further information, refer to Mounting the Lower Arms, page 155, Replacing The Parallel Plate, page 258, and Mounting the Telescopic Axis, page 153.</td></tr>
</table>

Calibrating the Rotational Axis

Step	Action
1	Move and align the rotational axis (and robot) in a clearly defined position in the working range of the machine (for example, put a plane surface of the mounted gripping device against an existing edge).
2	Use the function block `FB_CalibrationPSeries` with mode `ET_CalibrationMode.WriteEncoderRotationalAxis` to calibrate the rotational axis.

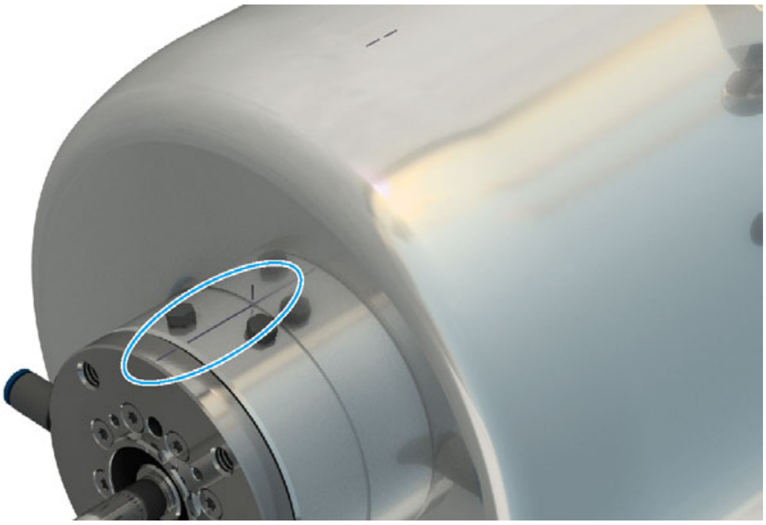
Calibrating the Double Rotational Module or the Rotational Tilting Module (Optional Equipment)

Overview

For calibrating the fourth and the fifth axis of the Double Rotational Modules or the Rotational Tilting Modules, use the applied markings. Align the markings to each other as presented in the following figures.

Calibration Markings at the Fourth Axis

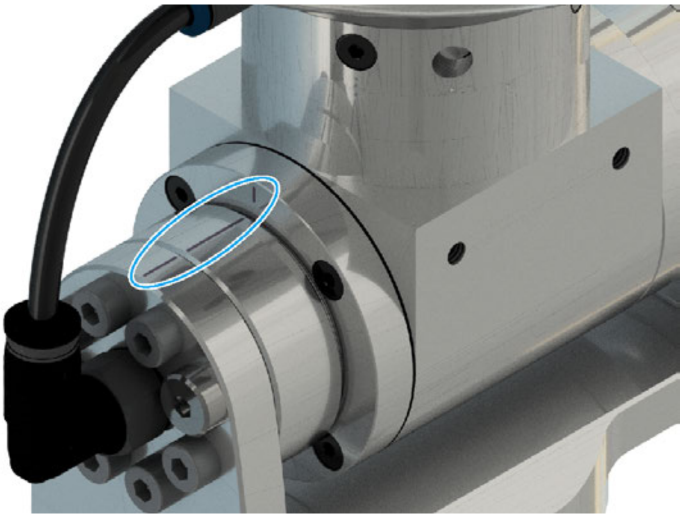
For calibrating the fourth axis of the Double Rotational Modules and the Rotational Tilting Modules, use the markings presented in the following figure.



Calibration Markings at the Fifth Axis

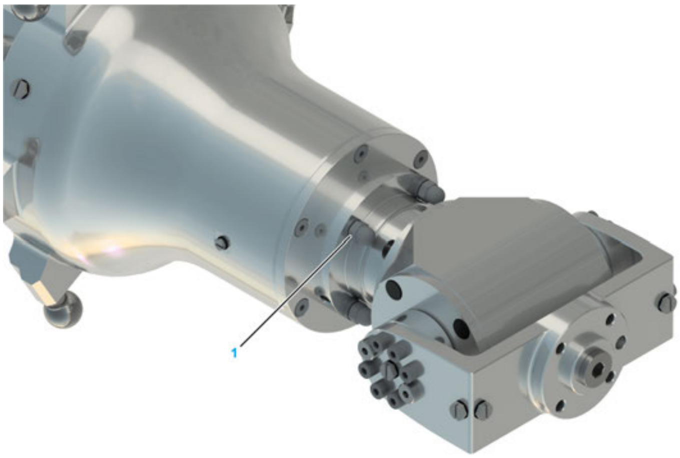
For calibrating the fifth axis of the Double Rotational Modules, use the markings presented in the following figure.

For calibrating the fifth axis of the Rotational Tilting Modules, use the markings presented in the following figure.



