

Assembly and Operating Manual

PR 2

Servo-electrical rotary unit



Imprint

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We reserve the right to make alterations for the purpose of technical improvement.

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Dear Customer,

thank you for trusting our products and our family-owned company, the leading technology supplier of robots and production machines.

Our team is always available to answer any questions on this product and other solutions. Ask us questions and challenge us. We will find a solution!

Best regards,

Your SCHUNK team

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1 General

1.1 About this manual

This manual contains important information for a safe and appropriate use of the product.

This manual is an integral part of the product and must be kept accessible for the personnel at all times.

Before starting work, the personnel must have read and understood this operating manual. Prerequisite for safe working is the observance of all safety instructions in this manual.

Illustrations in this manual are provided for basic understanding and may differ from the actual product design.

In addition to these instructions, the documents listed under [Applicable documents](#) [► 7] are applicable.

1.1.1 Presentation of Warning Labels

To make risks clear, the following signal words and symbols are used for safety notes.



⚠ DANGER

Danger for persons!

Non-observance will inevitably cause irreversible injury or death.



⚠ WARNING

Dangers for persons!

Non-observance can lead to irreversible injury and even death.



⚠ CAUTION

Dangers for persons!

Non-observance can cause minor injuries.

NOTICE

Material damage!

Information about avoiding material damage.

1.1.2 Applicable documents

- General terms of business*
- Catalog data sheet of the purchased product *
- Assembly and operating manuals of the accessories *
- "SCHUNK Motion Tool (MTS)" software manual *
- "SCHUNK Motion Protocol (SMP)" software manual *
- "SCHUNK Drive Protocol (SDP)" software manual *

The documents marked with an asterisk (*) can be downloaded on our homepage **[schunk.com](https://www.schunk.com)**

1.1.3 Sizes

This operating manual applies to the following sizes:

- PR 2 - 70
- PR 2 - 90
- PR 2 - 110

1.2 Warranty

If the product is used as intended, the warranty is valid for 24 months from the ex-works delivery date under the following conditions:

- Observe the maximum service life. [Technical data](#) [► 22]
- Observe the ambient conditions and operating conditions, [Environmental and operating conditions](#) [► 10]
- Observe the specified maintenance intervals, [Maintenance](#) [► 66]

Parts touching the workpiece and wear parts are not included in the warranty.

1.3 Scope of delivery

The scope of delivery includes

- Servo-electrically rotary unit PR 2 in the version ordered
- USB cable mini A
- USB cable micro B
- Centering sleeves
- DVD

Contents of DVD:

- "SCHUNK Motion Tool (MTS)" configuration and commissioning tool
- "SCHUNK Motion Tool (MTS)" software manual
- "SCHUNK Motion Protocol (SMP)" software manual
- "SCHUNK Drive Protocol (SDP)" software manual
- "Firmware Updater" tool
- Assembly and operating manual
- USB driver
- Parameter data set

1.4 Accessories

The following accessories, which must be ordered separately, are required for the product:

- Power cable
- Data cable
 - PROFIBUS or CAN bus
- Termination resistor
 - PROFIBUS or CAN bus

A wide range of accessories are available for this product

For information regarding which accessory articles can be used with the corresponding product variants, see catalog data sheet.

2 Basic safety notes

2.1 Appropriate use

The product may only be used for swivelling or turning workpieces or objects.

- The product may only be used within the scope of its technical data, [Technical data](#) [► 22].
- When implementing and operating components in safety-related parts of the control systems, the basic safety principles in accordance with DIN EN ISO 13849-2 apply. The proven safety principles in accordance with DIN EN ISO 13849-2 also apply to categories 1, 2, 3 and 4.
- The product is intended for installation in a machine/system. The applicable guidelines must be observed and complied with.
- The product is intended for industrial and industry-oriented use.
- Appropriate use of the product includes compliance with all instructions in this manual.

2.2 Not intended use

- Any utilization that exceeds or differs from the appropriate use is regarded as misuse.

Inappropriate use includes using the product as a lifting tool, tool guide or drive tool, for example.

2.3 Constructional changes

Implementation of structural changes

By conversions, changes, and reworking, e.g. additional threads, holes, or safety devices can impair the functioning or safety of the product or damage it.

- Structural changes should only be made with the written approval of SCHUNK.

2.4 Spare parts

Use of unauthorized spare parts

Using unauthorized spare parts can endanger personnel and damage the product or cause it to malfunction.

- Use only original spare parts or spares authorized by SCHUNK.

2.5 Environmental and operating conditions

Required ambient conditions and operating conditions

Incorrect ambient and operating conditions can make the product unsafe, leading to the risk of serious injuries, considerable material damage and/or a significant reduction to the product's life span.

- Make sure that the product is a sufficient size for the application.
- Observe maintenance and lubrication intervals, [Maintenance intervals](#) [► 66].
- Make sure that the environment is free from splash water and vapors as well as from abrasion or processing dust. Exceptions are products that are designed especially for contaminated environments.

2.5.1 Electromagnetic compatibility

The product meets the requirements of the EMC act of the inner-European market, among other requirements. The product has passed the EMC test as per the following standards:

Standard	Title
EN 61000-6-2 (2006)	EMC: Generic standard – Interference immunity in industrial environments
EN 61000-6-3 (2011)	EMC: Generic standards - emitted interference for living area, business and commercial areas and small businesses

The product must be installed using interference-free cables and in a way that meets EMC requirements in order to ensure interference-free operation.

Interference variables:

The electromagnetic compatibility with pulse-shaped interference variables has been verified and confirmed according to the following standards:

Standard	Title
EN 61000-4-2 (2008)	Test and measurement procedures - Testing the interference immunity to discharging of static electricity
EN 61000-4-4 (2008)	Test and measurements procedures - Testing the interference immunity to fast transient electric interference variables/burst
EN 61000-4-5 (2014)	Test and measurement procedures - Testing the interference immunity to surge voltages

Sinusoidal interference variables:

The electromagnetic compability with sinusoidal interference variables has been verified and confirmed according to the following standards:

Standard	Title
EN 61000-4-3 (2011)	Test and measurement procedures - Testing the interference immunity to electromagnetic high frequency fields
EN 61000-4-6 (2014)	Test and measurement procedures - interference immunity to conducted interference variables induced by high frequency fields

Emission of radio interference

The emission of radio interference has been verified and confirmed according to the following standards:

Standard	Title
EN 61000-6-3 (2011)	EMC: Generic standards - emitted interference for living area, business and commercial areas and small businesses

The emitted interference of electromagnetic fields (limit class A, group 1, measured with 10 m distance) has been tested according to the following standards:

Standard	Title
EN 55011 (2009)	Industrial, scientific and medical devices - radio interference - limits and measurement procedures

2.5.2 Insulation resistance and voltage resistance in accordance with EN 60204-1

When measuring the insulation resistance and inspecting the voltage resistance of the machine/automated system, observe the following information in order to protect the product from damage:

- The electronics are connected to the housing ground, in order to protect against overvoltage.
- For measurements of the insulation resistance in accordance with EN 60204-1, no voltage levels above the permitted operating voltage range may be used. In addition, the maximum measuring current must be safely limited to values below 10mA.

- Before testing the voltage resistance of the machine/automated system in accordance with EN 60204-1, disconnect the product from the electric circuits to be tested. This applies to all connections on the product:
 - positive and negative connections of the power and logic supply
 - Fieldbus connections
 - USB interface

2.5.3 Ambient conditions

Requirements for transport and storage

The following information applies if the product is transported and stored in the original package.

Mechanical Environmental Conditions Standard: IEC 60721-3-2 (1997-02) Title: Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities, Section 2: Transportation. Class 2M3 applies.

Climatic Environmental Conditions Standard: IEC 60721-3-2 (version 1997-02) Title: Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities, Section 2: Transportation. Class 2K4 applies.

The aforementioned standards result in the following parameters for the essential environmental conditions:

Standard	Title
According to EN 60068-2-1	Test method - test A: cold
According to EN 60068-2-2	Test method - test B: dry heat
EN 60068-2-14	Test method - test N: temperature change
According to IEC 60068-2-32	Tests - Test ed: free fall

Requirements during operation

The following overview shows the permissible environmental conditions for the product.

Mechanical Environmental Conditions Standard: IEC 60721-3-3 (1995-09) Title: Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities, Section 3: Stationary use at weather-protected locations. Class 3M7 applies.

Climatic Environmental Conditions Standard: IEC 60721-3-3 (1995-09) Title: Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities, Section 3: Stationary use at weather-protected locations. Class 3K3 applies

The product has been tested for the essential environmental conditions according to the following standards:

Standard	Title
According to EN 60068-2-1	Test method - test A: cold
According to EN 60068-2-2	Test method - test B: dry heat

The product may only be used in the following locations if additional measures are taken:

- In locations with a high level of ionizing radiation
- In locations with difficult operating conditions, e.g., due to caustic fumes, gases, oils or chemicals
- In facilities requiring special monitoring, e.g., in particularly at-risk areas

The product must also not be used in potentially explosive zones. If the product is subjected to unacceptably large impacts or vibrations, suitable measures must be taken to reduce the amplitude or acceleration of such disturbances. Vibration-damping or vibration-absorbing systems are to be used in such cases.

Tests with regard to ambient conditions

Tests with regard to mechanical environmental conditions

The electronics integrated in the product has been tested with respect to mechanical environmental conditions according to the following standards:

Standard	Title
EN 60068-2-6 (2008-10)	Test procedure - test Fc: swinging (sinusoidal)
EN 60068-2-27 (2010-02)	Test procedure - test Ea and guideline: shocking

2.6 Personnel qualification

Inadequate qualifications of the personnel

If the personnel working with the product is not sufficiently qualified, the result may be serious injuries and significant property damage.

- All work may only be performed by qualified personnel.
- Before working with the product, the personnel must have read and understood the complete assembly and operating manual.
- Observe the national safety regulations and rules and general safety instructions.

The following personal qualifications are necessary for the various activities related to the product:

Trained electrician

Due to their technical training, knowledge and experience, trained electricians are able to work on electrical systems, recognize and avoid possible dangers and know the relevant standards and regulations.

Qualified personnel

Due to its technical training, knowledge and experience, qualified personnel is able to perform the delegated tasks, recognize and avoid possible dangers and knows the relevant standards and regulations.

Instructed person

Instructed persons were instructed by the operator about the delegated tasks and possible dangers due to improper behaviour.

Service personnel of the manufacturer

Due to its technical training, knowledge and experience, service personnel of the manufacturer is able to perform the delegated tasks and to recognize and avoid possible dangers.

2.7 Personal protective equipment

Use of personal protective equipment

Personal protective equipment serves to protect staff against danger which may interfere with their health or safety at work.

- When working on and with the product, observe the occupational health and safety regulations and wear the required personal protective equipment.
- Observe the valid safety and accident prevention regulations.
- Wear protective gloves to guard against sharp edges and corners or rough surfaces.
- Wear heat-resistant protective gloves when handling hot surfaces.
- Wear protective gloves and safety goggles when handling hazardous substances.
- Wear close-fitting protective clothing and also wear long hair in a hairnet when dealing with moving components.

2.8 Notes on safe operation

Incorrect handling of the personnel

Incorrect handling and assembly may impair the product's safety and cause serious injuries and considerable material damage.

- Avoid any manner of working that may interfere with the function and operational safety of the product.
- Use the product as intended.
- Observe the safety notes and assembly instructions.
- Do not expose the product to any corrosive media. This does not apply to products that are designed for special environments.
- Eliminate any malfunction immediately.
- Observe the care and maintenance instructions.
- Observe the current safety, accident prevention and environmental protection regulations regarding the product's application field.

2.9 Transport

Handling during transport

Incorrect handling during transport may impair the product's safety and cause serious injuries and considerable material damage.

- When handling heavy weights, use lifting equipment to lift the product and transport it by appropriate means.
- Secure the product against falling during transportation and handling.
- Stand clear of suspended loads.

2.10 Malfunctions

Behavior in case of malfunctions

- Immediately remove the product from operation and report the malfunction to the responsible departments/persons.
- Order appropriately trained personnel to rectify the malfunction.
- Do not recommission the product until the malfunction has been rectified.
- Test the product after a malfunction to establish whether it still functions properly and no increased risks have arisen.

2.11 Disposal

Handling of disposal

The incorrect handling of disposal may impair the product's safety and cause serious injuries as well as considerable material and environmental harm.

- Follow local regulations on dispatching product components for recycling or proper disposal.

2.12 Fundamental dangers

General

- Observe safety distances.
- Never deactivate safety devices.
- Before commissioning the product, take appropriate protective measures to secure the danger zone.
- Disconnect power sources before installation, modification, maintenance, or calibration. Ensure that no residual energy remains in the system.
- If the energy supply is connected, do not move any parts by hand.
- Do not reach into the open mechanism or movement area of the product during operation.

2.12.1 Protection during handling and assembly

Incorrect handling and assembly

Incorrect handling and assembly may impair the product's safety and cause serious injuries and considerable material damage.

- Have all work carried out by appropriately qualified personnel.
- For all work, secure the product against accidental operation.
- Observe the relevant accident prevention rules.
- Use suitable assembly and transport equipment and take precautions to prevent jamming and crushing.

Incorrect lifting of loads

Falling loads may cause serious injuries and even death.

- Stand clear of suspended loads and do not step into their swiveling range.
- Never move loads without supervision.
- Do not leave suspended loads unattended.

2.12.2 Protection during commissioning and operation

Falling or violently ejected components

Falling and violently ejected components can cause serious injuries and even death.

- Take appropriate protective measures to secure the danger zone.
- Never step into the danger zone during operation.

2.12.3 Protection against dangerous movements

Unexpected movements

Residual energy in the system may cause serious injuries while working with the product.

- Switch off the energy supply, ensure that no residual energy remains and secure against inadvertent reactivation.
- The faulty actuation of connected drives may cause dangerous movements.
- Operating mistakes, faulty parameterization during commissioning or software errors may trigger dangerous movements.
- Never rely solely on the response of the monitoring function to avert danger. Until the installed monitors become effective, it must be assumed that the drive movement is faulty, with its action being dependent on the control unit and the current operating condition of the drive. Perform maintenance work, modifications, and attachments outside the danger zone defined by the movement range.

- To avoid accidents and/or material damage, human access to the movement range of the machine must be restricted. Limit/prevent accidental access for people in this area due through technical safety measures. The protective cover and protective fence must be rigid enough to withstand the maximum possible movement energy. EMERGENCY STOP switches must be easily and quickly accessible. Before starting up the machine or automated system, check that the EMERGENCY STOP system is working. Prevent operation of the machine if this protective equipment does not function correctly.

2.12.4 Protection against electric shock

Work on electrical equipment

Touching live parts may result in death.

- Work on the electrical equipment may only be carried out by qualified electricians in accordance with the electrical engineering regulations.
- Lay electrical cables properly, e. g. in a cable duct or a cable bridge. Observe standards.
- Before connecting or disconnecting electrical cables, switch off the power supply and check that the cables are free of voltage. Secure the power supply against being switched on again.
- Before switching on the product, check that the protective earth conductor is correctly attached to all electrical components according to the wiring diagram.
- Check whether covers and protective devices are fitted to prevent contact with live components.
- Do not touch the product's terminals when the power supply is switched on.

Possible electrostatic energy

Components or assembly groups may become electrostatically charged. When the electrostatic charge is touched, the discharge may trigger a shock reaction leading to injuries.

