

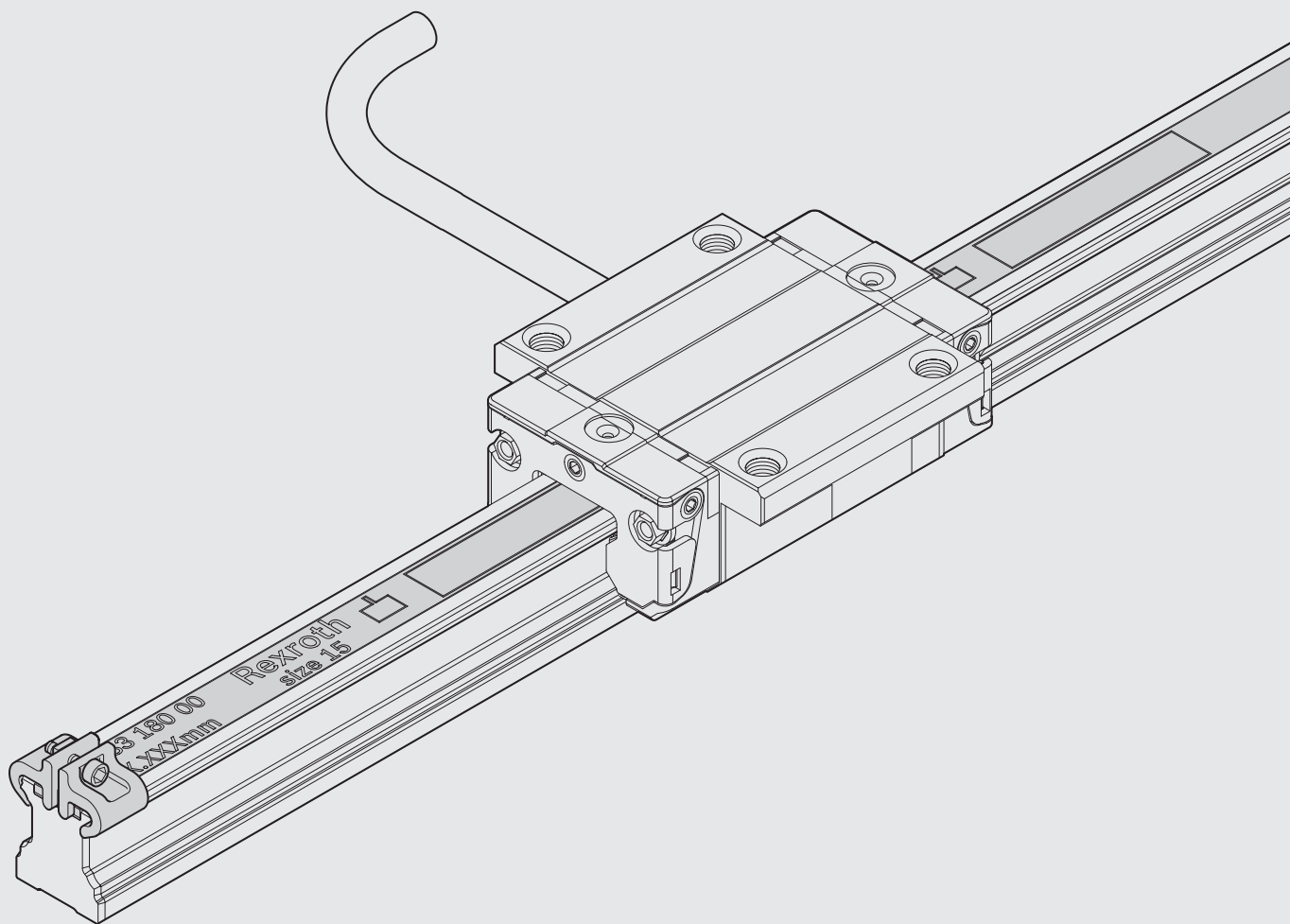
IMScompact integrated measuring system for BSHP ball rail systems

R320103196/2022-09

EN

Instructions

EN



The data specified above only serves to describe the product. No statements concerning a certain condition or suitability for a certain purpose can be derived from our information. The information given does not release the user from the obligation of own judgment and verification. It should be noted that our products are subject to a natural process of aging and wear.

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The title page contains an illustration of a sample configuration. The product as delivered can differ from the illustration.

The original instructions are in German.

Any dissemination of the product must include these instructions.

Die vorliegende Anleitung ist in folgenden Sprachen verfügbar.
These instructions are available in the following languages.
Les présentes instructions sont disponibles dans les langues suivantes.
Le presenti istruzioni sono disponibili nelle lingue seguenti.
Las presentes instrucciones están disponibles en los siguientes idiomas.
As presentes instruções estão disponíveis nas seguintes línguas.
本说明书具有下列语言版本。

DE	Deutsch (Originaldokumentation)
EN	English
FR	Français
IT	Italiano
ES	Español
PT	Português
ZH	中文

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1 About these instructions

1.1 Validity of the documentation

This documentation applies to the following products:

- "IMScompact integrated measuring system" according to the catalog

This documentation is intended for assembly personnel, operators and system owners.

This documentation contains important information for the proper and safe mounting, operation, maintenance and disassembly of the product and for troubleshooting simple errors oneself.

► Before commissioning the product, read these instructions completely.

1.2 Required and supplementary documentation

Documentation which is indicated by the book symbol  must be obtained before handling the product and must be observed:

Table 1: Required documentation

	Title	Document number	Document type
	IMScompact integrated measuring system	R999001484	Catalog
	Ball rail systems BSHP	R999000464	Catalog
	Instructions for profiled rail systems	R320103885	Instructions
	Instructions for measuring display	R320103197	Instructions
	Product data sheet for Dynalub 510	R310 2052	Data sheet

The Rexroth documentation is available for download at www.boschrexroth.com/en/xc/myrexroth/media-directory.