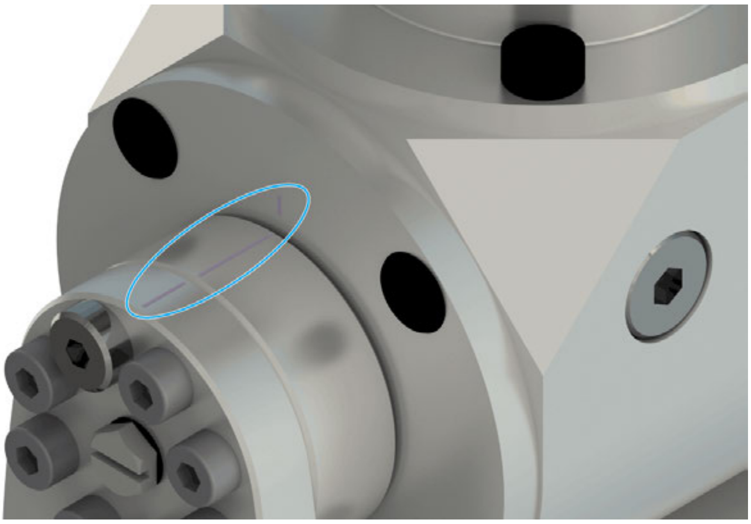
Calibrating the Tilting Module (Optional Equipment)

Adjusting the Rotation Angle of the Tilting Axis

Step	Action
1	Loosen the four nuts (1). 
2	Adjust the required angle by rotating the tilting gearbox. **NOTE:** The adjustment angle range is 40°.
3	Tighten the four nuts. Tightening torque: 3.5 Nm (31 lbf-in)

Calibration Markings at the Tilting Axis

For calibrating the tilting axis, align the applied markings to each other as presented in the following figure.



Replacement Equipment and Accessories

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, page 30:

Parameter	Example value	Position on type plate
Item name	Robot P4I-R-NO-15-1200	First line
Item reference (type code)	VRKP4L0RNO00000	ID-No
Hardware revision	S00	HW

Replacement Equipment Stock for Robots without a Rotational Axis

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

Item reference	Item name	Quantity*								
		VRKP0	VRKP0•••••••-E00	VRKP1	VRKP1•••••••-E00	VRKP2	VRKP4	VRKP5	VRKP6	VRKP6•••••••-E00
VRKP0YYYYY00002	Upper arm	(1)**	(1)**	0	0	0	0	0	0	0
VRKP1YYYYY00002		0	0	(1)**	(1)**	0	0	0	0	0
VRKP2YYYYY00002		0	0	0	0	(1)**	0	0	0	0
VRKP4YYYYY00002		0	0	0	0	0	(1)**	0	0	0
VRKP5YYYYY00002		0	0	0	0	0	0	(1)**	0	0
VRKP6YYYYY00002		0	0	0	0	0	0	0	(1)**	(1)**
VRKP1YYYYY00003	Gearbox main axis	(1)**	(1)**	(1)**	(1)**	0	0	0	0	0
VRKP4YYYYY00003		0	0	0	0	(1)**	(1)**	(1)**	(1)**	(1)**
VRKP4YYYYY00006	Parallel plate with ball pins	(1)**	(1)**	(1)**	(1)**	(1)**	(1)**	(1)**	(1)**	(1)**
VRKP4YYYYY00024	Ball pins - set of 12	(1)**	(1)**	(1)**	(1)**	(1)**	(1)**	(1)**	(1)**	(1)**
VRKP4YYYYY00025	Ball sockets - set of 12	1	1	1	1	1	1	1	1	1
VRKP4YYYYY00028	Fan	0	0	0	0	(1)***	(1)***	(1)***	(1)***	(1)***
VRKP1YYYYY00032	Springs - set of 6	1	1	1	1	0	0	0	0	0
VRKPXYYYYYY00032		0	0	0	0	1	1	1	1	1

Item reference	Item name	Quantity*								
		VRKP0	VRK-P-0•••••••-E00	VRKP1	VRK-P-1•••••••-E00	VRKP2	VRKP4	VRKP5	VRKP6	VRK-P-6•••••••-E00
VRKP0YYYYY00037	Lower arm pair	1 (2)**	0	0	0	0	0	0	0	0
VRKP1YYYYY00037		0	1 (2)**	1 (2)**	0	0	0	0	0	0
VRKP2YYYYY00037		0	0	0	1 (2)**	1 (2)**	0	0	0	0
VRKP4YYYYY00037		0	0	0	0	0	1 (2)**	0	0	0
VRKP5YYYYY00037		0	0	0	0	0	0	1 (2)**	0	0
VRKP6YYYYY00037		0	0	0	0	0	0	0	1 (2)**	0
VRKP6YYYYY00E37		0	0	0	0	0	0	0	0	1 (2)**

* 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 VRKP2•••WD / VRKP2•••WF / VRKP4L0•WD / VRKP4L0•NO / VRKP4S0•WF / VRKP5S0•WF / VRKP6S0•WF with increased requirements on the availability of the machine.