- The operator must ensure that all components and assembly groups are included in the local potential equalisation in accordance with the applicable regulations.
- While paying attention to the actual conditions of the working environment, the potential equalisation must be implemented by a specialist electrician according to the applicable regulations.
- The effectiveness of the potential equalisation must be verified by executing regular safety measurements.

2.12.5 Protection against magnetic and electromagnetic fields

Work in areas with magnetic and electromagnetic fields

Magnetic and electromagnetic fields can lead to serious injuries.

- Persons with pace-makers, metal implants, metal shards, or hearing aids require the consent of a physician before entering areas in which components of the electric drive and control systems are mounted, started up, and operated.
- Persons with pace-makers, metal implants, metal shards, or hearing aids require the consent of a physician before entering areas in which magnetic grippers or motor parts with permanent magnets are stored, repaired, or assembled.
- Do not operate high-frequency or radio devices in the proximity of electric components of the drive system and their feed lines.

If the use of such devices is necessary:

When starting up the electric drive and control system, check the machine or automated system for possible failures when such systems are used at different intervals and in different states of the control system. A special additional EMC test may be necessary if the system has a high risk potential.

2.13 Notes on particular risks



DANGER

Danger from electric voltage!

Touching live parts may result in death.

- Switch off the power supply before any assembly, adjustment or maintenance work and secure against being switched on again.
- Only qualified electricians may perform electrical installations.
- Check if de-energized, ground it and hot-wire.
- Cover live parts.



DANGER

Risk of fatal injury from suspended loads!

Falling loads can cause serious injuries and even death.

- Stand clear of suspended loads and do not step within their swiveling range.
- Never move loads without supervision.
- Do not leave suspended loads unattended.
- Wear suitable protective equipment.



WARNING

Risk of injury from objects falling and being ejected!

Falling and ejected objects during operation can lead to serious injury or death.

- Take appropriate protective measures to secure the danger zone.



WARNING

Risk of injury due to unexpected movements!

If the power supply is switched on or residual energy remains in the system, components can move unexpectedly and cause serious injuries.

- Before starting any work on the product: Switch off the power supply and secure against restarting.
- Ensure that no residual energy remains in the system.

**⚠ WARNING****Risk of injury from sharp edges and corners!**

Sharp edges and corners can cause cuts.

- Use suitable protective equipment.

**⚠ WARNING****Risk of burns through contact with hot surfaces!**

The product can heat up considerably during operation. Touching hot surfaces can cause burns.

- Do not touch hot surfaces.
- Let them cool down before working on the product.
- Wear appropriate safety equipment.

**⚠ WARNING****Risk of injury from objects falling during energy supply failure!**

Electronic devices are not fail-safe. In case of an energy supply failure, the gripping force decreases. As a consequence, it cannot be guaranteed that the workpiece is held safely.

- In case of an energy supply failure, it is the user's responsibility to revert the drive into a safe state.

3 Technical data

3.1 Basic data

Designation	PR 2		
	70	90	110
Mechanical operating data			
Weight [kg]	1.9	3.7	6.4
Noise emission [dB(A)]	≤ 70		
IP rating*	40		
Ambient temperature [°C]			
Min.	+ 5		
Max.	+ 50		
Electronic control unit (logic)			
Nominal voltage [VDC]	24 ± 10%		
Nominal power current [A]	0.5		
Fuse logic supply			
Value [A]	1A, Träge		
Interface			
CAN bus [up to 1 MBit/s]	x	x	x
PROFIBUS [12 MBit/s]	x	x	x
USB Mini AB, Device	x	x	x
USB Micro AB, Host	x	x	x
Note: a product is supplied either with CAN or with PROFIBUS.			
Holding brake			
Operation principle	magnetic, low active		
Actuation	automatic, parameterizable		

- * For use in dirty ambient conditions (e.g. sprayed water, vapors, abrasion or processing dust) SCHUNK offers corresponding product options as standard. SCHUNK also offers customized solutions for special applications in dirty ambient conditions.

More technical data is included in the catalog data sheet.
Whichever is the latest version.

Warranty

Size	PR 2		
	70	90	110
Warranty duration [months]	24		
or maximum cycles [piece]	2.5 millions		

3.2 Electrical operating data

3.2.1 Nominal operating mode

Designation	PR 2		
	70	90	110
Power connection, nominal operating mode			
Nominal voltage [VDC] (stabilized and smoothed) **	24 ± 10%		
Nominal current [A_{eff}]	5.0	13.0 *	12.0
Peak current [A_p]	7.5	20.0	18.0

*) Due to the internal fuse, no effective value of the measured current (effective values for time ranges > 0.5 s) may be above 13 A_{eff} in the application!

**) The product has an internal polarity protection diode. This is connected in parallel to the supply connections. So if a supply voltage is created with incorrect polarity, extremely high short-circuit currents may flow, which might cause the internal fuse to respond. Therefore, operation is only permitted with an external fuse protection in accordance with the recommendation in the following table.

Recommended data for power supply and fusing

Designation	PR 2		
	70	90	110
Power supply and fusing, nominal operating mode			
Output voltage [V DC]	24 ± 10%		
Output current [A DC]	7.5	20.0	18.0
Fusing [A_{eff}]	5.0 *	13.0 *	12.0 *

*) Time-delay feature of the fuse required; motor protective circuits with combined peak and bi-metal triggering are advantageous here.

If the module protection is integrated directly on the product and/or the supply is executed from a 24V bus, the following must be observed:

- For power supply units with a short-circuit current larger than 10 A and cable cross-sections from 1.5 mm² or a short-circuit current larger than 15 A and cable cross-sections from 2.5 mm². A fusing depending on cable quality, installation type, ambient temperature and expected short-circuit current is mandatory for adequate cable protection.

- If the fusing of the cable is below the effective current input of the product in the application, the next largest cable cross-section must be selected and the design calculation of the network restarted.
- No self-resetting fuse elements may be used for module/cable protection.
- It is not permitted to operate the product with a cable cross-section smaller than 1.5 mm².

3.2.2 Overload operating mode

Designation	PR 2		
	70	90	110
Power connection, overload operating mode (overload duration <250 ms, minimal overload repeating time 10 s)			
Nominal voltage [VDC] ***	24 -0% / +10% **		
Overload current [A_{eff}]	10.5	13.0	13.0
Peak current [A_p]	16.0 *	23.0 *	22.0 *

*) The overload duration of the peak currents must be restricted to <250 ms at all times. The minimum cycle duration up to the repeating of the overload power may not exceed 10 s. In the remaining cycle, the nominal values of the product may not be exceeded again.

**) In overload operation, the supply voltage on the product may not fall below 24 V DC.

***) With respect to fusing, the values from the following table apply.

Recommended data for power supply and fusing

Designation	PR 2		
	70	90	110
Power supply and fusing, overload operating mode			
Output voltage [VDC]	24 -0% / +10% **		
Output current [A DC]	16.0	23.0	22.0
Fusing [A_{eff}]	10.5 *	13.0 *	13.0 *

*) Time-delay feature of the fuse required; motor protective circuits with combined peak and bi-metal triggering are advantageous here.

**) In overload operation, the supply voltage on the product may not fall below 24 V DC.

If the module protection is integrated directly on the product and/or the supply is executed from a 24V bus, the following must be observed:

- For power supply units with a short-circuit current larger than 10 A and cable cross-sections from 1.5 mm² or a short-circuit current larger than 15 A and cable cross-sections from 2.5 mm². A fusing depending on cable quality, installation type, ambient temperature and expected short-circuit current is mandatory for adequate cable protection.
- If the fusing of the cable is below the effective current input of the product in the application, the next largest cable cross-section must be selected and the design calculation of the network restarted.
- No self-resetting fuse elements may be used for module/cable protection.
- It is not permitted to operate the product with a cable cross-section smaller than 1.5 mm².

3.2.3 Recommended cable lengths for all operating modes

Designation	PR 2		
	70	90	110
Cable cross-section 1.5 mm²			
Cable length [m]	14.0	8.0	6.0
Cable cross-section 2.5 mm²			
Cable length [m]	22.0	14.0	9.0

3.3 Power supply requirements

NOTE

If the product is operated during a position run at high speed, acceleration and jerk values, then voltage peaks in the power supply may occur when delaying/braking due to the engine recovering. The terminal voltage of the power supply can increase via the output voltage of the power supply unit.

The power supply unit used for the power needs to be able to handle this overvoltage and must not switch off its output voltage. Otherwise, the product, for example, will stop with the error message "ERROR_Motor_Voltage_LOW!" or "ERROR_Motor_Voltage_High" which must be acknowledged.

Supply of the logic and power are to be separate. For this reason, it is recommended that the product be connected in the following way:

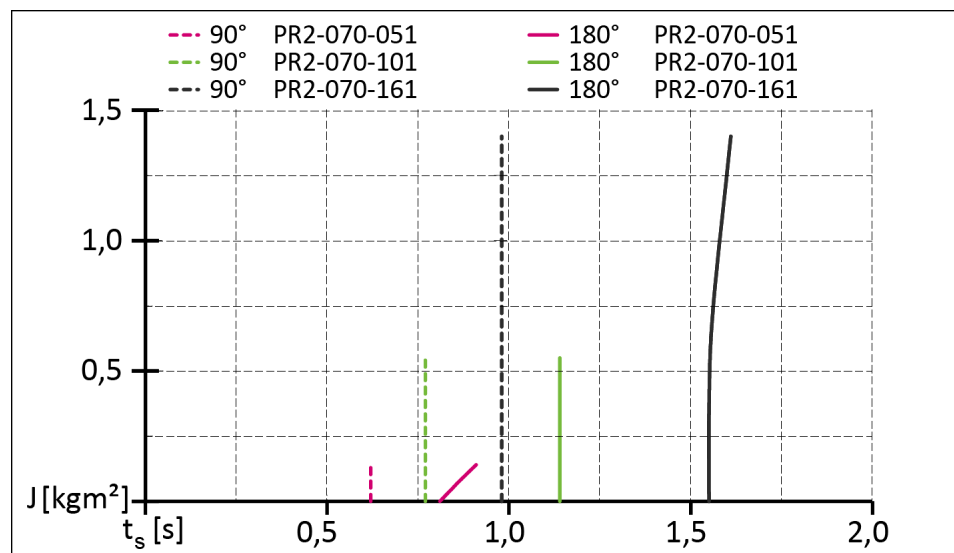
- Connection of the logic supply of the product to a 24V power supply unit.
- Connection of the power supply of the product to a transformer power supply unit or to a switching power supply unit.

3.4 Diagrams

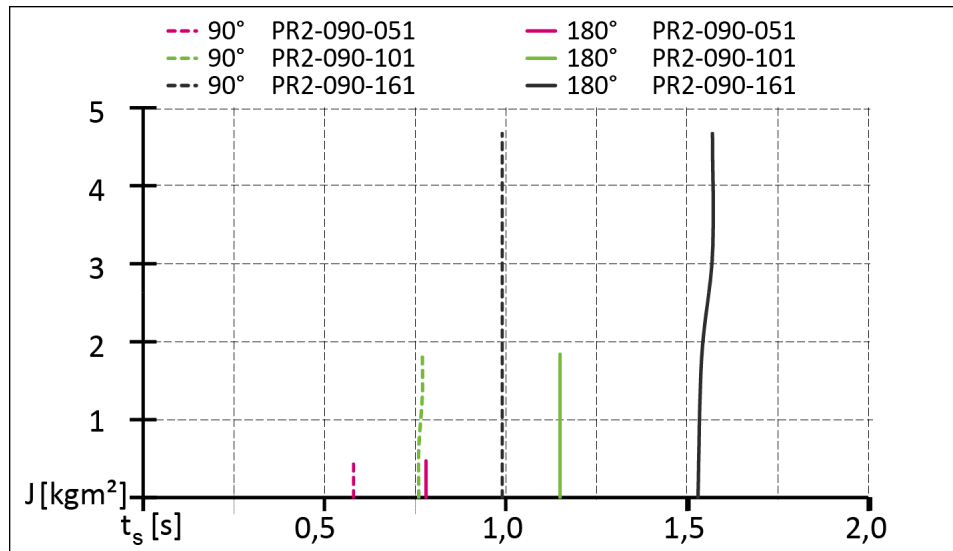
Swiveling time

The swivel time diagram shows swivel times according to the mass moment of inertia.

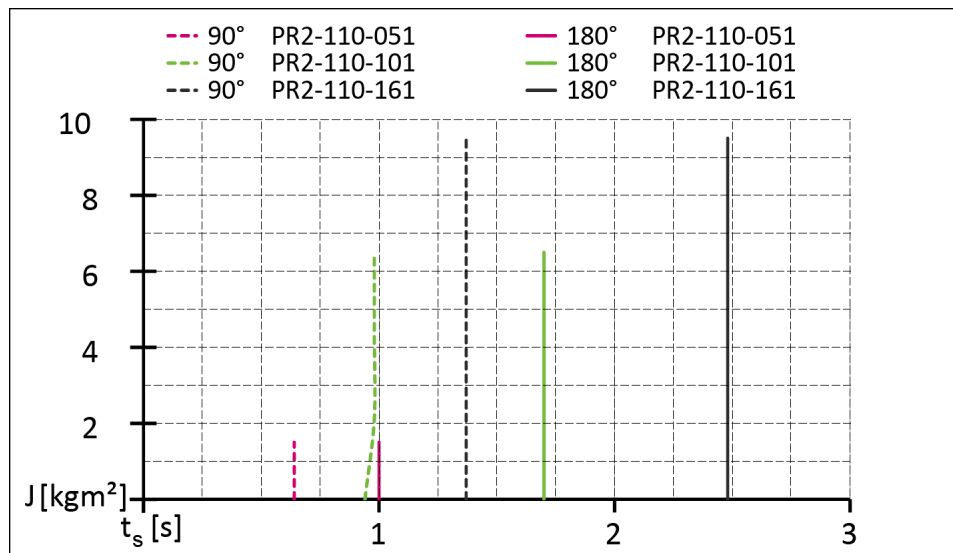
The diagrams are only valid for applications with vertical swivel axes or horizontal swivel axes with even mass distribution and without the effects of gravity.