1.3 Presentation of information

To enable users to work rapidly and safely with the product while following these instructions, this documentation uses standardized safety instructions, symbols, terms and definitions, and abbreviations. These are explained in the following sections.

1.3.1 Safety instructions in this document

This document contains safety instructions preceding any actions that involve a risk of personal injury or damage to property. The safety precautions described must be adhered to.

Safety instructions are structured as follows:

 SIGNAL WORD
Type of hazard! Consequences if ignored. ► Hazard prevention measure.

- Warning sign: draws attention to the hazard
- Signal word: indicates the severity of the hazard
- Type of hazard: indicates the type or source of hazard
- Consequences: describes the consequences that may occur if precautions to avoid the hazard are not taken
- Hazard prevention measure: indicates how to avoid the hazard

The safety instructions cover the following hazard classes. The hazard class describes the risks involved if the safety instruction is not complied with.

Table 2: Hazard classes as per ANSI Z535

Warning sign, signal word	Meaning
 DANGER	Indicates a hazardous situation which will result in death or serious injury if not avoided.
 WARNING	Indicates a hazardous situation which may result in death or serious injury if not avoided.
 CAUTION	Indicates a hazardous situation which may result in minor to moderate injury if not avoided.
NOTICE	Property damage: The product or its surroundings may be damaged.

1.3.2 Symbols

The following symbols indicate notes which are not related to safety but make the documentation easier to understand.

Table 3: Meaning of the symbols

Symbol	Meaning
	If this information is not observed, the product cannot be optimally used/operated.
	Single, independent work step
1.	Numbered work steps
2.	The numbers indicate the sequence of the work steps.
3.	
➡ 7	See section 7
➡ ☒ Fig. 7.1	See figure 7.1
	Screw with strength class...
	Tightening torque
	Cleaning
	Wear gloves

1.3.3 Abbreviations

The following abbreviations are used in this documentation:

Table 4: Abbreviations and definitions

Abbreviation	Meaning
IMS	Integrated measuring system
IMScmpact	Compact integrated measuring system
KSF	Ball rail system
1VSS	1 Volt peak-peak (electrical interface)
TTL	Transistor-transistor logic (electrical interface)
SSI	Synchronous serial interface (electrical interface)

2 Safety instructions

The product has been manufactured according to the generally accepted standards of good engineering practice. Nevertheless, if these safety instructions and the safety instructions given in the related documentation (instruction manuals, product catalogs) are not adhered to, there is a risk of personal injury and damage to property when using the product. These safety instructions form part of the product instructions. To avoid personal injury and damage to property:

- Before commencing any work with the product, be sure to read the product documentation carefully and completely.
- Make sure these safety instructions and the product documentation are always accessible to all users.
- When passing the product on to third parties, always include these safety instructions and all the required documentation.
- The product may only be mounted, started up and maintained in accordance with these safety instructions and the information given in the product documentation.

2.1 Intended use

The compact integrated position measurement system (IMScmpact) is an assembly. The IMS consists of components for precise linear movements and integrated position measuring. The product may be used in accordance with the technical documentation (product catalog) for the following purposes:

- Use as direct linear position measurement system in industrial environments (automation technology, woodworking, laser welding, laser cutting, machine tools)
- High-speed pick-and-place machines
- Use in bending and punching thanks to its high shock and vibration resistance
- Use as position encoder in applications with linear motor
- Use in currently common ambient conditions with respect to dirt, dust, magnetic fields
- For connection to display units, evaluation electronics for PCs and drive controllers

The product is intended exclusively for professional use and not for private use.

The intended use also includes having read and understood the product documentation completely, in particular these "Safety instructions".

The product is exclusively intended for incorporation into a final machine or system or for assembling with other components to build a final machine or system.



The permissible operating conditions are determined by the individual components.

2.2 Misuse

Using the product in any other way than as described under "Intended use" is considered to be misuse and is therefore not permitted.

The product may only be used in applications or environments constituting a hazard to the health and life of persons if this use – for example, in potentially explosive atmospheres covered by ATEX regulations – has been expressly specified and permitted in the product documentation.

Bosch Rexroth AG will not accept any liability for damage caused by misuse of the product. The risks associated with any misuse of the product shall be borne by the user alone.

Misuse of the product includes:

- The transport of persons
- Use in potentially explosive atmospheres
- Use in direct contact with unpacked foodstuffs
- Use in liquids
- Use as a safety component, either mechanical or electrical
- Use in environments with increased radioactivity

2.3 Personnel qualifications

The activities described in these safety instructions and the product documentation require fundamental knowledge of mechanical and electrical engineering principles and familiarity with the associated technical terminology.

For transporting and handling the product, additional skills are required in regard to the correct use of hoisting equipment and the associated fastening means.

In order to ensure safe use, these activities may therefore only be performed by appropriately trained specialists or instructed persons working under the supervision of a trained specialist.

A trained specialist is a person whose professional training, knowledge, experience and familiarity with the relevant regulations enable him/her to assess the tasks assigned to him/her, identify potential hazards and take appropriate safety precautions. A trained specialist must adhere to the relevant technical rules and standards and possess the necessary technical knowledge.



Bosch Rexroth offers you support for training in specialist areas. An overview of the training contents is provided online at: <http://www.boschrexroth.com/didactic>

2.4 General safety instructions

The integrated measuring system uses state-of-the-art technology and complies with the relevant safety regulations. However, hazards cannot be excluded. Improper handling of these components, failure to comply with the safety instructions given here, and improper interventions can result in damage to property, injury and, in extreme cases, death. Persons who mount/install, operate, de-install or maintain Rexroth products must not be under the influence of alcohol, other drugs or medications which might affect their judgment or slow down their reactions.