Replacement Equipment Stock for Robots with a Rotational Axis

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

Item reference	Item name	Quantity*								
		VRKP0	VRK-P-0•••••••-E00	VRKP1	VRK-P-1•••••••-E00	VRKP2	VRKP4	VRKP5	VRKP6	VRK-P-6•••••••-E00
VRKP0YYYYY00002	Upper arm	(1)**	(1)**	0	0	0	0	0	0	0
VRKP1YYYYY00002		0	0	(1)**	(1)**	0	0	0	0	0
VRKP2YYYYY00002		0	0	0	0	(1)**	0	0	0	0
VRKP4YYYYY00002		0	0	0	0	0	(1)**	0	0	0
VRKP5YYYYY00002		0	0	0	0	0	0	(1)**	0	0
VRKP6YYYYY00002		0	0	0	0	0	0	0	(1)**	(1)**
VRKP1YYYYY00003	Gearbox main axis	(1)**	(1)**	(1)**	(1)**	0	0	0	0	0
VRKP4YYYYY00003		0	0	0	0	(1)**	(1)**	(1)**	(1)**	(1)**
VRKP4YYYYY00029	Parallel plate with bearing and ball pins	(1)**	(1)**	(1)**	(1)**	(1)**	(1)**	(1)**	(1)**	(1)**
VRKP4YYYYY00012	Slide films - three sets of three	1	1	1	1	1	1	1	1	1
VRKP4YYYYY00024	Ball pins - set of 12	(1)**	(1)**	(1)**	(1)**	(1)**	(1)**	(1)**	(1)**	(1)**
VRKP4YYYYY00025	Ball sockets - set of 12	1	1	1	1	1	1	1	1	1
VRKP4YYYYY00028	Fan	0	0	0	0	(1)***	(1)***	(1)***	(1)***	(1)***
VRKP1YYYYY00032	Springs - set of 6	1	1	1	0	0	0	0	0	0
VRKPXYYYYY00032		0	0	0	1	1	1	1	1	1

Item reference	Item name	Quantity*								
		VRKP0	VRK-P-0•••••••-E00	VRKP1	VRK-P-1•••••••-E00	VRKP2	VRKP4	VRKP5	VRKP6	VRK-P-6•••••••-E00
VRKP0YYYYY00033	Telescop-ic axis	(1)**	0	0	0	0	0	0	0	0
VRKP0YYYYY00E33		0	(1)**	0	0	0	0	0	0	0
VRKP1YYYYY00033		0	0	(1)**	0	0	0	0	0	0
VRKP1YYYYY00E33		0	0	0	(1)**	0	0	0	0	0
VRKP2YYYYY00033		0	0	0	0	(1)**	0	0	0	0
VRKP4YYYYY00033		0	0	0	0	0	(1)**	0	0	0
VRKP5YYYYY00033		0	0	0	0	0	0	(1)**	0	0
VRKP6YYYYY00033		0	0	0	0	0	0	0	(1)**	0
VRKP6YYYYY00E33		0	0	0	0	0	0	0	0	(1)**
VRKP0YYYYY00037	Lower arm pair	1 (2)**	0	0	0	0	0	0	0	0
VRKP1YYYYY00037		0	1 (2)**	1 (2)**	0	0	0	0	0	0
VRKP2YYYYY00037		0	0	0	1 (2)**	1 (2)**	0	0	0	0
VRKP4YYYYY00037		0	0	0	0	0	1 (2)**	0	0	0
VRKP5YYYYY00037		0	0	0	0	0	0	1 (2)**	0	0
VRKP6YYYYY00037		0	0	0	0	0	0	0	1 (2)**	0
VRKP6YYYYY00E37		0	0	0	0	0	0	0	0	1 (2)**
VRKPXYYYYYY00040	Plain bearing	1	1	1	1	1	1	1	1	1
VRKPXYYYYYY00043	Upper universal joint	1	1	1	1	1	1	1	1	1
VRKPXYYYYYY00044	Lower universal joint	1	1	1	1	1	1	1	1	1

* When using more than one robot, increase the quantity accordingly.

** Only if there are increased requirements on the availability of the machine.

*** Only for robots VRKP2•••WD / VRKP2•••WF / VRKP4L0•WD / VRKP4L0•NO / VRKP4S0•WF / VRKP5S0•WF / VRKP6S0•WF with increased requirements on the availability of the machine.