Swivel time diagram PR 2-070



Swivel time diagram PR 2-090



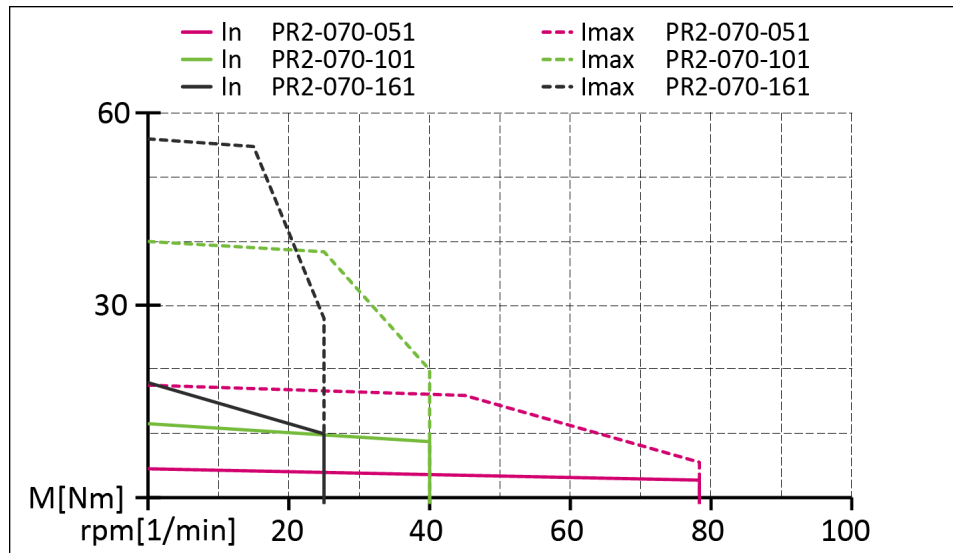
Swivel time diagram PR 2-110

Torque

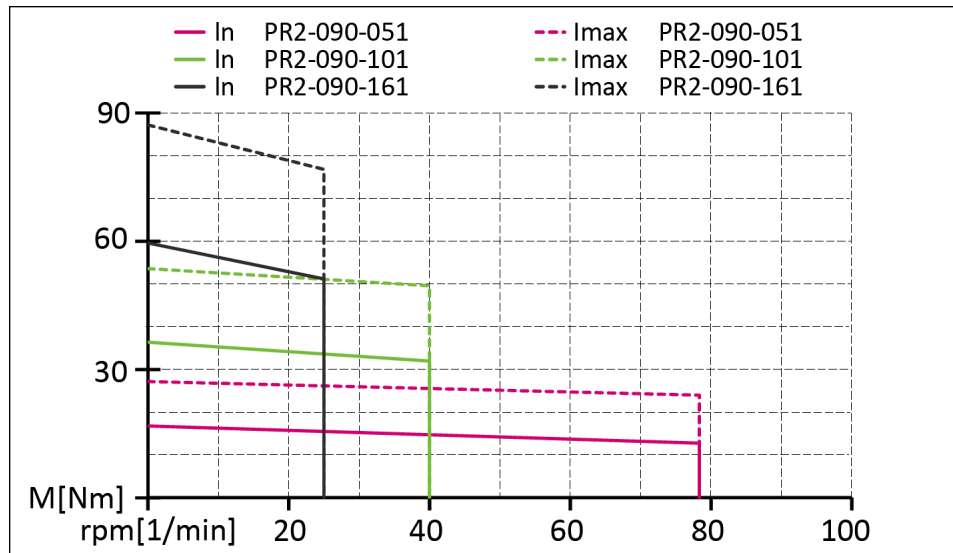
The peak torques serve as short-term drive reserves when accelerating and delaying.

The values were determined under the following conditions:

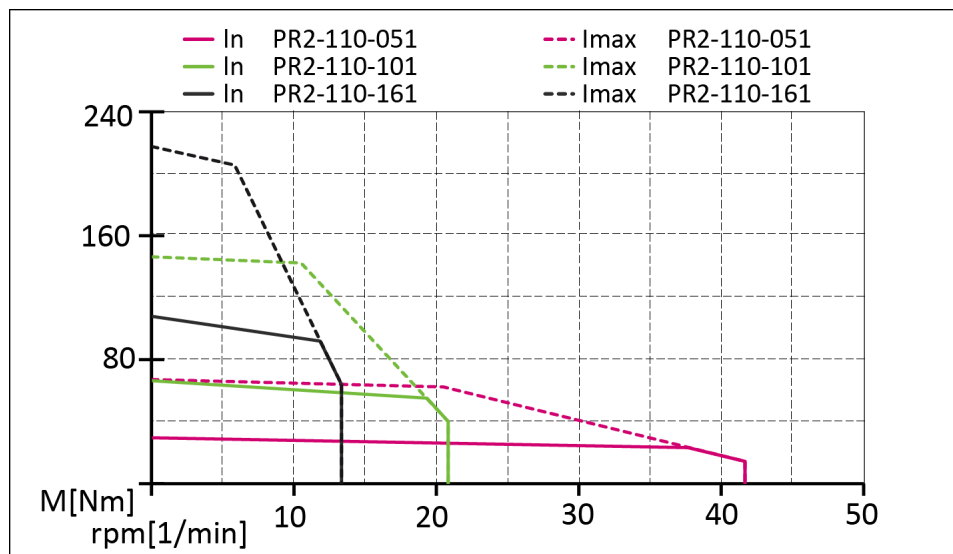
- Outside temperature 25°C
- After suitable warm-up period, product to operating temperature internally



Torque characteristic PR 2-070



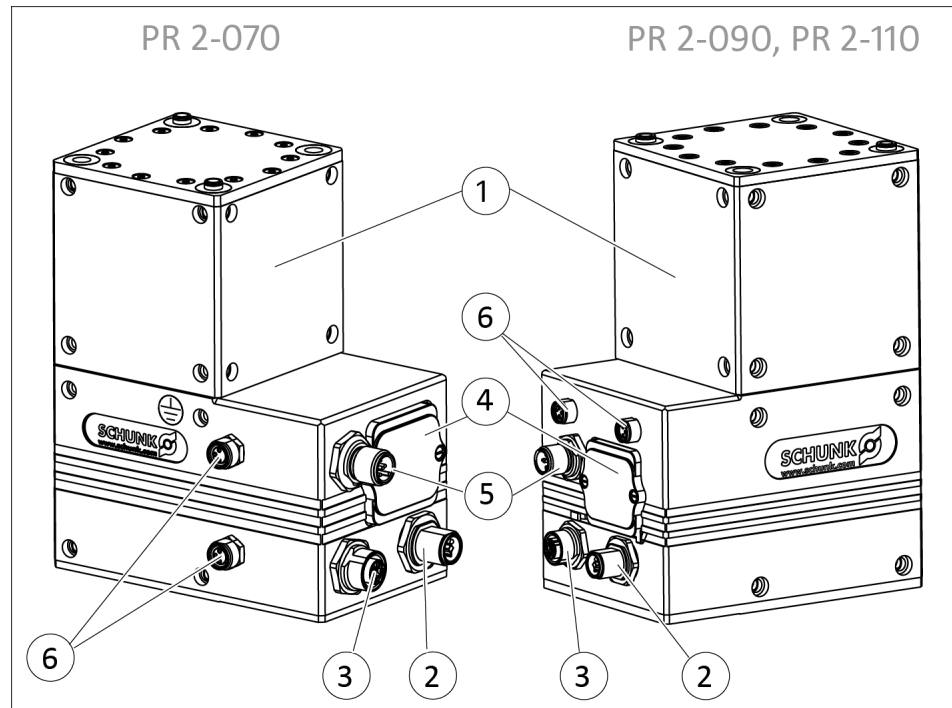
Torque characteristic PR 2-090



Torque characteristic PR 2-110

4 Design and description

4.1 Design



PR 2 Servo electric drive

1	Housing
2	Power supply plug
3	CAN bus or PROFIBUS socket
4	Service window
5	CAN bus or PROFIBUS plug
6	Digital input

4.2 Description

The product is a modular and compact servo-electric swivel unit with integrated electronics.

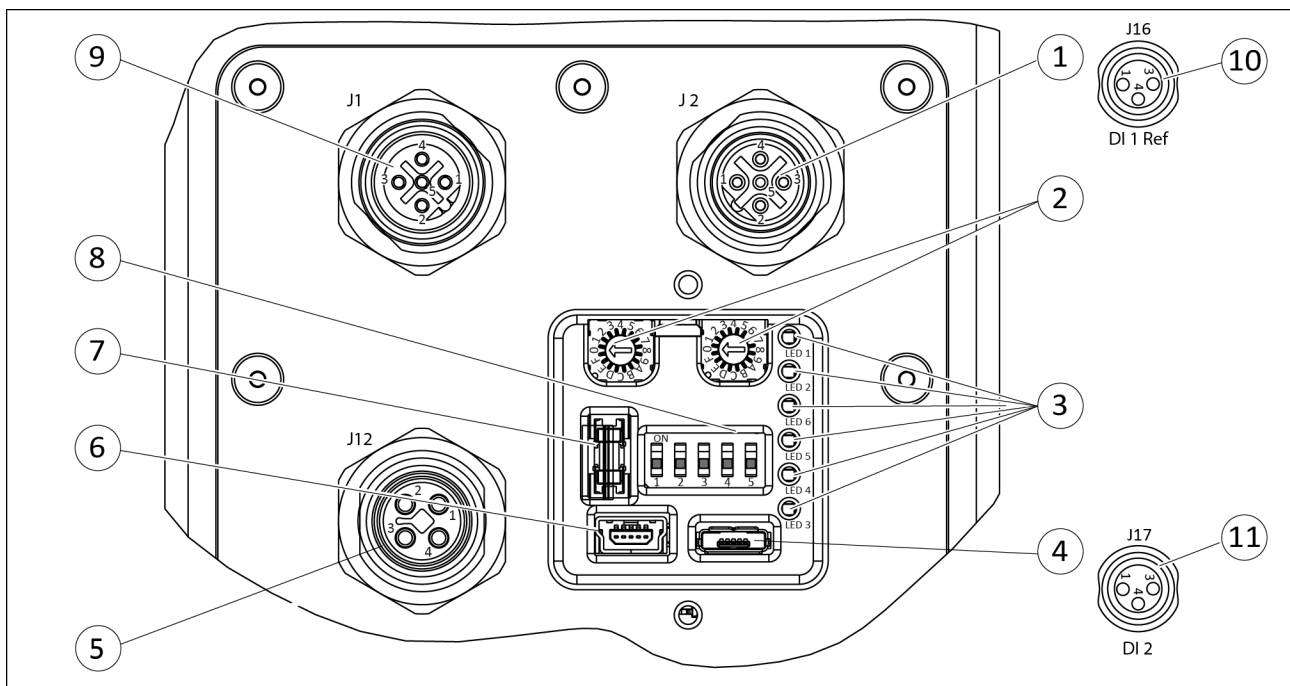
Depending on the bus system, various address ranges and communication protocols are available:

	Address range	Communication protocol
Profibus	0-127	SDP* / SMP
CAN bus	0-255	SMP

*) recommended by SCHUNK

All possible parameters and the special features of each communication interface (of the individual bus systems) are described in the "SCHUNK Motion Protocol (SMP)" and "SCHUNK Drive Protocol (SDP)" software manuals.

4.3 Interfaces and service windows



Interfaces and service windows

Item	Designation		Function
1	J2	CAN bus or PROFIBUS plug	Inlet communication
2	S1/S2	Rotary encoding switch	Address configuration for CAN bus or PROFIBUS
3	LED1-6	LED	Status display and error analysis
4	X2*	USB Micro AB, host	Firmware update via USB flash drive
5	J12	Power supply plug	Logic and power supply
6	X1*	USB Mini AB, device, parameterized interface	Service interface, parameterization and firmware update via computer
7	F2	Logic supply fuse	Protection for logic supply, 1 A, time delay
8	SW 1	DIP switch	Testing and commissioning functions, adjustment of the baud rate for CAN bus
9	J1	CAN bus or PROFIBUS socket	Communication outlet or termination resistor
10	J16	Digital input connector	DI1 Ref: Reference switch OR: Freely assignable auxiliary input for non-time-critical applications
11	J17	Digital input connector	DI 2: Freely assignable auxiliary input for non-time-critical applications

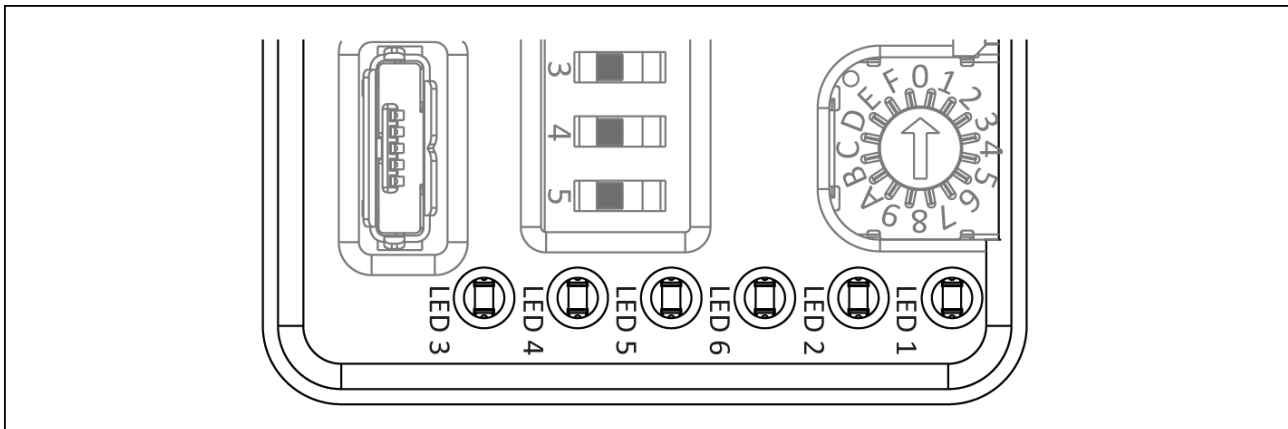
*) Do not load the USB interface laterally as doing so may damage it.

If a device is connected to one or both USB interfaces, the respective bus connection will not function even if a bus cable is connected.

In the following cases, communication via the bus connection is not possible:

- If a USB device is connected to the interface USB mini AB, device.
- When connecting the USB stick to the interface USB micro AB, host and when the DIP switch 1 is "ON".

4.3.1 LED

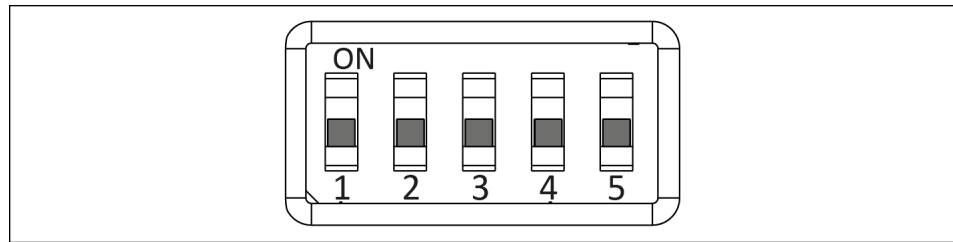


LED, PROFIBUS and CAN bus variant

LED	Designation	Color	Function
1	Supply power	green	Indicates whether the power supply is connected. <ul style="list-style-type: none"> • Lights up when the power supply for the product is connected.
2	Logic supply	green	Indicates whether the logic voltage is connected. <ul style="list-style-type: none"> • Lights up when the power supply for the product is connected.
3	Module status	yellow	Indicates the operating condition of the product. <ul style="list-style-type: none"> • Lights up if the product is ready for operation. • Does not light up if there is an error. • Does not light up if there is a warning. • Lights up if there is an info message. • Flashes if the hardware is not recognized or if the status of the software is undefined (alternating with "module error" LED). • Flashes if a firmware update is being installed via USB Micro AB, host (CAN bus communication interface). • Lights up if a firmware update is being installed via USB Micro AB, host (PROFIBUS communication interface).

LED	Designation	Color	Function
4	Module error	red	<p>Indicates if there is an error; see "SCHUNK Motion Protocol (SMP)" and "SCHUNK Drive Protocol (SDP)" software manuals.</p> <ul style="list-style-type: none"> • Lights up if there is an error. • Does not light up if the product is ready for operation. • Flashes if there is a warning. • Flashes briefly if there is an info message (on/off about 5 times). • Flashes if the hardware is not recognized or if the status of the software is undefined (alternating with "module status" LED). • Lights up (approximately 1 second) and goes out before the logic board is updated during a firmware update via USB Micro AB, host. Flashes when the logic board is updating. Lights up when the adapter board is being updated and goes out when the update is finished.
5	PROFIBUS or CAN bus operation	yellow	<p>Indicates whether there is communication.</p> <ul style="list-style-type: none"> • Lights up if there is communication via CAN bus. Flashes briefly with each change of direction (on/off about 2 times). • Lights up if there is communication via PROFIBUS. • Does not light up if communication via PROFIBUS or CAN bus is interrupted.
6	PROFIBUS or CAN bus off state	red	<p>Indicates whether communication has been interrupted.</p> <ul style="list-style-type: none"> • Lights up if communication via PROFIBUS or CAN bus has been interrupted. • Does not light up if there is communication via PROFIBUS or CAN bus.