- The safety rules and regulations of the country in which the product is used must be complied with.
- All current and applicable accident prevention and environmental regulations must be adhered to.
- The product may only be used when it is in technically perfect condition.
- Only manufacturer-approved accessories and spare parts may be used in order to exclude any hazards to personnel caused by unsuitable spare parts.
- The technical data and operating conditions stated in the documentation for the product and accessories must be complied with.
- The product must not be put into service until it has been verified that the final product (for example a machine or system) into which the product has been installed complies with the country-specific requirements, safety regulations and standards for the application.

- The product must never be altered or modified.
- The product must never be disassembled. The only exceptions are activities described in chapter "Removal and replacement".
- The constituents of the product have been designed to last for the product's service life. In exceptional cases, however, a defect can occur. In vertical or hanging installations, the product can fall down. Appropriate measures must be taken in such installation configurations to protect against such an event (see also the Division Information Sheet on "Gravity-Loaded Axes" (No. 005 Edition 08/2012) of the Woodworking and Metalworking Division of the German statutory accident assurance association DGUV).
- The product must not under any circumstances be subjected to impermissible mechanical loads (for data, see product catalog).
- The product must never be used as a hand-support or step.
- Do not place any objects on the product without securing them in place.
- Take note of the transport instructions on the packaging.
- Cables and lines must be routed safely and tidily so that they will not be damaged, and no one can become entangled in them.
- Checks must be performed to ensure that all electrical connections are connected up or sealed off.
- The product may only be put into service when it has been completely installed.
- It must be ensured that only persons authorized by the equipment user are granted access to the immediate operating zone of the product. This applies also when the product is at a standstill.
- It must be ensured that no cable connections, other connections or components are disconnected while the system is under pressure and voltage.
- After any work on the machine, reinstall the product in compliance with instructions and regulations and check its function.
- In all cases, the provisions of the following standard must be noted and followed: DIN 637, Safety regulations for dimensioning and operation of profiled rail systems with recirculating rolling elements.

2.5 Personal protective equipment

- Wear appropriate protective equipment (e.g. safety shoes, gloves, ...) when working with the product. All items of personal protective equipment must be intact.

2.6 Obligations of the operator

- The user of the product is responsible for complying with the appropriate safety precautions for use of the product for the specific purpose envisaged by the user.
- It must be ensured that the product is operated only within the scope of the intended use as stated under ➡ 2.1 on page 6.
- It must be ensured that the operating personnel is appropriately instructed at regular intervals.
- Any potential hazard zones must be indicated by signs.
- The user is responsible for ensuring that safety devices and guards are in proper working order.

2.7 Safety devices and guards

It must be ensured that all safety devices and guards are in perfect condition and are inspected regularly according to the manufacturer's instructions and in compliance with occupational safety regulations.

Before the start-up of the product, it must be ensured that all safety devices and guards required for the product have been properly installed and are in full working order.

3 General notes on damage to product and property

The warranty applies exclusively to the as-delivered configuration.

- The warranty will not apply if the product is incorrectly assembled, commissioned, or operated, and/or if it is not handled or not used as intended.
- All assembly work must be performed with a high regard for cleanliness to avoid contamination that could lead to premature wear and malfunctioning of the product.
- Before commissioning the product, all seals and plug-and-socket connections must be checked for correct installation and intactness in order to prevent liquids and foreign matter from working their way into the product.
- At critical ambient temperatures, ➡ "9.1 Operating conditions" on page 35 in the product instruction manual, the product must be allowed to acclimatize for several hours before commissioning.
- Do not disconnect plug-and-socket connectors or cover them with mounting hole plugs to ensure that no cleaning agent or detergent can work its way into the system.
- Perform the specified maintenance work at the intervals stated in the product instruction manual (➡ "Table 1: Required documentation" on page 4).

4 Scope of delivery

Table 5: Scope of delivery

Runner block	Guide rail
Runner block with integrated scanner	Guide rail
Lube nipple	Optional IMScompact cover strip
IMScompact (R320103195) quick reference guide	Magnetic strip
	IMScompact (R320103195) quick reference guide
	Strip clamps

5 Product description

5.1 Performance description

Please refer to the notes, technical data and descriptions in the IMScapact catalog.

5.2 Device description:

The product consists of the following parts:

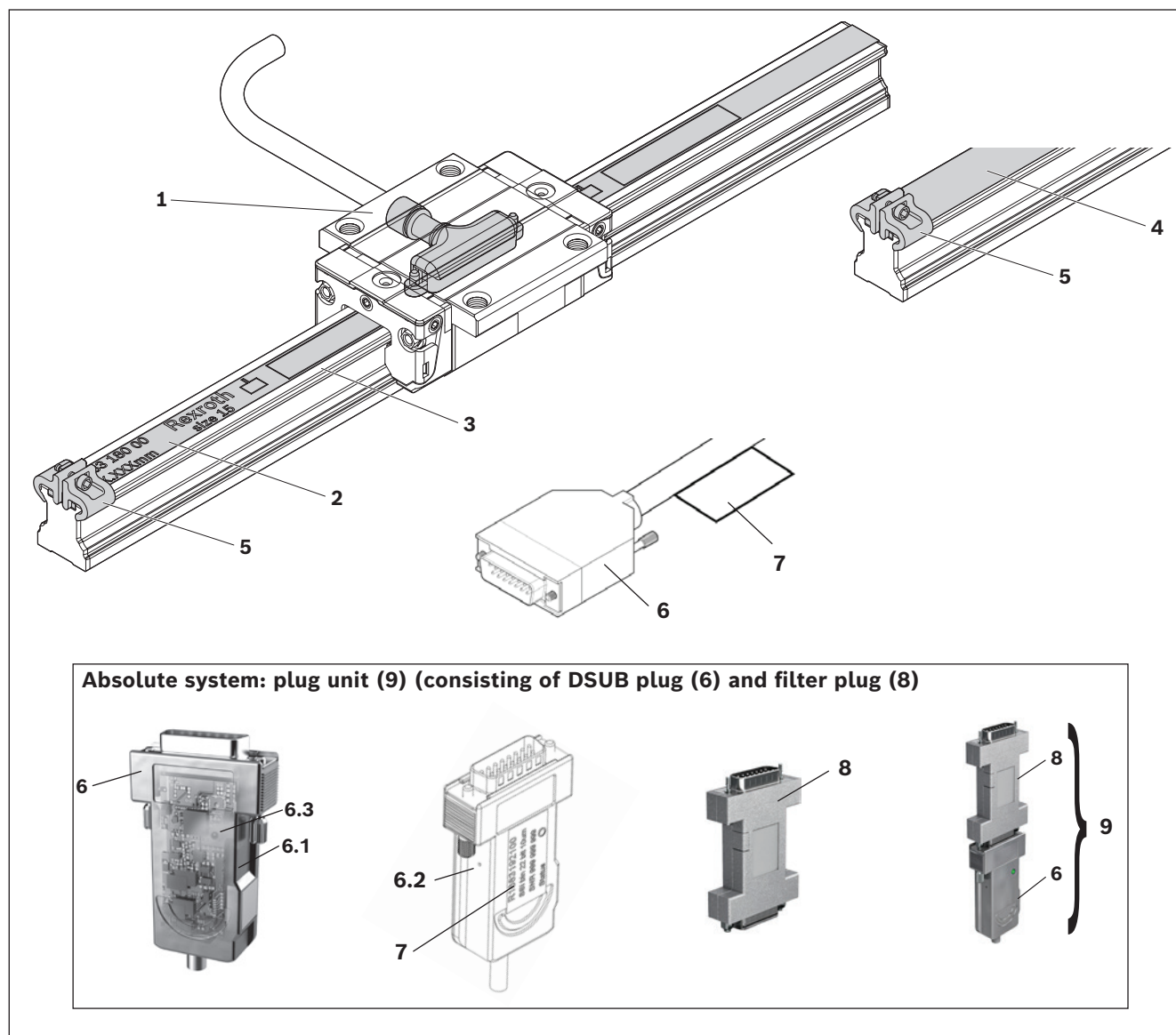


Fig. 1: Device description

- | | |
|---|---|
| 1 BSHP runner block with integrated scanner | 5 Strip clamp (for magnetic strip and cover strip) |
| 2 Magnetic strip | 6 DSUB connector 15-pin ¹⁾ |
| 3 Ball guide rail with slot in the top section | 7 Nameplate |
| 4 Optional: IMScapact cover strip | 8 Filter plug ²⁾ |
| | 9 Plug unit |

¹⁾ In absolute systems, the DSUB connector contains evaluation electronics with the following structural design:

6.1 Lithium-ion buffer battery: integrated, nominal capacity 250 mA, energy content 0.9 Wh

6.2 Reset button: Actuation force approx. 5 N, Actuation with wire Ø 0.8 mm

6.3 Status LED

²⁾ Optional: filter plug (accessories)

5.3 Identification of the product

Name plate

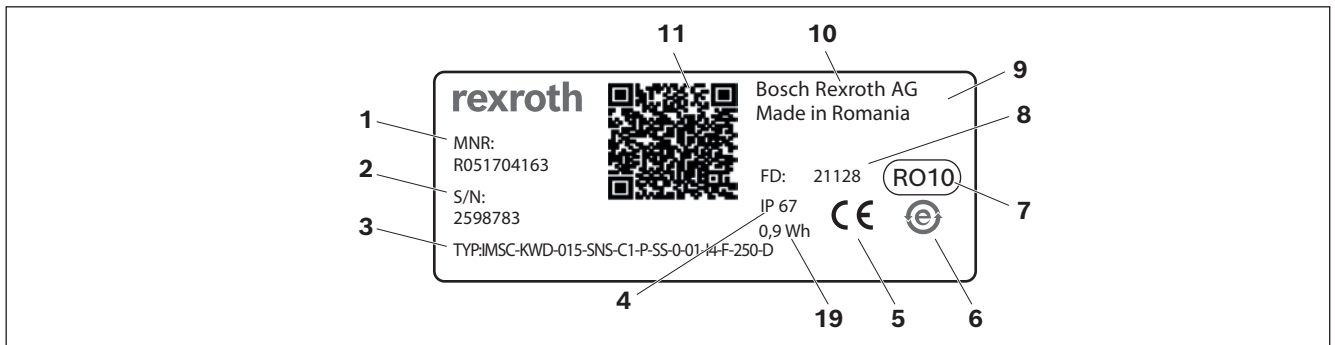


Fig. 2: Nameplate example

Guide rail:

Matching partial sections of a composite ball guide rail (track) are identified as such by a label on the packaging. This label includes the material number, the production facility as well as the rail length. All partial sections of the same rail have the same serial track number. The labeling is provided at the bottom of the ball guide rail.

For composite ball guide rails, a one-piece cover strip and a magnetic strip to cover the overall length L are supplied separately. The cover strip and magnetic strip must be secured with strip clamps after the assembly!