Replacement Equipment Stock for Robots with a Motorized Module

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

Item reference	Item name	Quantity*								
		VRKP0	**VRK-P-0•••••••-E00**	**VRKP1**	**VRK-P-1•••••••-E00**	**VRKP2**	**VRKP4**	**VRKP5**	**VRKP6**	**VRK-P-6•••••••-E00**
VRKP0YYYYY00002	Upper arm	(1)**	(1)**	0	0	0	0	0	0	0
VRKP1YYYYY00002		0	0	(1)**	(1)**	0	0	0	0	0
VRKP2YYYYY00002		0	0	0	0	(1)**	0	0	0	0
VRKP4YYYYY00002		0	0	0	0	0	(1)**	0	0	0
VRKP5YYYYY00002		0	0	0	0	0	0	(1)**	0	0
VRKP6YYYYY00002		0	0	0	0	0	0	0	(1)**	(1)**
VRKP1YYYYY00003	Gearbox main axis	(1)**	(1)**	(1)**	(1)**	0	0	0	0	0
VRKP4YYYYY00003		0	0	0	0	(1)**	(1)**	(1)**	(1)**	(1)**
VRKP4YYYYY00024	Ball pins - set of 12	(1)**	(1)**	(1)**	(1)**	(1)**	(1)**	(1)**	(1)**	(1)**
VRKP4YYYYY00025	Ball sockets - set of 12	1	1	1	1	1	1	1	1	1
VRKP4YYYYY00028	Fan	0	0	0	0	(1)***	(1)***	(1)***	(1)***	(1)***
VRKP1YYYYY00032	Springs - set of 6	1	1	1	1	0	0	0	0	0
VRKPXYYYYY00032		0	0	0	0	1	1	1	1	1
VRKP0YYYYY00037	Lower arm pair	1 (2)**	0	0	0	0	0	0	0	0
VRKP1YYYYY00037		0	1 (2)**	1 (2)**	0	0	0	0	0	0
VRKP2YYYYY00037		0	0	0	1 (2)**	1 (2)**	0	0	0	0
VRKP4YYYYY00037		0	0	0	0	0	1 (2)**	0	0	0
VRKP5YYYYY00037		0	0	0	0	0	0	1 (2)**	0	0
VRKP6YYYYY00037		0	0	0	0	0	0	0	1 (2)**	0
VRKP6YYYYY00E37		0	0	0	0	0	0	0	0	1 (2)**
VRKPXYYYYY00045	Rotational Module B	0	0	0	0	0	(1)**	0	0	0

* When using more than one robot, increase the amount accordingly.

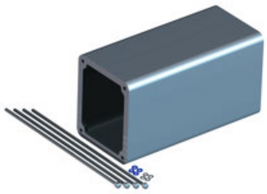
** Only if there are increased requirements on the availability of the machine.

*** Only for robots VRKP2•••WD / VRKP2•••WF / VRKP4L0•WD / VRKP4L0•NO / VRKP4S0•WF / VRKP5S0•WF / VRKP6S0•WF with increased requirements on the availability of the machine.

Standard Replacement Equipment

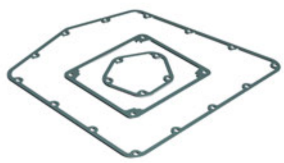
Overview

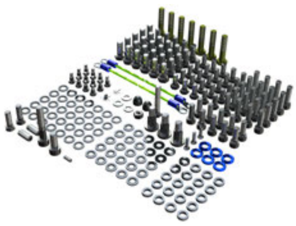
This following table presents the standard replacement equipment for the serial version of the Lexium P robot. For optional equipment, refer to *Optional Equipment and Accessories*, page 290.

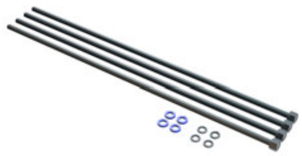
Item description and content	Representation	Item reference	To be used for
Motor cover with fasteners - without sealing: • 1x motor cover VRKP4•••WD • 4x threaded rod • 4x sealing washer • 4x captive washer		VRKP4YYYYY00001	VRKP2•••WD VRKP2•••WF VRKP4•••WD VRKP4•••NO VRKP4•••WF VRKP5•••WF VRKP6•••WF
Upper arm with ball pins, indexing bolt, and fasteners: • 1x upper arm complete • 1x indexing bolt gearbox • 7x titanium screw upper arm		VRKP0YYYYY00002	VRKP0
		VRKP1YYYYY00002	VRKP1
		VRKP2YYYYY00002	VRKP2
		VRKP4YYYYY00002	VRKP4
		VRKP5YYYYY00002	VRKP5
		VRKP6YYYYY00002	VRKP6
Gearbox for the main axis with fasteners and indexing bolt for robots with hardware code S00, S01, or S02(1): • 1x gearbox main axis • 16x screw gearbox to housing • 16x lock washer gearbox to housing • 4x screw motor to gearbox • 1x indexing bolt gearbox • 1x quad ring • 1x grounding cap for motor		VRKP1YYYYY00003	VRKP0 VRKP1 with hardware code S00, S01, or S02(1)
		VRKP4YYYYY00003	VRKP2 VRKP4 VRKP5 VRKP6 with hardware code S00, S01, or S02(1)
Gearbox for the main axis with fasteners and indexing bolt for robots with hardware code S03 (1): • 1x gearbox main axis • 16x screw gearbox to housing • 16x lock washer gearbox to housing • 4x screw motor to gearbox • 1x indexing bolt gearbox • 1x quad ring • 1x grounding cap for motor		VRKP1YYYYY01003	VRKP0 VRKP1 with hardware code S03(1)
		VRKP4YYYYY01003	VRKP2 VRKP4 VRKP5 VRKP6 with hardware code S03(1)

(1) To identify the manufacturer, refer to the hardware code on the robot type plate. See *Type Plate*, page 30.