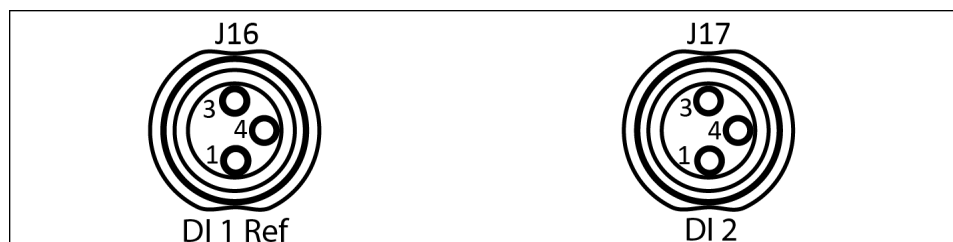
4.3.2 DIP switch



DIP switch

Item	Designation	Function
1	Enable USB host	Enable USB host for firmware update, Update via USB Micro AB, host [► 59]
2	Test 1	Perform quick test on the product, Perform quick test [► 56]
3	Test 2	Perform quick test on the product, Perform quick test [► 56]
4	CAN baud rate 1	Set baud rate for CAN bus, baud rate link [► 43]
5	CAN baud rate 2	Set baud rate for CAN bus, baud rate link [► 43]

4.3.3 Digital input "DI 1 ref"



Digital Inputs

Alternatively to the internal reference switch, the digital input "DI 1 Ref" can be used for referencing.

In this case, the "eReferenceType" parameter is set either to "External switch IN1 left" or "External switch IN1 right", see "SCHUNK Motion Protocol (SMP)" and "SCHUNK Drive Protocol (SDP)" software manuals.

5 Assembly and settings

5.1 Assembling and connecting



DANGER

Danger from electric voltage!

Touching live parts may result in death.

- Switch off the power supply before any assembly, adjustment or maintenance work and secure against being switched on again.
- Only qualified electricians may perform electrical installations.
- Check if de-energized, ground it and hot-wire.
- Cover live parts.



WARNING

Risk of injury due to unexpected movements!

If the power supply is switched on or residual energy remains in the system, components can move unexpectedly and cause serious injuries.

- Before starting any work on the product: Switch off the power supply and secure against restarting.
- Ensure that no residual energy remains in the system.

NOTE

Mount the product so that sufficient heat dissipation is guaranteed. A temperature malfunction may occur if the product reaches excessively high temperatures.

Overview

- Check the evenness of the mounting surface, [Mechanical connection](#) [► 35].
- Screw the product to the machine/system, [Mechanical connection](#) [► 35].
 - ✓ Use suitable connecting elements (adapter plates) if necessary.
 - ✓ Observe the permissible depth of engagement.
 - ✓ Observe the tightening torque for the mounting screws.
- Connect the ground cable between the product and the machine/system, [Connecting ground cable](#) [► 42].
- Plug the cable for the CAN bus into the plug and screw it in tight.
OR: Plug the cable for the PROFIBUS into the plug and screw it in tight.

- If applicable: connect multiple products to each other, [Combining multiple products](#) [► 43].
- On the last product, plug the termination resistor into the socket.
- Set the baud rate, [Setting the baud rate \(CAN bus\)](#) [► 43].
- Use the rotary encoder switch to set the address of the CAN bus or PROFIBUS, [Configuring PROFIBUS or CAN bus](#) [► 44].
- Plug the power supply cable into plug and screw it in tight.
 - ✓ "Power supply" LED lights up green.
 - ✓ "Logic supply" LED lights up green.
 - ✓ "Module status" LED flashes yellow.
 - ✓ "Module error" LED does not light up.
- If necessary, insert the cable for digital input into the socket and screw it in tight.

5.2 Connections

5.2.1 Mechanical connection

Evenness of the mounting surface

The values apply to the whole mounting surface to which the product is mounted.

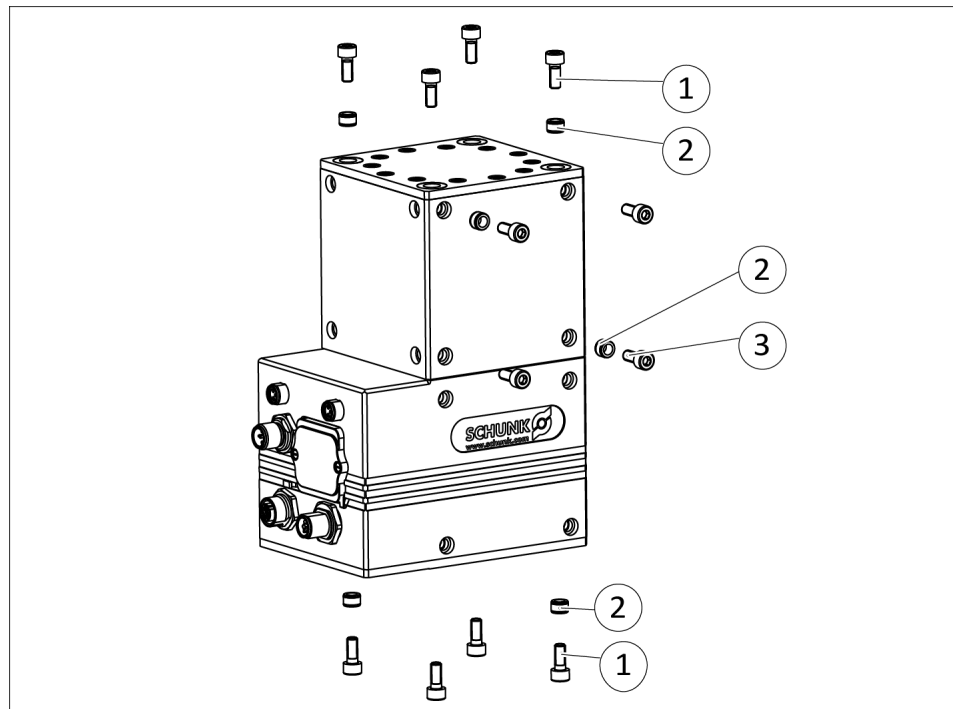
Requirements for evenness of the mounting surface (Dimensions in mm)

Edge length	Permissible unevenness
< 100	< 0.02
> 100	< 0.05

Connections on the product

The product can be assembled from the top, bottom and laterally. Choose the installation position of the product in such a way that cables are not damaged or cannot wrap around the product when swiveling.

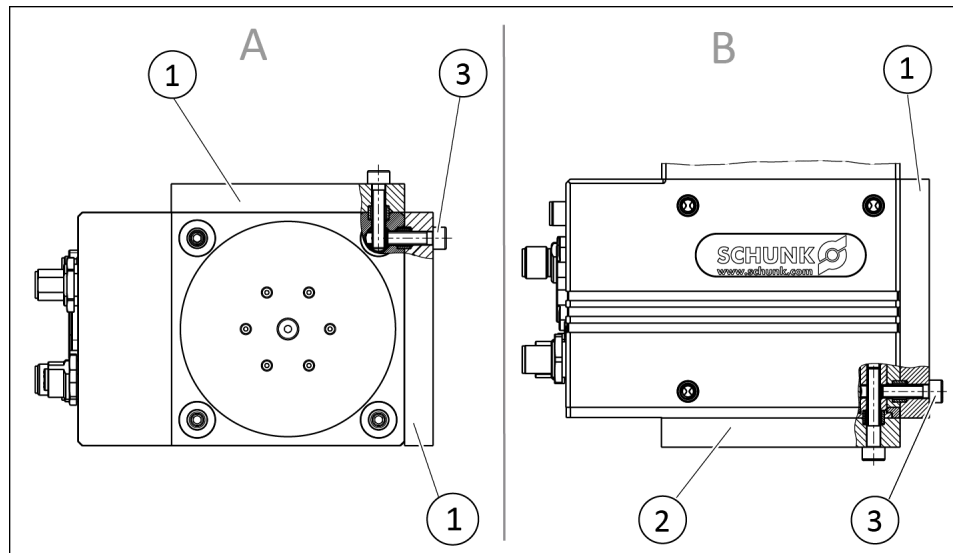
When selecting the fastening screws, observe the values prescribed by SCHUNK, see following table.



Assembly options

Item	Designation	PR 2		
		70	90	110
Mounting from top / bottom				
1	Mounting screw	M4	M5	M6
	Minimum depth of engagement [mm]	14	18	19
	Maximum depth of engagement [mm]	16	21	30
	Mounting screws as per standard	DIN EN ISO 4762 Max. strength class 8.8		
	Tightening torque [Nm]	3.1	6.1	10
2	Centering sleeve [mm]	Ø6	Ø8	Ø8
Side mounting				
3	Mounting screw	M4	M5	M5
	Minimum depth of engagement [mm]	6	8	8
	Maximum depth of engagement [mm]	10.5	14	15.5
	Mounting screws as per standard	DIN EN ISO 4762 Max. strength class 8.8		
	Tightening torque [Nm]	3.1	6.1	10
2	Centering sleeve [mm]	Ø6	Ø8	Ø8

Transverse mounting



Transverse mounting

Please note the following for transverse mounting:

- Transverse mounting - twice laterally (A)
 - The first mounting screw to be screwed in has the standard depth of engagement.
 - The second mounting screw, which is screwed in, has a lower depth of engagement, see the following table.
- Transverse mounting from top/bottom and laterally (B)
 - The mounting screw at the top or bottom has the standard depth of engagement.
 - The lateral mounting screw has a lower depth of engagement, see the following table.

NOTICE

Damage to property may result from an incorrect depth of engagement for transverse mounting!

If the product is mounted laterally and from the top / bottom (transverse mounting) the mounting screws could collide.

- Observe the lowered depth of engagement.

Item	Designation	PR 2		
		70	90	110
1	Lateral adapter plate			
2	Lower adapter plate			
3	Mounting screws			
	Lowered depth of engagement [mm]	5	7	6.5

5.2.2 Electrical connection

NOTICE

Risk of damage to the electronics!

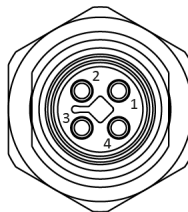
A faulty connection can cause damage to the internal electronics.

- The supply network must be a network of type "PELV" for power and logic.
 - Observe the PIN assignment of the connecting terminals.
 - Make sure that all components are grounded correctly.
-

5.2.2.1 Pin allocation

Power supply

The power is supplied via an M12 plug. The plug is T-coded.



Pin allocation for power supply plug

1	Logic+	3	GND
2	GND	4	Power+

Profibus and CAN bus

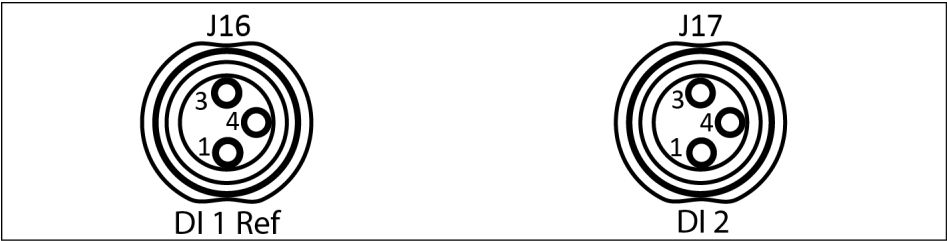
Profibus and CAN bus are connected via an M12 plug and an M12 socket. The plug and socket of the Profibus are B-coded. The plug and socket of the CAN bus are A-coded.



PIN allocation of socket and plug for Profibus oder CAN bus

Profibus			
1	+5V bus	4	PB-B
2	PB-A	5	–
3	PB-GND		
CAN bus			
1	FE	4	CAN-H
2	–	5	CAN-L
3	GND-CAN		