Ball guide rails consisting of several partial sections

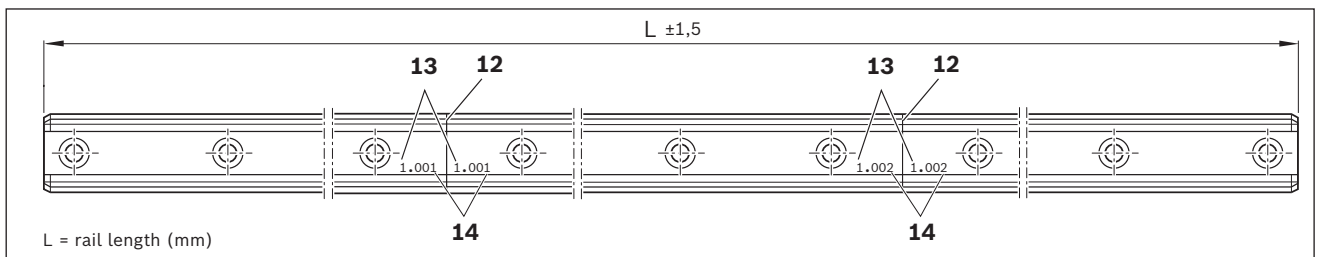


Fig. 3: Guide rail

Magnetic strip:

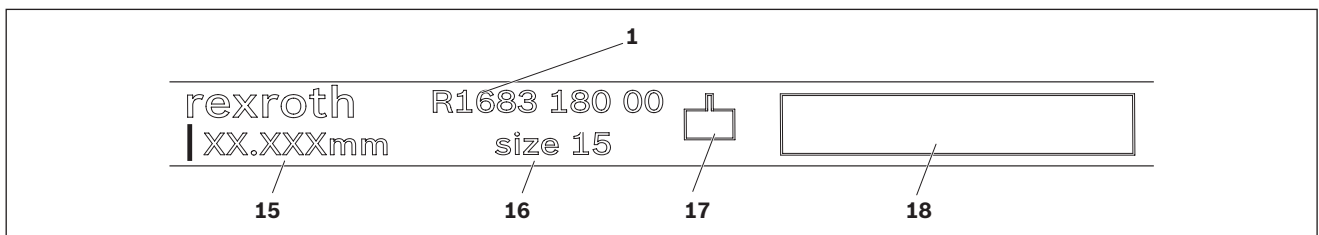


Fig. 4: Magnetic strip

- | | |
|------------------------------------|--|
| 1 Material number | 11 QR code |
| 2 Serial number | 12 Joint |
| 3 Type designation (40 characters) | 13 Track number |
| 4 Protection class | 14 Number of joint |
| 5 CE mark | 15 Absolute position |
| 6 China RoHS marking | 16 Size |
| 7 Department/factory number | 17 Pictogram for push-on direction of runner block |
| 8 Date of manufacture | 18 Magnetic strip serial number |
| 9 Designation of origin | 19 Energy content of lithium-ion battery (only absolute systems) |
| 10 Company address | |

5.4 Type designation

Example of type designation

I M S C - K W D -														IMS IMScompact integrated measuring system													
														KWD Ball runner block with scanner													
0 2 0 - F N S - C 2 - P - S S - 0 - 0 1 - I 9 - E - 3 0 0 - D																											
1 2 3 4 5 6 7 8 9 10 11																											
1 Size																											
2 Format																											
3 Preload class																											
4 Accuracy class																											
5 Seal																											
6 Ball Chain																											
7 Lubrication																											
8 Interface																											
9 Connector type																											
10 Cable length																											
11 Documentation																											

6 Transport and storage

Observe the prescribed operating conditions ➡ 9.1 on page 35 and catalogs.

6.1 Transporting the product

- Observe the Instructions for profiled rail systems.

6.2 Storing the product

NOTICE

Risk of damage due to improper storage!
Potential corrosion of product parts.

- Store the product only in dry, covered areas.
- Protect the product against humidity and corrosive agents.

- To reduce the aging of the transfer adhesive tape (at the not yet attached magnetic strip) as much as possible during storage, a storage temperature of +18°C is recommended. Additionally, the indicated storage and transport temperatures and ambient conditions of the individual components can be found in the corresponding catalogs.

7 Mounting



IMScompact assembly videos are available on YouTube:

www.boschrexroth.com/how-to-LT



7.1 Installation conditions

NOTICE

Risk of damage caused by operation under inadmissible media!

The adhesive bond between the magnetic strip and the rail as well as the electronics casting compounds used may cause a chemical reaction with solvents. For instance, this applies to alcohols, acids and ester-based solvents and cooling lubricants. For further information, please refer to the IMScompact catalog.

- Observe the operating conditions indicated in the catalog "IMScompact" and in the catalog "Ball rail systems BSHP" as well as the installation instructions in the profiled rail system instructions.



WARNING

Uncontrolled machine movement if the magnetic strip detaches!

A detachment of the magnetic strip during operation, for instance as a result of an incorrect assembly or a failure of the adhesive bond under the impact of media or due to incorrect storage (storage temperature, storage time), will lead to an incorrect formation of the position value in the machine control unit. This may result in uncontrolled machine movements.

- Observe the operating conditions indicated in the catalog "IMScompact" and in the catalog "Ball rail systems BSHP" as well as the installation instructions in the profiled rail system instructions.

7.2 Installation position



WARNING

Risk of product crashing down in vertical or slanting installations due to lack of arrestor devices!

Severe injury or death.

- In vertical or slanting installations, secure the product so that it cannot drop.
- Do not stay within the hazard zone.
- Observe the instructions for profiled rail systems.