Item description and content	Representation	Item reference	To be used for
Titanium parallel plate with ball pins: • 1x titanium parallel plate complete		VRKP4YYYYY00006	All Lexium P robots
Guiding tubes for the telescopic axis: • 3x lower tube • 1x upper tube		VRKP0YYYYY00010	VRKP0
		VRKP0YYYYY00E10	VRKP0•••••••E00
		VRKP1YYYYY00010	VRKP1
		VRKP1YYYYY00E10	VRKP1•••••••E00
		VRKP2YYYYY00010	VRKP2
		VRKP4YYYYY00010	VRKP4
		VRKP5YYYYY00010	VRKP5
		VRKP6YYYYY00010	VRKP6
		VRKP6YYYYY00E10	VRKP6•••••••E00
Miscellaneous fasteners for the telescopic axis: • 1x clamping cone large • 1x clamping sleeve large • 1x washer large • 6x washer small • 6x clamping cone small • 6x clamping sleeve small • 1x cover universal joint • 7x screw clamping • 1x screw universal joint large • 1x screw universal joint small • 6x countersunk head screw universal joint • 2x straight pin universal joint		VRKP4YYYYY00011	All Lexium P robots
Standard slide films, three sets: • 3x slide film 20 • 9x slide film 16		VRKP4YYYYY00012	All Lexium P robots
Gearbox for the rotational axis with fasteners and sealings: • 1x gearbox rotational axis • 1x O-ring rotational motor • 4x sealing washer rotational motor • 4x screw motor to gearbox • 4x screw gearbox rotational axis to housing		VRKP4YYYYY00014	All Lexium P robots
Maintenance cover with fasteners: • 1x maintenance cover • 14x screws maintenance cover • 14x sealing washer maintenance cover		VRKP4YYYYY00015	VRKP2•••WD VRKP4•••WD VRKP4•••NO

Item description and content	Representation	Item reference	To be used for
Cable gland with covers and fasteners: • 1x cable gland M16 PVDF • 1x counter nut M16 • 1x sealing ring PE M16 • 2x cable gland M50 PVDF • 2x counter nut M50 • 2x sealing ring PE M50 • 1x sealing insert 4x13 • 1x sealing insert 4x7 • 1x lock bolt 13 • 1x lock bolt 7 • 1x media cover 50 • 1x media cover 50/16 • 10x screw media cover • 10x sealing washer for screw media cover		VRKP4YYYYY00016	VRKP2•••WD VRKP4S0•WD / VRKP4S0•NO
Motor cover with fasteners - without sealing: • 1x motor cover VRKP4•••NO • 4x threaded rod • 4x sealing washer for threaded rod • 4x lock washer		VRKP4YYYYY00017	VRKP4•••WD VRKP4•••NO
Media covers with fasteners - without sealings: • 2x media cover blank • 10x screw media cover • 10x sealing washer for screw media cover		VRKP4YYYYY00018	VRKP2•••WD VRKP2•••WF VRKP4•••WD VRKP4•••NO VRKP4•••WF
Closing for the rotational axis, cover with fasteners and sealing: • 1x cover rotational axis • 1x O-ring central motor • 4x sealing washer central motor • 4x screw cover rotational axis		VRKP4YYYYY00019	VRKP2•••WD VRKP2•••WF VRKP4•••WD VRKP4•••NO VRKP4•••WF
Sealing set for the maintenance cover, motor cover, and media cover: • 1x sealing gasket maintenance cover • 1x sealing gasket motor cover • 1x sealing gasket media cover		VRKP4YYYYY00020	VRKP2•••WD VRKP4•••WD VRKP4•••NO VRKP4•••CW
Sealings for gearboxes, two sets: • 6x quad ring main axis motor • 2x O-ring rotational axis motor		VRKP4YYYYY00021	VRKP2•••WD VRKP2•••WF VRKP4•••WD VRKP4•••NO VRKP4•••WF

Item description and content	Representation	Item reference	To be used for
Screw set for one upper arm: • 7x screw upper arm		VRKP1YYYYY00022	VRKP0 VRKP1
		VRKP4YYYYY00022	VRKP2 VRKP4 VRKP5 VRKP6
Ball pin set for one robot: • 12x ball pins		VRKP4YYYYY00024	All Lexium P robots
Ball socket set for one robot: • 12x ball sockets		VRKP4YYYYY00025	All Lexium P robots
Set of small parts (for example, screws, washers, nuts) without expendable parts: • 12x bolt lower arm • 2x sticker ground connection • 25x sealing washer for rotational motor / covering housing • 35x sealing washer for maintenance cover / media cover / motor cover • 2x washer for ground connection • 2x bolt for rotational motor • 10x screw for rotational motor to gearbox/ main motor to gearbox / universal joint small • 7x titanium bolt for upper arm • 1x straight pin universal joint • 1x clamping screw universal joint plastic • 2x screw for universal joint large / clamping universal joint titan • 3x countersunk head screw for universal joint • 30x screw for gearbox to housing • 30x lock washer for gearbox to housing • 25x bolt for rotational motor / covering housing • 2x indexing bolt for gearbox • 2x nut for ground connection • 1x spring ring for ground connection • 1x bolt for ground connection • 30x bolt for maintenance cover / media cover / clamping • 3x flat head screw for motor cover • 6x captive washer for motor cover • 2x grounding cap for motor		VRKP1YYYYY00026	VRKP0 VRKP1
		VRKP4YYYYY00026	VRKP2 VRKP4 VRKP5 VRKP6