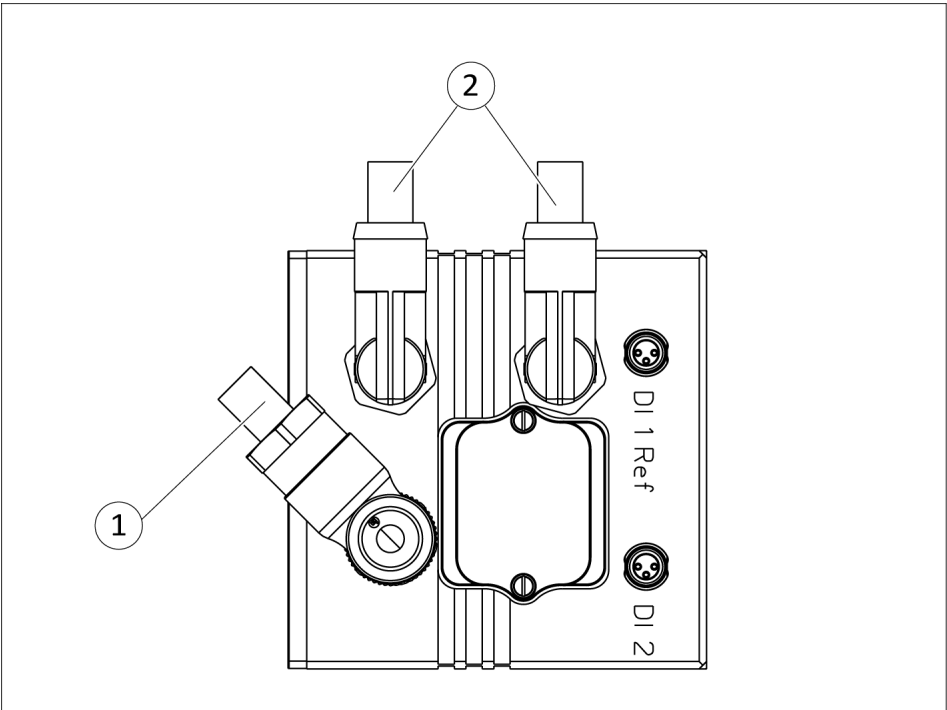
Digital input



Digital input plug PIN allocation

1	+24V	3	GND
2	-	4	Signal

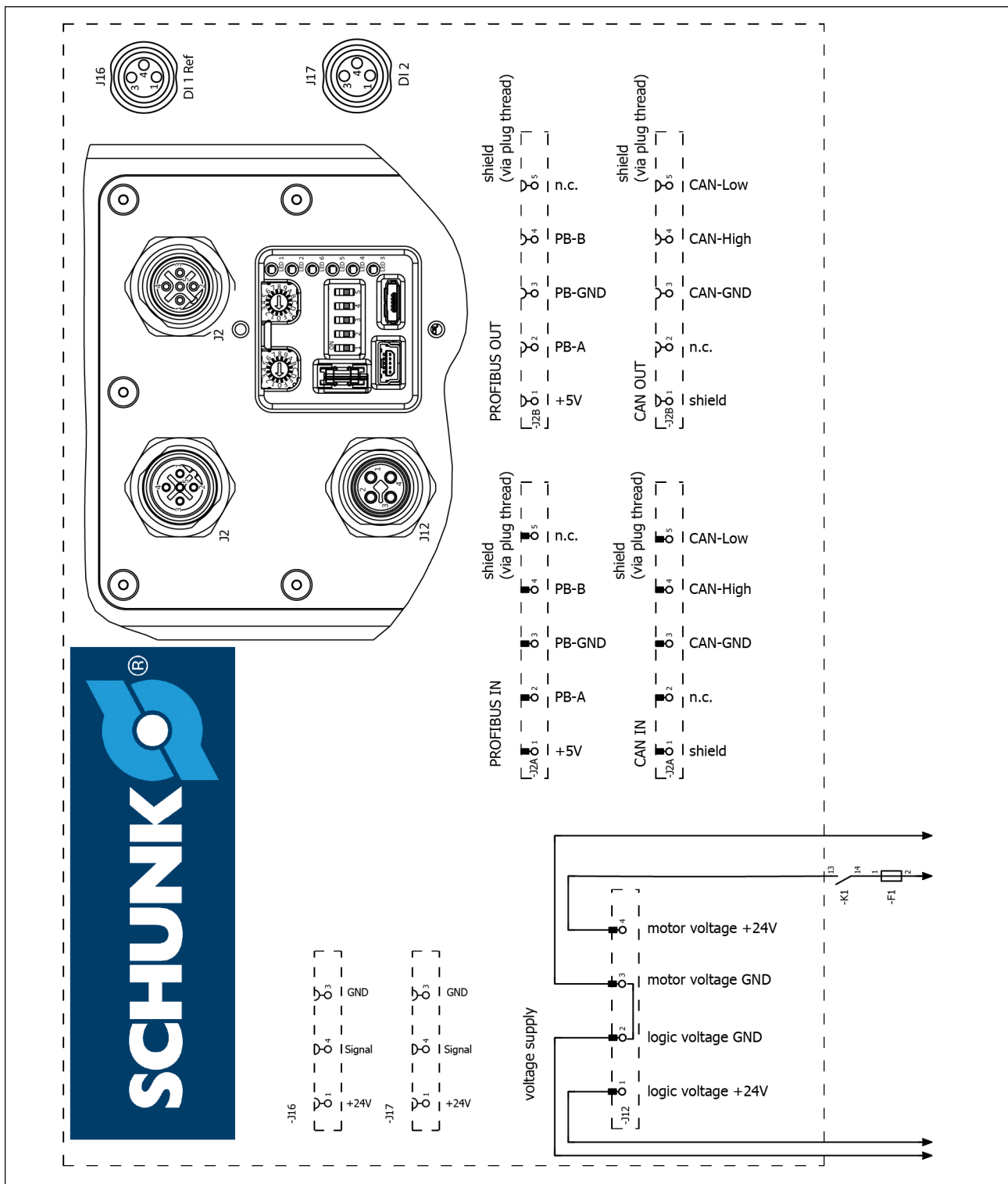
5.2.2.2 Cable connections



Cable outlets

1	Power supply cable
2	Cable communication (CAN bus or Profibus)

5.2.2.3 Wiring diagram

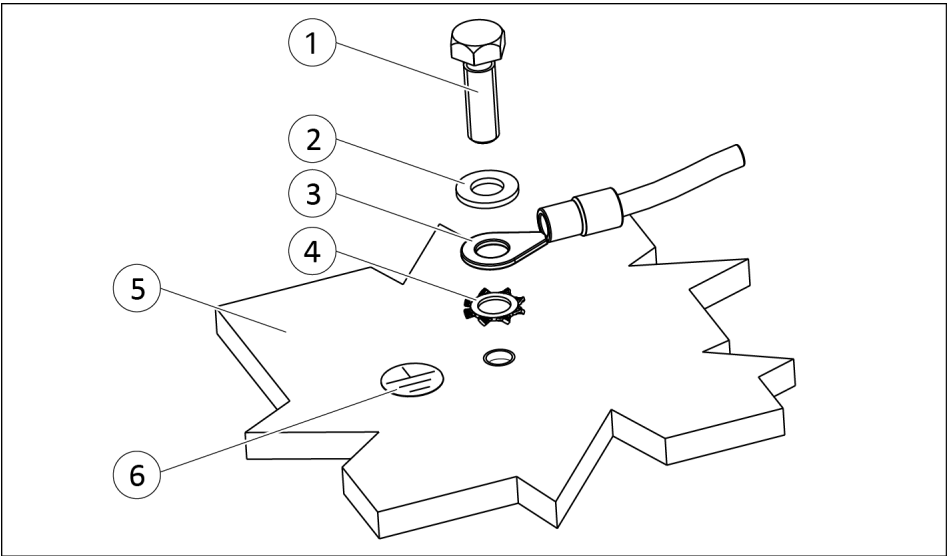


Wiring diagram

5.2.2.4 External protection

The power circuit of the PR 2 needs to be protected by a fuse provided by the customer, [Technical data](#) [► 22].

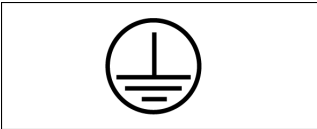
5.3 Connecting ground cable



Ground connection

1	Screw *	4	Toothed lock washer
2	Washer	5	Product
3	Cable lug	6	Ground marking

*) Tightening torque: 5 Nm



A ground connection with a sufficient cross-section must be established between the product and the machine on the customer's premises.

The ground cable must be mounted on the threaded hole identified by the ground marking.

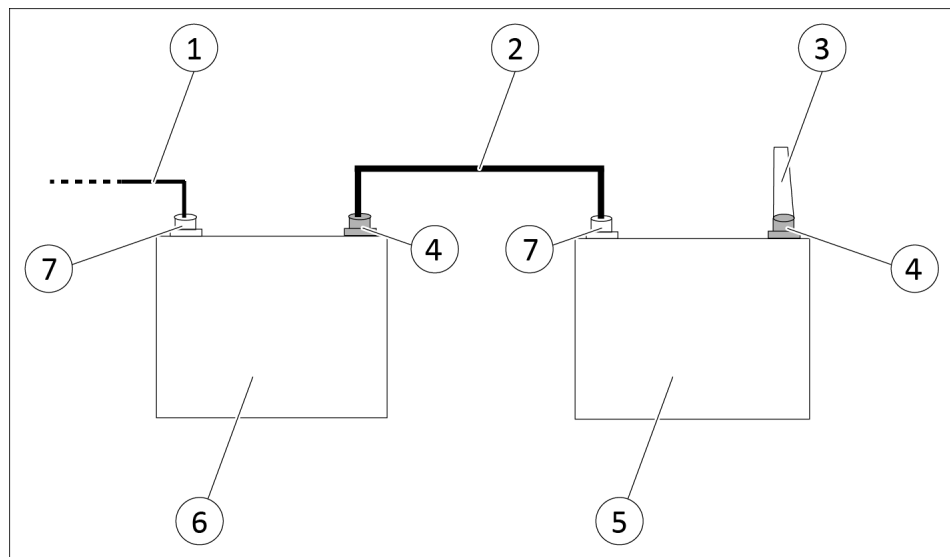
NOTE

Only connect the ground cable at the location intended for this purpose.

Always mount the ground cable singly.

Always use all components to screw in the ground cable and install them in this order: washer, cable lug, toothed lock washer and bolt. See "Ground connection" diagram. Observe the tightening torque.

5.4 Combining multiple products



Combining multiple products

1	Bus cable 1	5	Product n+1
2	Bus cable 2	6	Product n
3	Termination resistor	7	CAN bus or Profibus plug
4	CAN bus or Profibus socket		

When multiple products are combined, the signals are looped through from product "n" to product "n+1".

- Plug bus cable 2 from the socket of the product "n" to the product plug "n+1".
- On the last product, plug the termination resistor into the plug.

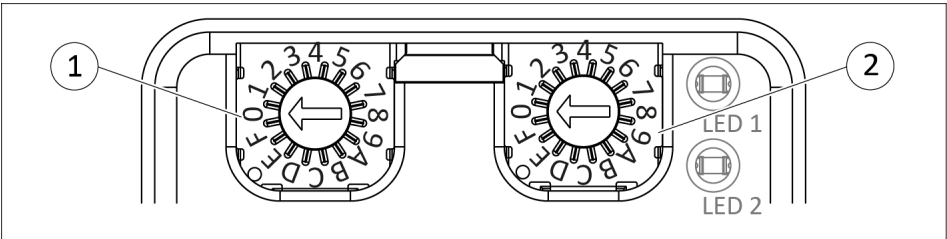
5.5 Setting the baud rate (CAN bus)

The baud rate is only set for variants with CAN bus. The baud rate is set via DIP switches "4" and "5",

[DIP switch](#) [► 33]. The following settings are possible:

DIP switch 4	DIP switch 5	Baud rate
OFF	OFF	125 kbaud
ON	OFF	250 kbaud
OFF	ON	500 kbaud
ON	ON	1000 kbaud

5.6 Configuring PROFIBUS or CAN bus



Rotary encoder switch

Item	Designation	Note
1	Rotary encoder switch "S1"	For setting the less significant digit (half byte).
2	Rotary encoder switch "S2"	For setting the more significant digit (half byte).

NOTE

The CAN bus or PROFIBUS address is configured as a hexadecimal code on the product. The hexadecimal value "0" means decimal "0" and the hexadecimal value "F" means decimal "15". To show the hexadecimal address as a decimal value, multiply the more significant digit (rotary encoder switch "S2") by factor 16 and the less significant digit (rotary encoder switch "S1") by factor 1, see table for configuring the CAN bus or PROFIBUS address. Then add the two values.

Example: Configuring address CAN bus 31

Set rotary code switch "S1" to "F" (decimal $15 \cdot 1$) and rotary code switch "S2" to "1" (decimal $1 \cdot 16$).

- Switch off the logic voltage.
- Set the desired fieldbus address by turning the "S1" and "S2" rotary encoder switches.
 - ✓ The rotary encoder switch must engage into the desired position.
- Switch on the logic voltage.

CAN bus and PROFIBUS address range

Fieldbus	Decimal address range	Hexadecimal address range
PROFIBUS	0-125	00-7D
CAN bus	0-255	00-FF

Address configuration for CAN bus or PROFIBUS

Hexadecimal address		Decimal address
Rotary encoder switch "S1"	Rotary encoder switch "S2"	
0	0	0
1	0	1
...	0	...
F	0	15
0	1	16
...	1	...
F	1	31
0	2	32
...
D	7	125
...
F	F	255

6 Start-up

6.1 Systemintegration

6.1.1 SCHUNK Drive Protocol (SDP)

If products are connected to the SPS via PROFIBUS or PROFINET, the "SDP" protocol is available.

For more information, see software manual "SCHUNK Drive Protocol (SDP)".

6.1.2 SCHUNK Motion protocol (SMP)

If products are connected to the SPS via PROFIBUS or PROFINET, the "SMP" protocol is available.

For PROFIBUS, SCHUNK recommends using the "SDP" protocol.

For more information, see software manual "SCHUNK Motion Protocol (SMP)".

6.1.3 Notes on the compatibility of Motion Tool Schunk (MTS) and firmware

The "Motion Tool SCHUNK (MTS)" configuration and commissioning tool and the firmware are coordinated with each other. Only the combinations of "MTS" and firmware version listed in the following table are compatible with each other. If other combinations are used, the product may end up in an undefined status during parameterization.

Compatibility of Firmware and Motion Tool SCHUNK (MTS)		
Firmware	2.x	3.x
MTS	2.x	2.x

The program version of the "Motion Tool SCHUNK (MTS)" is shown at the top of the program window.

The software version is displayed on the "General Information" tab under "Software Version".

The firmware version of the product can be found in the product window by choosing "Module" and then "Module Information".

6.2 Commissioning the product

NOTE

The product has either a CAN bus or a Profibus connection and always USB interfaces ("X1" and "X2").

If the computer has an interface for CAN or Profibus, the product can be connected for commissioning with the "Motion Tool SCHUNK (MTS)" software to the computer via the bus interface or via a USB interface ("X1" or "X2").

If a device is connected to one or both USB interfaces, the respective bus connection will not function even if a bus cable is connected.

In the following cases, communication via the bus connection is not possible:

- If a USB device is connected to the interface USB mini AB, device.
- When connecting the USB stick to the interface USB micro AB, host and when the DIP switch 1 is "ON".

The product is commissioned by means of the "Motion Tool SCHUNK (MTS)" configuration and commissioning tool.

When you open the "Motion Tool SCHUNK (MTS)", you must select the interface you wish to use for communication.

The following section describes commissioning and communication via the USB interface.

"The Motion Tool Schunk (MTS)" can be opened via the DVD or directly on the computer. If the "Motion Tool Schunk (MTS)" is to be opened directly on the computer, you must copy the "MTS" folder to a directory of your choice on the computer. **NOTICE!** **Motion Tool SCHUNK (MTS) does not require any installation!** SCHUNK recommends using a directory for which the user have write permission so that the settings that the user make for the "Motion Tool SCHUNK (MTS)" can be saved and retained.

Default values for motions are predefined for the product as standard values. The following default values apply after the re-start:

- Target speed
 - 10% of maximum value
- Target acceleration
 - 10% of maximum value
- Target jerk
 - 50% of maximum value

If these values are changed, the change is only saved temporarily, for as long as the product is connected to the logic voltage. When the logic voltage is disconnected from the product and switched on again, the product is always reset to these default values.

- The address for CAN bus or Profibus has been set
- The baud rate has been set
- The product has been mechanically and electrically connected
- Insert the supplied DVD into the computer and install the USB driver, [Install the USB driver](#) [► 48].
- Connect the product to the computer, [Connecting the product to the computer](#) [► 50].
- Open "Motion Tool SCHUNK (MTS)" via "mts.exe", [Opening Motion Tool SCHUNK \(MTS\)](#) [► 51].
- Perform initial commissioning via "Motion Tool SCHUNK (MTS)", [Performing initial commissioning](#) [► 53].