NOTICE

Risk of damage due to improper loads!

Damage to the product.

- Observe the instructions for profiled rail systems.

7.3 Mounting the IMScapact guide rail

7.3.1 Preparation for mounting

The push-on side for the runner block (with scanner) towards the magnetic strip is marked by a pictogram (1) and represents the side of the cable outlet. In the event of an incorrect mounting orientation, the measuring system will not work.

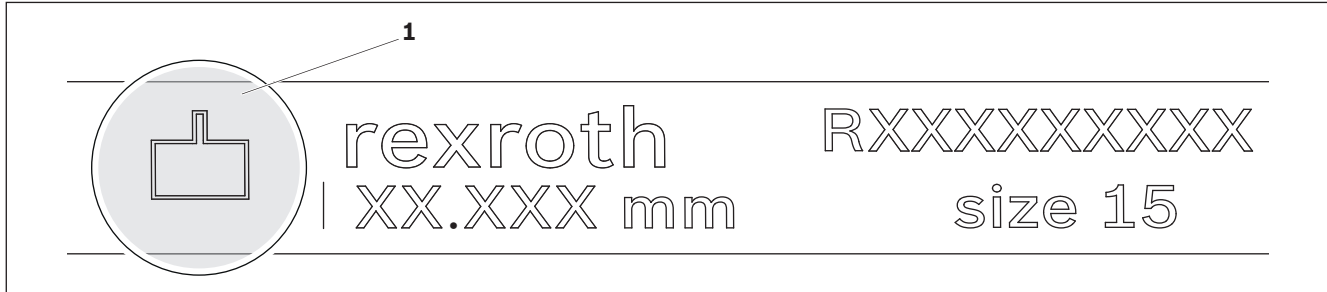


Fig. 5: Marking of push-on direction

Before mounting the guide rail, the correct installation position of the rail within the overall system must be verified, e.g. by means of a comparison with the design documents.

The subsequent installation position of the magnetic strip in the slot of the guide rail determines the position of the reference edge of the runner block and the position of the scanner at the runner block in the final installation condition!

The runner block must be pushed on after the assembly of the guide rail, as shown on the labeling of the magnetic strip (1).

Note: When using a cover strip, the labeling of the magnetic strip will be covered and the pictogram for the push-on direction (1) is no longer visible.

If the magnetic strip is shortened by the customer, please observe Fig. 7.

NOTICE

Risk of damage due to improper handling!

Damage to the product.

- ▶ Observe the instructions for profiled rail systems.
- ▶ To avoid tensions in the magnetic strip, it must not be stretched, twisted or stored/handled with the magnetized plastic strip directed to the inside.
- ▶ The minimum bending radius corresponds to 150 mm. If the magnetic strip is reeled up, inserting a partition layer to avoid damage is recommended.
- ▶ For the protection of the magnetic coding, no external magnetic fields > 64 mT may impact the magnetic strip (contact with e.g. magnetized tools, magnetic measuring stands, linear motor primary parts).