Item description and content	Representation	Item reference	To be used for
Fasteners for the motor cover: • 4x threaded rod • 4x sealing washer for threaded rod • 4x lock washer		VRKP4YYYYY00027	VRKP2•••WD VRKP2•••WF VRKP4•••WD VRKP4•••NO VRKP4•••WF VRKP5•••WF VRKP6•••WF
Fans with fastening clips: • 12x fastening clips • 3x fan 80x25 24 V • 6x wire ends		VRKP4YYYYY00028	VRKP2•••WD VRKP2•••WF VRKP4•••WD VRKP4•••NO VRKP4•••WF VRKP5•••WF VRKP6•••WF
Titanium parallel plate with bearing and ball pins: • 1x titanium parallel plate complete		VRKP4YYYYY00029	All Lexium P robots
PacDrive motor for the rotational axis: • 1x motor		MH30701P02F2200	VRKP0S0R VRKP1S0R VRKP2S0RWF VRKP4S0RWF VRKP5S0RWF VRKP6S0RWF
		SH30702P02F2000	VRKP2S0R VRKP4S0R VRKP5S0R VRKP6S0R
PacDrive motor for the main axis: • 1x motor		SH30553P02F2000	VRKP0 VRKP1
		SH30703P02F2000	VRKP2 VRKP4 VRKP5 VRKP6
PacDrive motor for the main axis, Lexium 62 ILM: • 1x motor		ILM0703P02F0000	VRKP2 VRKP4 VRKP5 VRKP6
PacDrive motor for the rotational axis, Lexium 62 ILM: • 1x motor		ILM0702P02F0000	VRKP2 VRKP4 VRKP5 VRKP6

Item description and content	Representation	Item reference	To be used for
Springs, spring brackets, rolls and fasteners. Set for one robot: • 6x spring • 12x spring bracket • 24x roll • 24x screw		VRKP1YYYYY00032	VRKP0 VRKP0•••••••E00 VRKP1
		VRKPXYYYYY00032	VRKP1•••••••E00 VRKP2 VRKP4 VRKP5 VRKP6
Telescopic axis with universal joints: • 1x telescopic axis complete		VRKP0YYYYY00033	VRKP0
		VRKP0YYYYY00E33	VRKP0•••••••E00
		VRKP1YYYYY00033	VRKP1
		VRKP1YYYYY00E33	VRKP1•••••••E00
		VRKP2YYYYY00033	VRKP2
		VRKP4YYYYY00033	VRKP4
		VRKP5YYYYY00033	VRKP5
		VRKP6YYYYY00033	VRKP6
		VRKP6YYYYY00E33	VRKP6•••••••E00
Lower arm pair with rolls, sockets, and springs: • 2x lower arm complete • 2x single spring		VRKP0YYYYY00037	VRKP0
		VRKP1YYYYY00037	VRKP0•••••••E00 VRKP1
		VRKP2YYYYY00037	VRKP1•••••••E00 VRKP2
		VRKP4YYYYY00037	VRKP4
		VRKP5YYYYY00037	VRKP5
		VRKP6YYYYY00037	VRKP6
		VRKP6YYYYY00E37	VRKP6•••••••E00
Protector Cap for the main axes with fasteners. Set for one robot: • 3x protector cap • 3x supporting ring • 3x O-ring for Protector Cap • 48x screw for Protector Cap • 48x sealing washer		VRKP1YYYYY00030	VRKP0 VRKP1
		VRKPXYYYYY00030	VRKP2 VRKP4 VRKP5 VRKP6
Plain bearings for the titanium universal joints of the telescopic axis: • 10x plain bearing • 1x thrust washer • 8x counter sunk screw M3 • 8x cylinder head screw M4 • 8x lock washer M4		VRKPXYYYYY00040	All Lexium P robots
Titanium upper universal joint with fasteners: • 1x upper universal joint titanium • 1x clamping screw upper universal joint		VRKPXYYYYY00043	All Lexium P robots

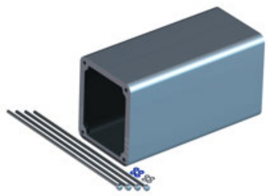
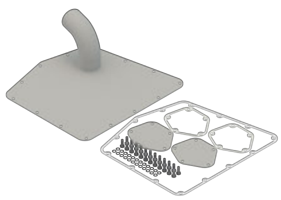
Item description and content	Representation	Item reference	To be used for
Titanium lower universal joint with fasteners and indexing bolt: • 1x lower universal joint titanium • 6x countersunk screw universal joint • 2x straight pin universal joint		VRKPXYYYYY00044	All Lexium P robots
Sealing set for the maintenance cover, motor cover, and media cover: • 7x sealing gasket maintenance cover and motor cover • 1x sealing gasket media cover		VRKPXYYYYY00051	VRKP2•••WF VRKP4S0•WF VRKP5S0•WF VRKP6S0•WF

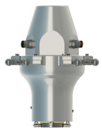
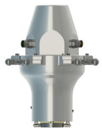
Optional Equipment and Accessories

Overview

This section presents the optional equipment and accessories for the Lexium P robot. For the standard replacement equipment, refer to *Standard Replacement Equipment*, page 283.