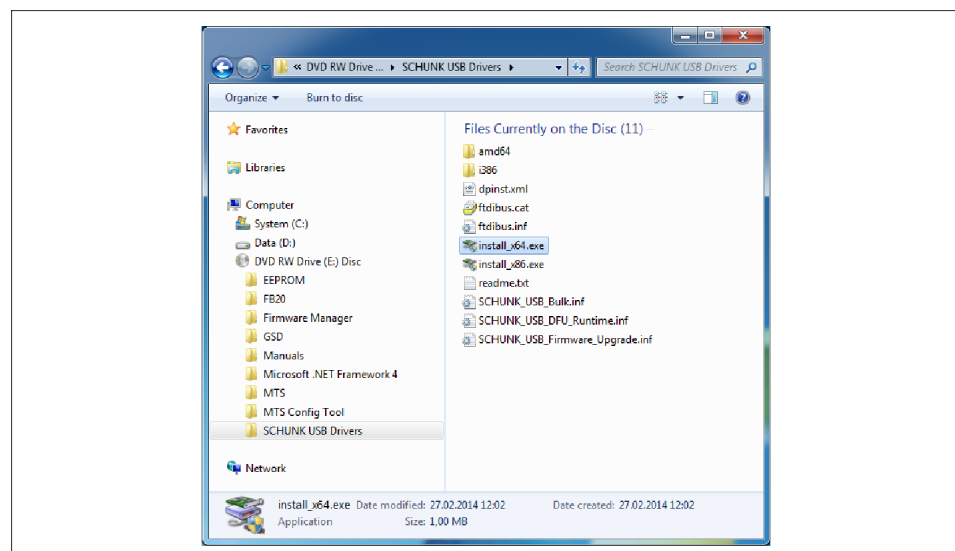
6.2.1 Install the USB driver

NOTE

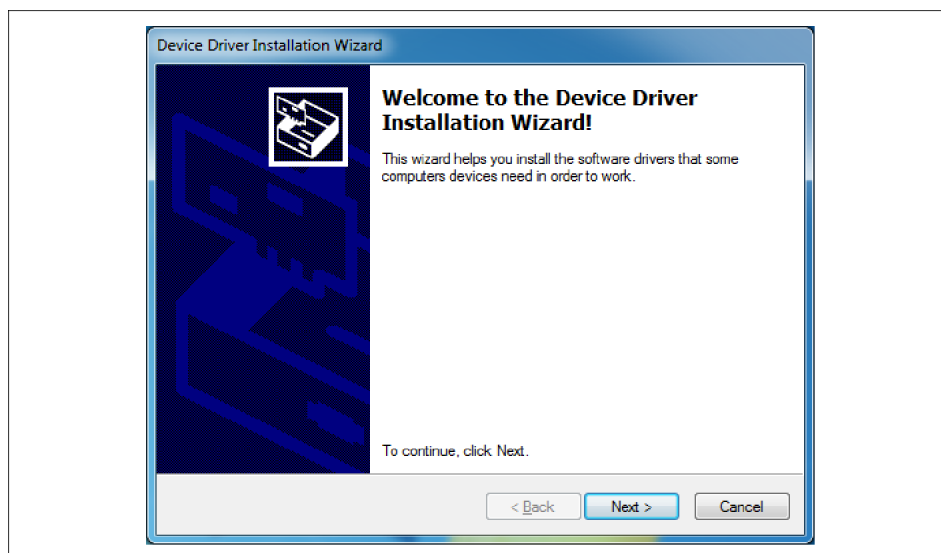
The USB driver is only preinstalled on the computer. When a new product is connected to the computer, the USB driver must be installed for the product, [Connecting the product to the computer](#) [► 50].

Procedure for Windows 7

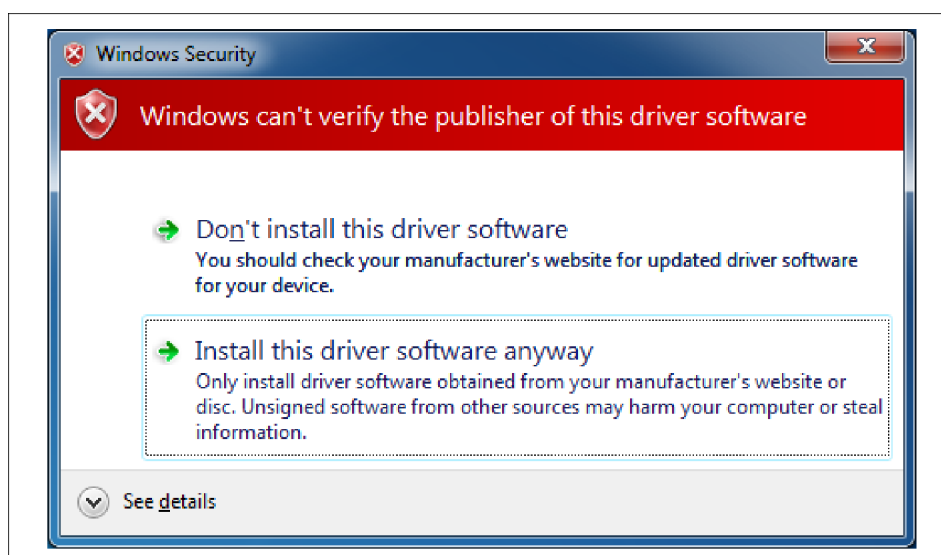
- Insert the supplied DVD into the computer and select the "SCHUNK USB Drivers" directory.



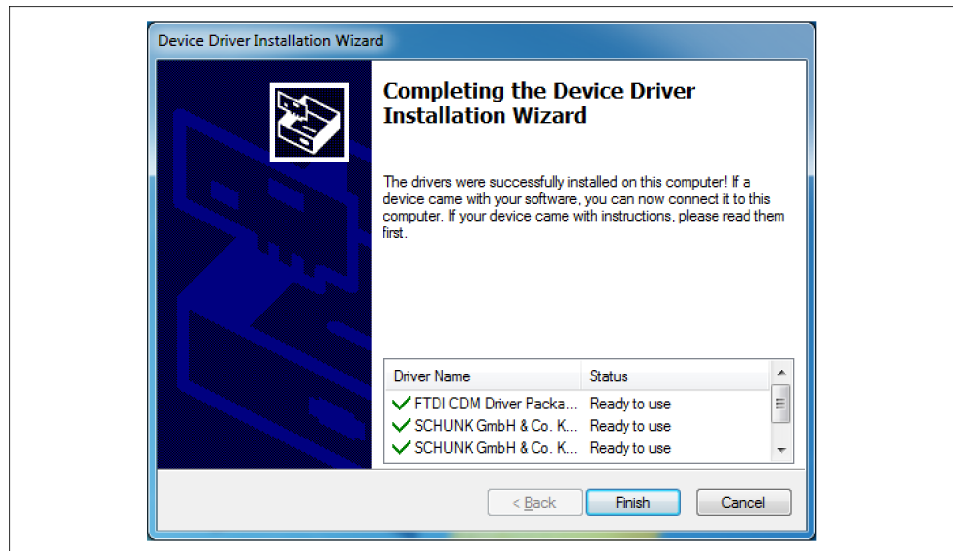
- Execute the installation file.
 - ✓ **For 64-bit systems:** install_x64.exe
 - ✓ **For 32-bit systems:** install_x86.exe



- ✓ The "Device Driver Installation Wizard" window appears.
- Click the "Continue" button.
- ✓ The USB driver is installed.



- If the "Windows Security" window appears during the installation, choose "Install this driver software anyway".



- ✓ After successful installation, the "Device Driver Installation Wizard" window appears.
- Click the "Finish" button.
- ✓ USB driver installation is finished.

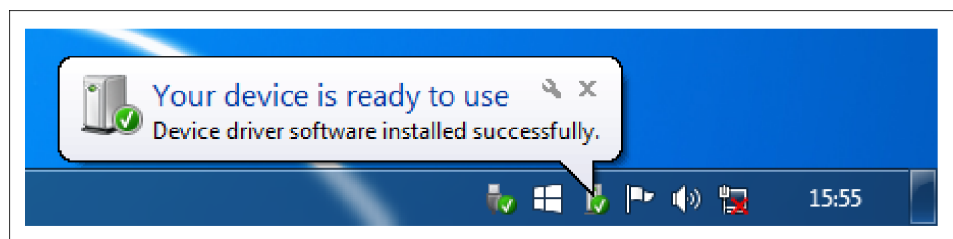
6.2.2 Connecting the product to the computer

NOTE

When a new product is connected to the computer, the USB driver must be installed for the product.

Procedure for Windows 7

- The USB driver is preinstalled on the computer
- The power supply of the product is connected.
- Connect the USB cables to the computer and to the USB Mini AB, Device on the product.

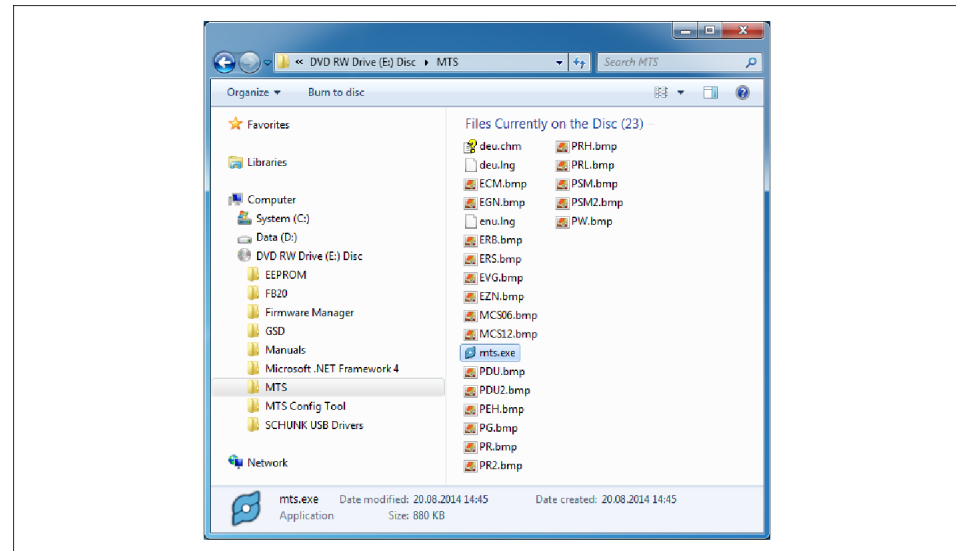


- ✓ A new product is detected and the USB driver is automatically installed for this product.

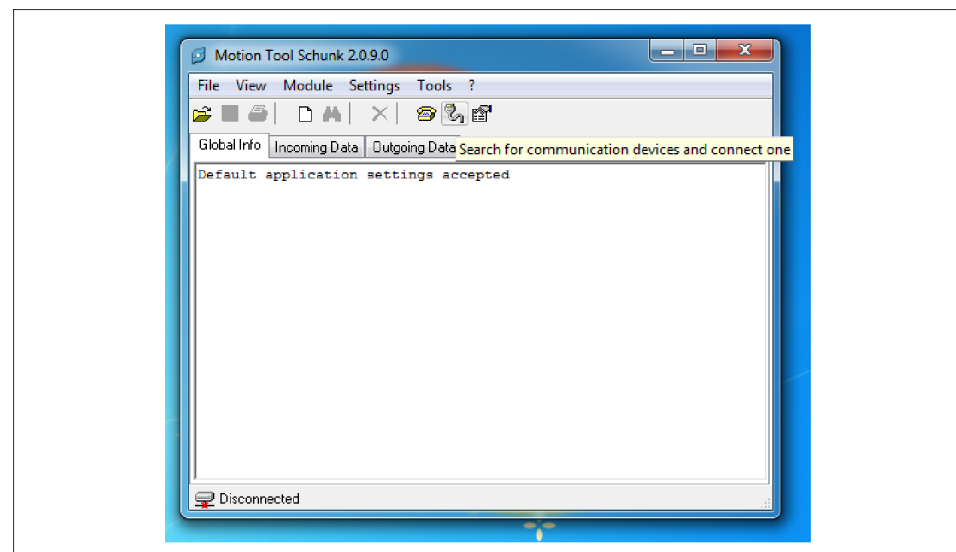
6.2.3 Opening Motion Tool SCHUNK (MTS)

Procedure for Windows 7

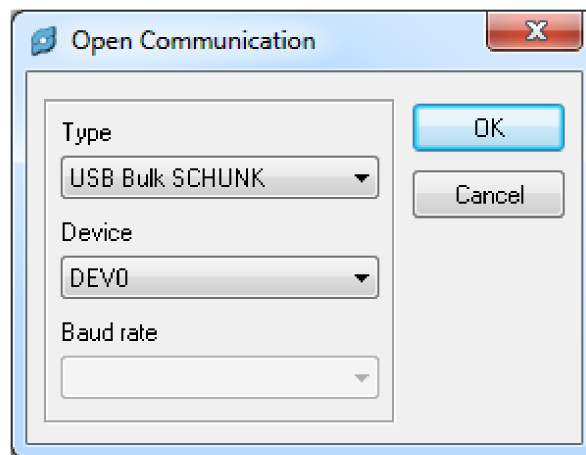
- The computer is connected to the product via USB Mini AB, Device



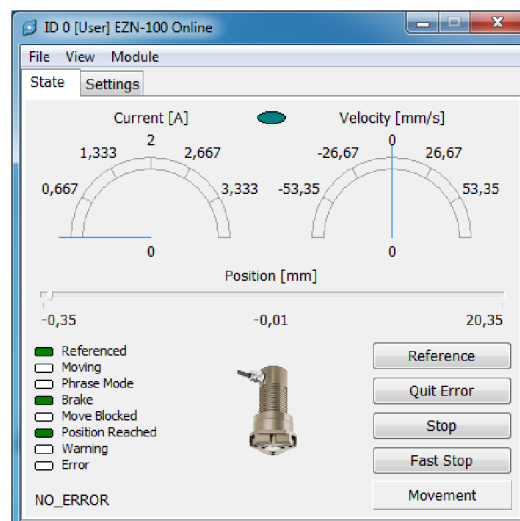
- Open Motion Tool SCHUNK (MTS) via "mts.exe".



- ✓ The program window is displayed.
- Go to "Settings" and choose "Open Communication..." from the menu.



- ✓ The "Open Communication" window appears.
- Choose the "USB Bulk SCHUNK" interface and click the "Select" button.
- ✓ Communication is established.

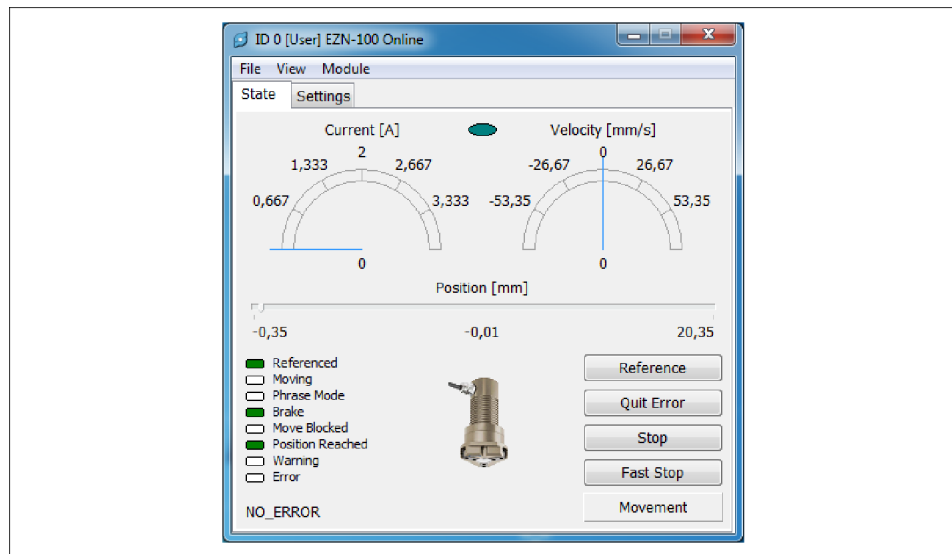


- ✓ The module window is shown.

NOTE

In the module window, you can view the status of the module, change parameters, and test SCHUNK Motion Protocol (SMP) commands; see the "SCHUNK Motion Control" software manual.