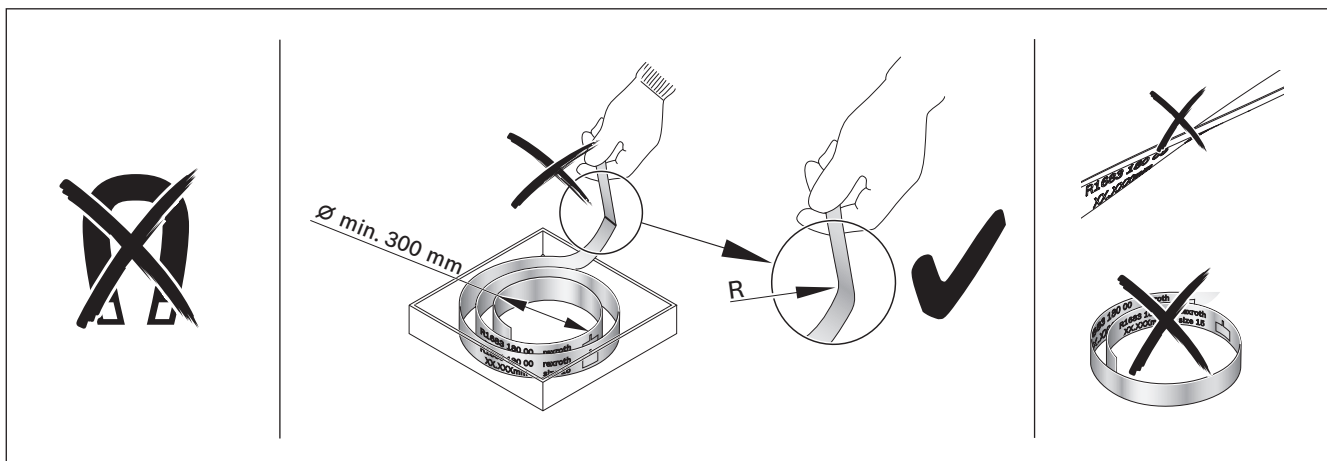


Fig. 6: Handling of magnetic strip

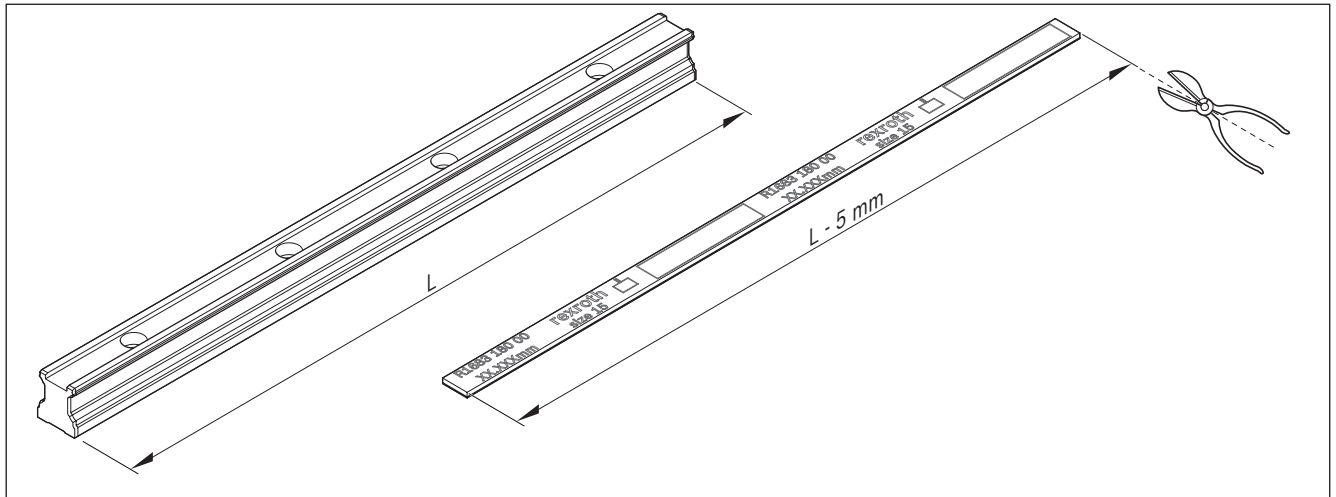


Fig. 7: Shortening the magnetic strip

7.3.2 Mounting the IMScompact guide rails

NOTICE

Risk of damage due to improper mounting!

Damage to the product.

- ▶ Always handle the integrated measuring system with great care!
- ▶ Observe the instructions for profiled rail systems.
- ▶ Take care not to exceed the maximum permitted tightening torques.

The detailed mounting sequence, including the requirements to the connection design, strength specifications notes on the alignment of the guide rails and on mounting multi-piece guide rails can be found in the mounting instructions for the ball rail system BSHP as well as in the catalog "Ball rail system BSHP".

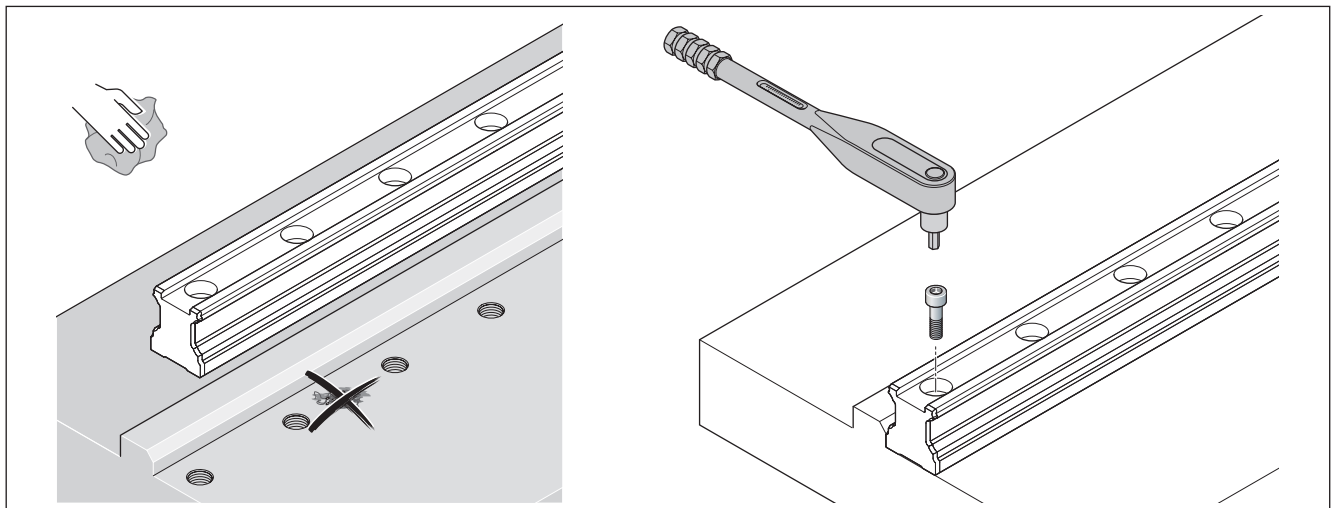


Fig. 8: Mounting the IMS guide rail

7.3.3 Mounting the IMScmpact magnetic strip

The magnetic strip is mounted by adhesion of the rail slot. Before mounting, the correct mounting orientation is to be ensured. A magnetic strip which has already been glued on is destroyed after its removal and cannot be re-used. Before bonding the magnetic strip, the latter is to be stored near the rail for approx. 30 minutes so that the temperature of the magnetic strip corresponds to the guide rail temperature, and any tensions due to thermal expansion can be excluded.

The following preparation instructions are to be observed:

Preparing the surface of guide rail slot

To guarantee an ideal adhesion, any anti-adhesive contamination (e.g. oil, grease, dust, separating agents) must be removed with solvents with residue-free evaporation. Suitable agents are ketones or alcohols. Typical solvents for cleaning the surface include a 50/50 isopropyl-alcohol/water mixture or heptane. These substances are offered by Loctite and 3M as surface cleaners, among others. When using solvents, the manufacturer's instructions are to be observed at all times!

Pressure force

The rigidity of the adhesion depends on the contact developed by the adhesive with the surfaces to be glued. The ideal pressure force is 4 ... 5 kg/cm². If applicable, use contact pressure aids.