Item description and content	Representation	Item reference	To be used for
Lower arms pair with rolls, sockets, and springs: • 2x lower arm complete • 4x springs		VRKP2YYYYY00004	VRKP2
		VRKP4YYYYY00004	VRKP4
		VRKP5YYYYY00004	VRKP5
		VRKP6YYYYY00004	VRKP6
		VRKP6YYYYY00E04	VRKP6•••••••E00
Telescopic Axis Double with universal joints: • 1x Telescopic Axis Double complete		VRKP2YYYYY00007	VRKP2
		VRKP4YYYYY00007	VRKP4
		VRKP5YYYYY00007	VRKP5
		VRKP6YYYYY00007	VRKP6
		VRKP6YYYYY00E07	VRKP6•••••••E00
Plastic upper universal joint with fastener: • 1x plastic upper universal joint • 1x clamping screw upper universal joint		VRKP4YYYYY00008	All Lexium P robots
Plastic lower universal joint with fasteners and indexing bolt: • 1x plastic lower universal joint • 6x countersunk screw universal joint • 1x straight pin universal joint		VRKP4YYYYY00009	All Lexium P robots
Food grade slide films, three sets: • 3x food grade slide film 20 • 9x food grade slide film 16		VRKP4YYYYY00013	All Lexium P robots
Springs, rolls, and fasteners. Set for one robot: • 12x springs • 24x roll • 24x screw		VRKP4YYYYY00023	All Lexium P robots
Gearbox Leakage Protection for the main axis with fasteners: • 1x protection box for gearbox • 1x output-flange-extension • 8x screw for output-flange-extension • 4x screw for protection box / gearbox • 12x screw for protection box / housing		VRKPXYYYYY00031	VRKP2 VRKP4 VRKP5 VRKP6

Item description and content	Representation	Item reference	To be used for
Impact Plate for the main axis with fasteners. Set for one robot: • 3x Impact Plate • 12x screw for Impact Plate • 48x sealing washer		VRKP1YYYYY00035	VRKP0 VRKP1
		VRKPXYYYYY00035	VRKP2 VRKP4 VRKP5 VRKP6
Motor cover extended with fasteners - without sealing: • 1x motor cover extended • 4x threaded rod • 4x sealing washer • 4x lock washer		VRKPXYYYYY00036	VRKP2•••WD VRKP2•••WF VRKP4•••WD VRKP4•••NO VRKP4•••WF VRKP5•••WF VRKP6•••WF for robots with Gearbox Leakage Protection
Lexium P Parallel Plate Bearing Protection: • 1x cover top side • 1x flange offset ring • 1x cover bottom side • 6x collar nut • 6x screw for cover bottom side • 9x screw for flange offset ring • 1x straight pin flange offset ring		VRKPXYYYYY00042	VRKP•••R
Lexium P Maintenance Cover Pipe Connection: • 1x Maintenance Cover Pipe Connection • 2x media cover blank • 1x sealing gasket maintenance cover • 2x sealing gasket media cover • 24x sealing washer maintenace / media cover • 24x screws maintenace / media cover • 1x straight pin flange offset ring		VRKPXYYYYY00048	VRKP2•••WD VRKP4•••WD VRKP4•••NO
Lexium P Double Rotational Module: • 1x Double Rotational Module		VRKPXYYYYY00038	All Lexium P robots
Lexium P Rotational Tilting Module: • 1x Rotational Tilting Module		VRKPXYYYYY00039	All Lexium P robots
Lexium P Rotational Tilting Module HD: • 1x Rotational Tilting Module HD		VRKPXYYYYY00041	All Lexium P robots

Item description and content	Representation	Item reference	To be used for
Lexium P Rotational Module B: • 1x Rotational Module B		VRKPXYYYYY00045	All Lexium P robots
Lexium P Rotational Module HT-B: • 1x Rotational Module HT-B		VRKPXYYYYY00046	All Lexium P robots
Lexium P Double Rotational Module HD: • 1x Double Rotational Module HD		VRKPXYYYYY00049	All Lexium P robots
Lexium P Rotational Tilting Module HD-B: • 1x Rotational Tilting Module HD-B		VRKPXYYYYY00050	All Lexium P robots
Lexium P Tilting Module HT-B-HD: • 1x Tilting Module HT-B-HD		VRKPXYYYYY00052	All Lexium P robots
Lexium P Tilting Module B: • 1x Tilting Module B		VRKPXYYYYY00053	All Lexium P robots
Encoder extension cable for the optional modules: • 1x encoder extension cable		VW3E2100R030	VRKP0 VRKP1 VRKP2 VRKP4
		VW3E2100R043	VRKP5 VRKP6
Power extension cable for the optional modules: • 1x power extension cable		VW3E1168R030	VRKP0 VRKP1 VRKP2 VRKP4
		VW3E1168R043	VRKP5 VRKP6