6.2.4 Performing initial commissioning



Example of product window in Windows 7

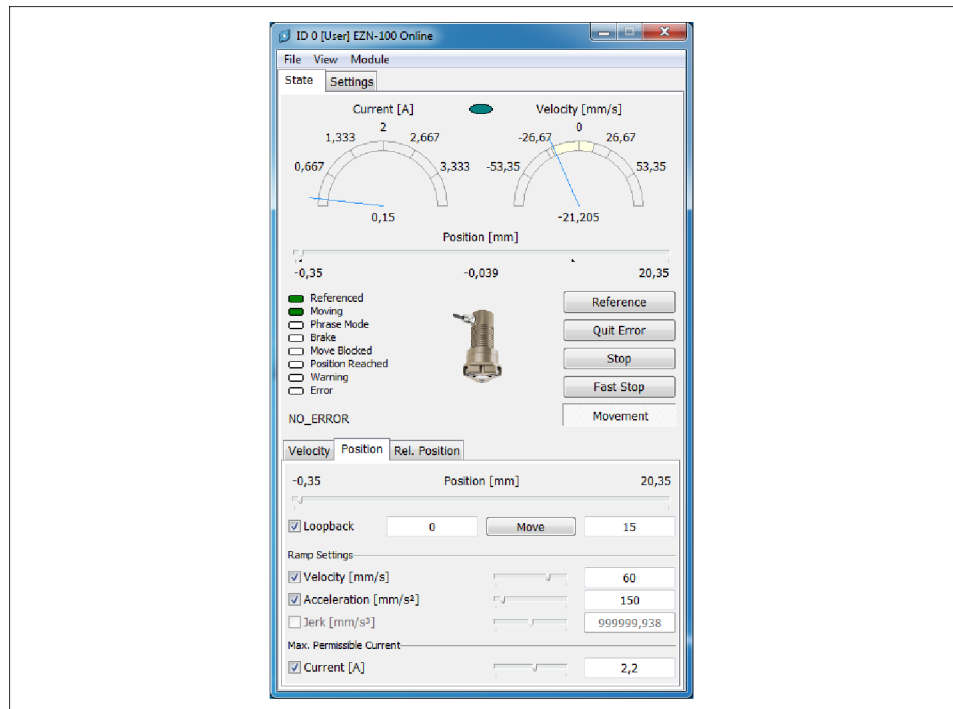
Initial commissioning of the product can be performed without any further parameterization.

The status of the product is displayed on the left side of the product window.

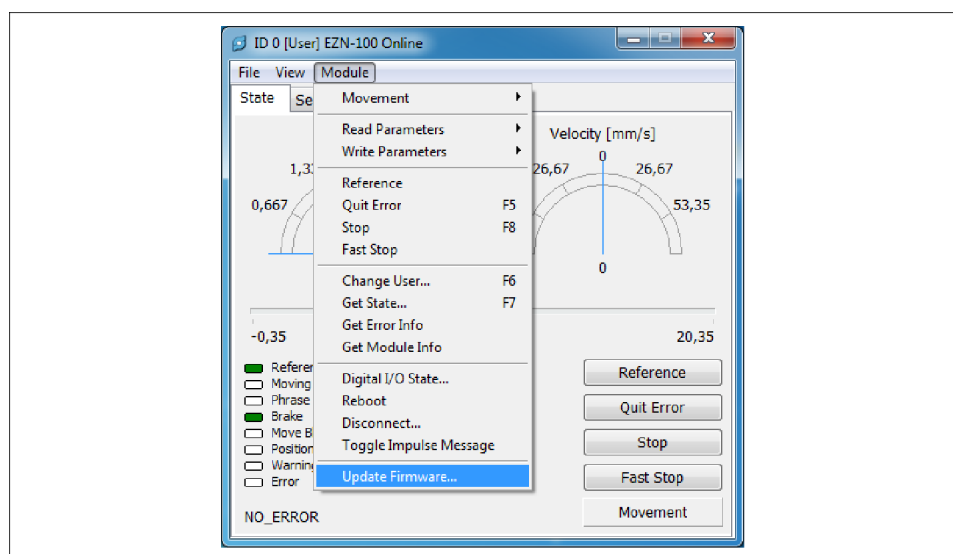
The most important SMP commands can be selected on the right side of the product window. All other possible SMP commands can be found under the "Module" menu option.

Procedure for Windows 7

- Click the "Movement" button.



- ✓ Additional control elements for motion commands are displayed.
- Click the "Move" button.
- ✓ The product moves in the defined cycle.



- To test further SMP commands, choose the "Module" option.

6.2.5 Notes on how to use the digital inputs

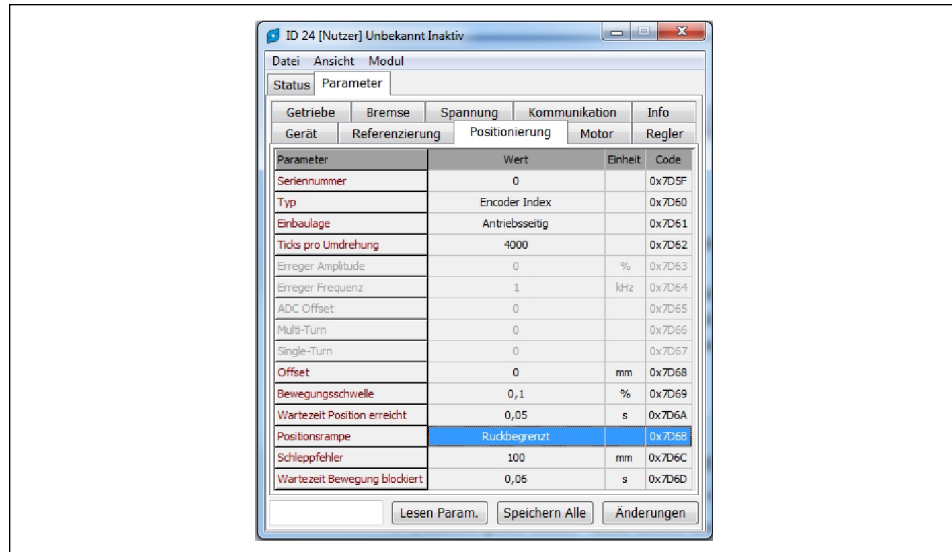
The product has two digital inputs: DI 1 Ref and DI 2.

The status of the two inputs can be queried at any time:

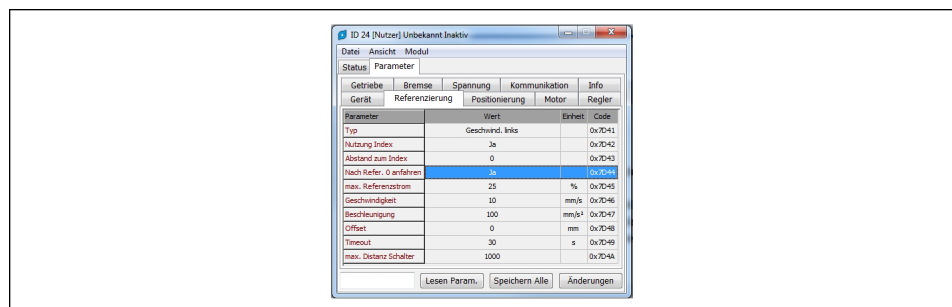
- For the SMP protocol via the "CMD_DIO" command, see "SCHUNK Motion Protocol (SMP)" software manual.
- For the SDP protocol via the cyclical data exchange, see "SCHUNK Drive Protocol (SDP)" software manual.

7 Operation

7.1 Special feature with Firmware 3.03



Parameter position ramp



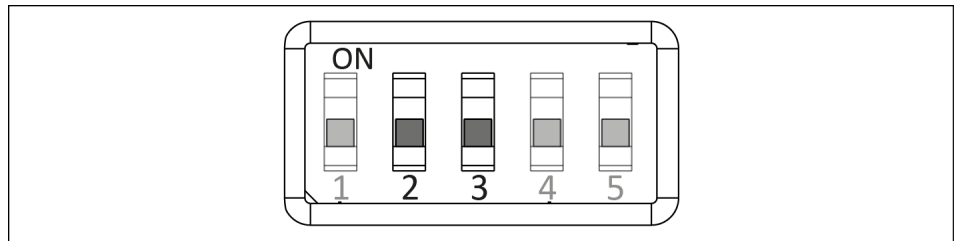
Move parameter to reference 0

If the SDP protocol is used, a value must be entered for the target jerk under the following conditions for a reference run:

- In the "Position ramp" parameter, the "jerk limited" ramp is set and in the "After reference 0 travel" a "Yes" is entered.

If a target jerk is entered, the product does not move.

7.2 Perform quick test



DIP switch

Via the USB device or the bus interface, a quick test can be performed with the DIP switches 2 "Test 2" and 3 "Test 1". The USB host must be inactive for the quick test. If the USB host is active, the USB stick inserted and DIP switch 1 set, a quick test is not possible.

Quick test, up to Firmware 2.12

DIP switch		Function
2 (Test 2)	3 (Test 1)	
0	0	Complete quick test
0	1	Acknowledge a pending error message
1	1	Perform reference journey
1	0	Perform relative travel by 0 mm or 1.0 degree with 10% maximum speed, 10% maximum acceleration, 50% nominal current and 50% maximum jerk

- DIP switches 2 "Test 2" and 3 "Test 1" are in "OFF" position
- If the "Error module" LED lights up: Switch DIP switch 3 "Test 1" to "ON" position.
 - ✓ A pending error message is acknowledged.
 - ✓ If the error is still present after acknowledgment, see "SCHUNK Motion Protocol (SMP)" and "SCHUNK Drive Protocol (SDP)" software manuals and [Trouble shooting](#) [► 63].
- Switch DIP switch 3 "Test 1" to "OFF" position.
- Switch DIP switches 2 "Test 2" and 3 "Test 1" to "ON" position.
 - ✓ Product moves to parameterized reference value.
- Switch DIP switches 2 "Test 2" and 3 "Test 1" to "OFF" position.
- Switch DIP switch 2 "Test 2" to "ON" position.
 - ✓ Relative travel is executed.
- Switch DIP switch 2 "Test 2" to "OFF" position.
- Switch logic voltage off and back on again.
 - ✓ Test mode is ended.
 - ✓ Product is restarted.

Quick test, from Firmware 3.03

DIP switch		Function
2 (Test 2)	3 (Test 1)	
0	0	Complete quick test
0	1	Acknowledge a pending error message
1	1	Perform reference journey
1	0	Reserved

- DIP switches 2 "Test 2" and 3 "Test 1" are in "OFF" position
- If the "Error module" LED lights up: Switch DIP switch 3 "Test 1" to "ON" position.
 - ✓ A pending error message is acknowledged.
 - ✓ If the error is still present after acknowledgment, see "SCHUNK Motion Protocol (SMP)" and "SCHUNK Drive Protocol (SDP)" software manuals and [Trouble shooting](#) [► 63].
- Switch DIP switch "Test 1" to "OFF" position.
- Switch DIP switches 2 "Test 2" and 3 "Test 1" to "ON" position.
 - ✓ Product moves to parameterized reference value.
- Switch DIP switches 2 "Test 2" and 3 "Test 1" to "OFF" position.
- Switch logic voltage off and back on again.
 - ✓ Test mode is ended.
 - ✓ Product is restarted.

7.3 Change parameter configuration on the product with USB stick

For the following action, a USB stick is required, whose file system FAT16 or FAT32 must be formatted. The USB stick is not included in the scope of delivery.

Export parameter file

The file ending of the exported parameter file is ***.sav**.

- Power supply to the product is switched off
- DIP switch "1" is in "OFF" position
- Connect USB stick to the USB micro AB, host.
- Put DIP switch "1" into "ON" position and wait 10 seconds.
 - ✓ The current configuration of the product is saved on the USB stick.
- Put DIP switch "1" into "OFF" position.
- Disconnect the USB flash drive from the USB Micro AB, host.

Change configuration

The parameters are changed in the "MTS Config Tool", software, see software manual "Motion Tool Schunk (MTS)".

Import parameter file

The file ending of the parameter file to be imported is ***.par**.

- Power supply to the product is switched off
- DIP switch "1" is in "OFF" position
- Connect USB stick to the USB micro AB, host.
- Turn on the power supply to the product and wait 10 seconds.
- Put DIP switch "1" into "ON" position and wait 10 seconds.
- Put DIP switch "3" into "ON" position and wait 10 seconds.
 - ✓ Parameters are transferred from the USB stick to the product.
- DIP switches "1" and "3" into "OFF" position.
- Disconnect the USB flash drive from the USB Micro AB, host.
- Switch off the logic voltage.
 - ✓ Product is restarted.

7.4 Updating firmware

The firmware can only be updated after consultation with SCHUNK's service department via the USB Mini AB (Device) or USB Micro AB (Host).

NOTE

The Firmware has the file extension *.bin.

7.4.1 Update via USB Mini AB (device)

The firmware can be updated via a Windows computer using the "Firmware Updater" tool:

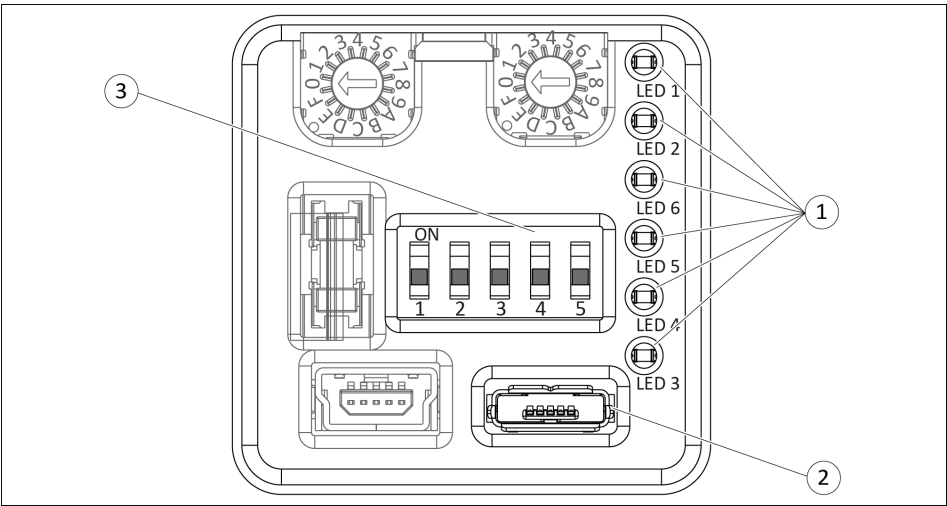
- Insert the DVD supplied in the scope of delivery into the computer.
- Open the "FirmwareUpdater.exe" file and follow the instructions.

7.4.2 Update via USB Micro AB, host

NOTE

Updating the firmware from 2.x to 3.x with the USB stick is **not** allowed.

Updating the firmware with the "Firmware Updater" tool, [Update via USB Mini AB \(device\)](#) [► 59].



Service window

1	LED
2	USB Micro AB, host
3	DIP switch

CAN bus communication interface

- There is new firmware on the USB flash drive
- The power supply is disconnected from the product
- DIP switches "1" and "2" are in "OFF" position
- Connect the USB flash drive to the USB Micro AB, host.
- Switch on the power supply of the product.
 - ✓ LED 1 and LED 2 light up green.
 - ✓ LED 6 lights up green.
 - ✓ LED 4 lights up red for approx. 5 seconds.
 - ✓ After LED 4 goes out, LED 3 lights up yellow for approx. 5 seconds.
 - ✓ After LED 3 goes out, LED 4 lights up red.
- Switch DIP switch "1" to "ON" position.
 - ✓ LED 1 and LED 2 light up green.
 - ✓ LED 6 lights up red.
 - ✓ LED 3 lights up yellow.
 - ✓ LED 4 flashes red once.
- Switch DIP switch "2" to "ON" position.
 - ✓ LED 1 and LED 2 light up green.
 - ✓ LED 6 lights up red.
 - ✓ LED 3 lights up yellow.
 - ✓ LED 4 flashes red once.

NOTE

The logic board is being updated.

NOTICE

Risk of damaging the logic board!