Troubleshooting

Troubleshooting

Overview

Malfunction	Probable cause	Solution
Trouble with components.	End of component life cycle.	Note the maintenance plan, page 230.
Squeaking.	Ball sockets are contaminated.	Clean the ball sockets dry, page 237.
	Ball sockets are worn out.	Replace the ball sockets, page 255.
	Spring roll is worn out.	Replace the spring roll, page 257.
Rattling noise.	A spring is absent and/or damaged. **NOTE:** Verify the upper arm regarding mechanical attachment.	Replace the springs, page 256.
Oil beads up at new gearbox.	Initial oozing of new gearboxes.	Clean the gearbox dry, page 237.
Grease at new ball bearing.	Initial oozing of new bearings.	Clean the ball bearing dry, page 237.
Extensive position deviation after motor replacement.	The robot is not calibrated.	Calibrate the robot, page 272.
	Incorrect motor replacement.	Mount the motor correctly, page 262.

Appendices

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Further Information About the Manufacturer

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Contact Addresses

Manufacturer

Schneider Electric Automation GmbH

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

Schneiderplatz 1

97828 Marktheidenfeld, Germany

Phone: +49 9391 603 5000

Internet: www.se.com

Other Contacts

See the homepage for additional contact addresses:

Contact Center | Schneider Electric Global (se.com)

Product Training Courses

Product Training Courses

Schneider Electric offers a number of product training courses.

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

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

Disposal

What's in This Chapter

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Disposal

Information on the Disposal of Schneider Electric Products

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

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

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

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

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

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

Declaration of Incorporation

What's in This Chapter

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Declaration of Incorporation

Overview

Declaration of Incorporation

According to EC directive 2006/42/EC on machinery (Annex II B)
Document number / Month.Year: RBA20130824.10 / 11.2023
- Original Language -

We: Schneider Electric Automation GmbH
Subsidiary of Schneider Electric SE (FR 92500 Rueil-Malmaison)

Schneiderplatz 1
97828 Marktheidenfeld
Germany

Hereby declare that this declaration of conformity is issued under our sole responsibility as manufacturer and that the product(s):

Trademark:	Schneider Electric
Product, Type, Function:	Lexium P Robot
Models:	VRKP – Series, see detailed list of references
Serial Number:	YYZXXXXXXX (YY: Year+10, e.g. 25 = 2015; Z: Plant Code; XXXXXXX = cont. number)

with the following references

Reference	Description
VRKP0S****00***	P0 with SH3 motor
VRKP0S****02***	P0 with SH3 Motor
VRKP1S****00***	P1 with SH3 motor
VRKP1S****02***	P1 with SH3 Motor
VRKP2S****00***	P2 with SH3 motor
VRKP2S****02***	P2 with SH3 motor
VRKP2I****00***	P2 with iSH motor
VRKP2L****00***	P2 with ILM motor
VRKP2WM***00***	P2 without motors
VRKP4S****00***	P4 with SH3 motor
VRKP4S****02***	P4 with SH3 motor
VRKP4I****00***	P4 with iSH motor
VRKP4L****00***	P4 with ILM motor
VRKP4WM***00***	P4 without motors
VRKP5S****00***	P5 with SH3 motor
VRKP5S****02***	P5 with SH3 motor
VRKP5L****00***	P5 with ILM motor
VRKP5WM***00***	P5 without motors
VRKP6S****00***	P6 with SH3 motor
VRKP6S****02***	P6 with SH3 motor
VRKP6L****00***	P6 with ILM motor
VRKP6WM***00***	P6 without motors

* are any letters or numbers not affecting the conformity of the product

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Declaration of Incorporation

According to EC directive 2006/42/EC on machinery (Annex II B)
Document number / Month.Year: RBA20130824.10 / 11.2023
- Original Language -

is complying with all essential requirements of the Machinery Directive 2006/42/EC, as far as the scope of delivery allows. Additional we declare that the relevant technical documentation is compiled in accordance with part B of Annex VII.

Directive	Fulfilled Requirements	Harmonized Standard
DIRECTIVE 2006/42/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 May 2006 on machinery, and amending Directive 95/16/EC	1.1.2, 1.1.3, 1.1.5, 1.3.2, 1.3.4, 1.7.2	**EN ISO 10218-1:2011** Robots and robotic devices - Safety requirements for industrial robots - Part 1: Robots

We commit to transmit, in response to a reasoned request by the market surveillance authorities, relevant documents
Name and address of the person authorised to compile the technical documentation:
Jens Bunsendal, Schneider Electric Automation GmbH, Schneiderplatz 1**, 97828 Marktheidenfeld – Germany**

The partly completed machinery must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of Directive 2006/42/EC on Machinery, where appropriate, and until the EC Declaration of Conformity according to Annex II A is issued.

Issued at: Carros - France, 24th November 2023

Mareau

i.A. Samuel Mareau
Manager Product Compliance & Certification

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

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