If the product is disconnected from the power supply while the logic board is being updated, the software will not be completely installed and can no longer be started. The logic board update cannot be repeated.

- Do not disconnect the product from the power supply.
 - If the product is disconnected from the power supply while the logic board is being updated, send the product to SCHUNK with a repair order.
-

- ✓ LED 4 rapidly flashes red.

NOTE

The adapter board is being updated.

If the product is disconnected from the power supply while the adapter board is being updated, repeat the update process for the product.

- ✓ LED 4 lights up red for approximately 10 seconds and goes out.
- The adapter board update is finished.
- Disconnect the product from the power supply.
- Disconnect the USB flash drive from the USB Micro AB, host.
- Switch DIP switches "1" and "2" to "OFF" position.
- Switch on the power supply of the product.
 - ✓ LED 1 and LED 2 light up green.
 - ✓ LED 6 lights up green.
 - ✓ LED 4 lights up red for approx. 5 seconds.
 - ✓ After LED 4 goes out, LED 3 lights up yellow for approx. 5 seconds.
 - ✓ After LED 3 goes out, LED 4 lights up red.
- ✓ The firmware update was successful and the product is ready for use.

Profibus communication interface

- There is new firmware on the USB flash drive
- The power supply is disconnected from the product
- DIP switches "1" and "2" are in "OFF" position
- Connect the USB flash drive to the USB Micro AB, host.
- Switch on the power supply of the product.
 - ✓ LED 1 and LED 2 light up green.
 - ✓ LED 6 lights up red.
 - ✓ LED 4 lights up red for approx. 5 seconds.
 - ✓ After LED 4 goes out, LED 3 lights up red.
- Switch DIP switch 1 to "ON" position.
 - ✓ LED 1 and LED 2 light up green.
 - ✓ LED 6 lights up red.
 - ✓ LED 3 lights up yellow.
 - ✓ LED 4 flashes red once.

- Switch DIP switch 2 to "ON" position.
 - ✓ LED 1 and LED 2 light up green.
 - ✓ LED 6 lights up red.
 - ✓ LED 3 lights up yellow.
 - ✓ LED 4 flashes red once.

NOTE

The logic board is being updated.

NOTICE

Risk of damaging the logic board!

If the product is disconnected from the power supply while the logic board is being updated, the software will not be completely installed and can no longer be started. The logic board update cannot be repeated.

- Do not disconnect the product from the power supply.
 - If the product is disconnected from the power supply while the logic board is being updated, send the product to SCHUNK with a repair order.
-

- ✓ LED 4 flashes red.
-

NOTE

The adapter board is being updated.

If the product is disconnected from the power supply while the adapter board is being updated, repeat the update process for the product.

- ✓ LED 4 lights up red for approx. 5 seconds and goes out.
- The adapter board update is finished.
- Disconnect the product from the power supply.
- Disconnect the USB flash drive from the USB Micro AB, host.
- Switch DIP switches "1" and "2" to "OFF" position.
- Switch on the power supply of the product.
 - ✓ LED 1 and LED 2 light up green.
 - ✓ LED 6 lights up red.
 - ✓ LED 3 lights up yellow for approx. 5 seconds.
 - ✓ After LED 3 goes out, LED 4 lights up red.
- ✓ The firmware update was successful and the product is ready for use.

8 Trouble shooting

Once an error with an error message is eliminated, this error message must be acknowledged, see the "SCHUNK Motion Protocol (SMP)" and "SCHUNK Drive Protocol (SDP)" software manuals. The error is indicated in the service window via LED 4, [LED](#) [► 31].

A list of the information and error codes can be found in the "SCHUNK Motion Protocol (SMP)" and "SCHUNK Drive Protocol (SDP)" software modules.

Detailed error information can be read out via "Motion Tool SCHUNK (MTS)"; see the "SCHUNK Motion Control (SMP)" software manual.

8.1 Product not referenced

If a product is unexpectedly no longer referenced, the distance between the Encoder-0-track to the referencing sensor has changed.

Possible cause	Corrective action
Referencing sensor dirty	Clean referencing sensor.
Referencing sensor position changed	Restore the position of the referencing sensor or reference the product again.
Mechanical clearance with different payload, for example, Switching point changed horizontally or vertically	Select the same installation position when referencing so as to reduce any possible clearance.
Installation position changed	Check installation position, restore old installation position if necessary.

If none of these measures result in success:

- Reset distance to the index via "Motion Tool SCHUNK (MTS)"; see "SCHUNK Motion Protocol (SMP)" software manual.
- OR: Deactivate function distance to the index via "Motion Tool SCHUNK (MTS)"; see "SCHUNK Motion Protocol (SMP)" software manual.

NOTE

Clarify possible consequences of deactivating distance monitoring with SCHUNK's Service department for position-critical applications.

8.2 Communication malfunction

Possible cause	Corrective action
Logic supply fuse triggered	Check logic supply fuse and replace if necessary.
Connection between the product and "Motion Tool SCHUNK (MTS)" was interrupted	Check bus cable or USB cable for damage and replace if necessary.
No communication can be established with "Motion Tool SCHUNK (MTS)" (USB, PROFIBUS or CAN bus interface)	Check delivery state. Note: the product is supplied either with CAN or with PROFIBUS.
	Check the communication interface.
	Check end terminals. Is the product an end node in the bus? Is the termination resistor connected?
	For product with CAN bus
	Configure the CAN bus address, Configuring PROFIBUS or CAN bus [► 44].
	Check the baud rate, Setting the baud rate (CAN bus) [► 43].
	For product with PROFIBUS
	Check GSD file, use suitable GSD file if necessary.
	Configure PROFIBUS address, Configuring PROFIBUS or CAN bus [► 44].
	Check baud rate (1.5 or 12 mbaud).
Values are saved in EEPROM but not activated	Restart product after saving. OR: Before saving, stop the product using fast stop. NOTICE! New values are not saved in EEPROM if the product is under control or in motion.

8.3 Product moves in a jerky fashion, is sluggish or blocked

Possible cause	Corrective action
Product is overloaded	Check the maximum torque.
Power supply malfunction	Check the power output of the power supply unit.
	Check power cable line and cable cross sections (high loss of voltage possible with 24 VDC power supply).
	Check power cable for shorts and breakage.
Sporadic breaks in communication	Check bus connection. Electrical connection [► 38].
Dirt deposits on product (increasing sluggishness)	Clean and if necessary re-lubricate. Maintenance intervals [► 66].
Moisture in the product (oil, cutting fluid, cleaning agent)	Clean and if necessary re-lubricate. Maintenance intervals [► 66].
	Check for appropriate IP class.
Mechanical defect	Check product and replace if necessary.

8.4 Drive not turning

Possible cause	Corrective action
No voltage connected. (emergency stop chain interrupted, safety light curtain triggered)	Check the power supply requirement, Technical data [► 22].
Insufficient voltage.	
Power supply fuse triggered	Check power supply fuse and replace if necessary.
Error message pending	Eliminate errors and acknowledge error message, see the "SCHUNK Motion Protocol (SMP)" and "SCHUNK Drive Protocol (SDP)" software manuals.
Setpoint settings for current, speed, jerk and acceleration are not suitable or too low	Check setpoint settings and enter suitable values, see the "SCHUNK Motion Protocol (SMP)" and "SCHUNK Drive Protocol (SDP)" software manuals.

9 Maintenance

9.1 Maintenance intervals

Interval (million cycles) for PR 2 70 / 90 / 110	Maintenance work
2	<ul style="list-style-type: none">• Clean the product dry. (The product complies with protection class IP 40.) Remove all coarse dirt and chips from the cavities in the product.• Inspect the product for damage. Replace the product if necessary. Have all repair work on the product carried out only by SCHUNK.
As required	Update firmware, Updating firmware [► 59].

9.2 Disassembly and assembling

This product must not be disassembled for maintenance.

NOTICE

Material damage due to incorrect assembly and disassembly!

Faulty assembly and disassembly of the product can cause damage to the mechanics and internal electronics.

- Only allow SCHUNK to repair the product.

10 EU-Declaration of Conformity

Manufacturer/ Distributor	SCHUNK GmbH & Co. KG Spann- und Greiftechnik Bahnhofstr. 106 – 134 D-74348 Lauffen/Neckar
Product designation:	Servo-electrically rotary unit PR 2
ID number	0359450, 0359451, 0359470, 0359471, 0359490, 0359491, 0359510, 0359511, 0359530, 0359531, 0359550, 0359551, 0359570, 0359571, 0359590, 0359591, 0359610, 0359611

We hereby declare on our sole authority that the product meets the requirements of the following directive at the time of declaration.

The declaration is rendered invalid if modifications are made to the product.

- **EMC Directive 2014/30/EU**

Directive of the European Parliament and the Council of February 26, 2014 on the harmonization of the laws of the Member States relating to electromagnetic compatibility

Applied harmonized standards, especially:

EN 61000-6-2 (2005)	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards -Immunity for industrial environments IEC 61000-6-2: 2005
EN 61000-6-3: 2007+ A1:2011	Electromagnetic compatibility (EMV) - Part 6-3: Generic standards - Interference emissions in residential, commercial, industrial and light industrial environments IEC 61000-6-3: 2006

Signed for and on behalf of: SCHUNK GmbH & Co. KG

Signature: see original declaration

Prof. Dr.-Ing. Markus Glück,
Managing Director Research & Development

Lauffen/Neckar, March 2018

11 Translation of original declaration of incorporation

in terms of the Directive 2006/42/EG, Annex II, Part 1.B of the European Parliament and of the Council on machinery.

Manufacturer/ Distributor	SCHUNK GmbH & Co. KG Spann- und Greiftechnik Bahnhofstr. 106 – 134 D-74348 Lauffen/Neckar
------------------------------	---

We hereby declare that on the date of the declaration the following partly completed machine complied with all basic safety and health regulations found in the directive 2006/42/EC of the European Parliament and of the Council on machinery. The declaration is rendered invalid if modifications are made to the product.

Product designation:	Servo-electrically rotary unit / PR 2 / electric
ID number	0359450, 0359451, 0359470, 0359471, 0359490, 0359491, 0359510, 0359511, 0359530, 0359531, 0359550, 0359551, 0359570, 0359571, 0359590, 0359591, 0359610, 0359611

The partly completed machine may not be put into operation until conformity of the machine into which the partly completed machine is to be installed with the provisions of the Machinery Directive (2006/42/EC) is confirmed.

Applied harmonized standards, especially:

EN ISO 12100:2010	Safety of machinery - General principles for design - Risk assessment and risk reduction
-------------------	---

The manufacturer agrees to forward on demand the relevant technical documentation for the partly completed machinery in electronic form to national authorities.

The relevant technical documentation according to Annex VII, Part B, belonging to the partly completed machinery, has been created.

Person authorized to compile the technical documentation:
Robert Leuthner, Address: see manufacturer's address

Signature: see original declaration

Lauffen/Neckar, March 2018

Prof. Dr.-Ing. Markus Glück,
Managing Director Research & Development

12 Annex to Declaration of Incorporation

according 2006/42/EG, Annex II, No. 1 B

1. Description of the essential health and safety requirements pursuant to 2006/42/EC, Annex I that are applicable and that have been fulfilled with:

Product designation	Servo-electrically rotary unit
Type designation	PR 2
ID number	0359450, 0359451, 0359470, 0359471, 0359490, 0359491, 0359510, 0359511, 0359530, 0359531, 0359550, 0359551, 0359570, 0359571, 0359590, 0359591, 0359610, 0359611

To be provided by the System Integrator for the overall machine	↓
Fulfilled for the scope of the partly completed machine	↓
Not relevant	↓

1.1	Essential Requirements			
1.1.1	Definitions		X	
1.1.2	Principles of safety integration		X	
1.1.3	Materials and products		X	
1.1.4	Lighting		X	
1.1.5	Design of machinery to facilitate its handling		X	
1.1.6	Ergonomics		X	
1.1.7	Operating positions			X
1.1.8	Seating			X

1.2	Control Systems			
1.2.1	Safety and reliability of control systems		X	
1.2.2	Control devices		X	
1.2.3	Starting		X	
1.2.4	Stopping		X	
1.2.4.1	Normal stop		X	
1.2.4.2	Operational stop		X	
1.2.4.3	Emergency stop		X	
1.2.4.4	Assembly of machinery		X	
1.2.5	Selection of control or operating modes		X	
1.2.6	Failure of the power supply			X

1.3	Protection against mechanical hazards			
1.3.1	Risk of loss of stability			X
1.3.2	Risk of break-up during operation			X
1.3.3	Risks due to falling or ejected objects			X

1.3	Protection against mechanical hazards			
1.3.4	Risks due to surfaces, edges or angles		X	
1.3.5	Risks related to combined machinery			X
1.3.6	Risks related to variations in operating conditions			X
1.3.7	Risks related to moving parts		X	
1.3.8	Choice of protection against risks arising from moving parts			X
1.3.8.1	Moving transmission parts		X	
1.3.8.2	Moving parts involved in the process			X
1.3.9	Risks of uncontrolled movements			X
1.4	Required characteristics of guards and protective devices			
1.4.1	General requirements			X
1.4.2	Special requirements for guards			X
1.4.2.1	Fixed guards			X
1.4.2.2	Interlocking movable guards			X
1.4.2.3	Adjustable guards restricting access			X
1.4.3	Special requirements for protective devices			X
1.5	Risks due to other hazards			
1.5.1	Electricity supply		X	
1.5.2	Static electricity		X	
1.5.3	Energy supply other than electricity		X	
1.5.4	Errors of fitting		X	
1.5.5	Extreme temperatures			X
1.5.6	Fire			X
1.5.7	Explosion			X
1.5.8	Noise			X
1.5.9	Vibrations			X
1.5.10	Radiation	X		
1.5.11	External radiation	X		
1.5.12	Laser radiation	X		
1.5.13	Emissions of hazardous materials and substances			X
1.5.14	Risk of being trapped in a machine	X		
1.5.15	Risk of slipping, tripping or falling	X		
1.5.16	Lightning			X
1.6	Maintenance			
1.6.1	Machinery maintenance		X	
1.6.2	Access to operating positions and servicing points		X	
1.6.3	Isolation of energy sources		X	
1.6.4	Operator intervention		X	

1.6	Maintenance			
1.6.5	Cleaning of internal parts		X	
1.7	Information			
1.7.1	Information and warnings on the machinery		X	
1.7.1.1	Information and information devices		X	
1.7.1.2	Warning devices		X	
1.7.2	Warning of residual risks		X	
1.7.3	Marking of machinery	X		
1.7.4	Instructions	X		
1.7.4.1	General principles for the drafting of instructions	X		
1.7.4.2	Contents of the instructions	X		
1.7.4.3	Sales literature	X		
	The classification from Annex 1 is to be supplemented from here forward.			
2	Supplementary essential health and safety requirements for certain categories of machinery			X
2.1	Foodstuffs machinery and machinery for cosmetics or pharmaceutical products			X
2.2	Portable hand-held and/or guided machinery			X
2.2.1	Portable fixing and other impact machinery			X
2.3	Machinery for working wood and material with similar physical characteristics			X
3	Supplementary essential health and safety requirements to offset hazards due to the mobility of machinery		X	
4	Supplementary essential health and safety requirements to offset hazards due to lifting operations		X	
5	Supplementary essential health and safety requirements for machinery intended for underground work			X
6	Supplementary essential health and safety requirements for machinery presenting particular hazards due to the lifting of persons		X	