Adhesion temperature

The most favorable adhesion temperature is between +18°C and +30°C.

Adhesions in which the surfaces to be glued are colder than +10°C are to be avoided since, in such case, the adhesive becomes too hard and a sufficient instant adhesion cannot be achieved under certain circumstances. After proper adhesion, the rigidity of the connection is also guaranteed with temperatures in the minus range. According to our experience, the final adhesion force of an adhesion is reached after approx. 72 hours (at +21°C). For adhesion, only the transfer adhesive tape which is already attached to the magnetic strip is to be used.

Notice: Acclimatize the magnetic strip ➡ 7.3.3

Mounting steps:

1. Thoroughly clean the surface.
2. Insert the magnetic strip into the rail slot. Pull off the protective film from the side beneath the magnetic strip, at the same time brush the magnetic strip into the rail groove without tensile stress.
3. Press on the magnetic strip under application of a great pressure force ($4\text{--}5\text{ kg/cm}^2$).
4. Cover the magnetic strip with lubricant (if no cover strip is used).

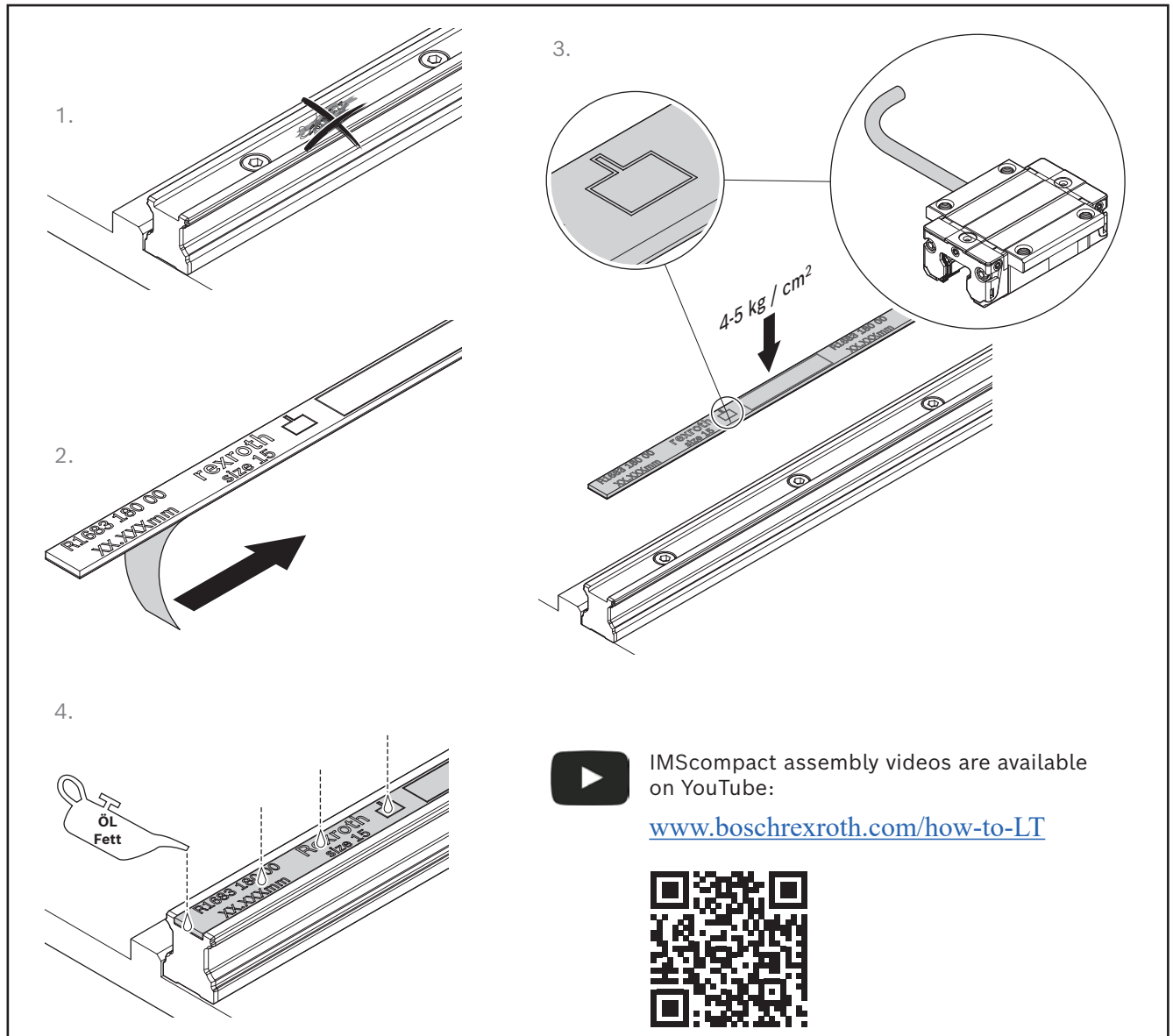


Fig. 9: Mounting the IMScompact magnetic strip

7.3.4 Mounting the IMScompact cover strip



The assembly and removal of the cover strip are described in the profiled rail system instruction.

Since the cover strip for IMScompact length measuring systems consists of a special non-magnetizable material, it must be ensured that it is not mixed up with a standard cover strip.

To avoid any mix-up, the transport packaging comprises a yellow adhesive label with the note "Measuring system".

The production of sliding seats at IMScompact cover strips is not intended.

7.4 Mounting the IMScompact runner block

For the protection of the scanner electronics, during assembly, the ESD protective cap must remain in place at the connector and/or the protective label must remain attached to the open cable end. In the event of an assembly by the customer, ESD protection is to be ensured.

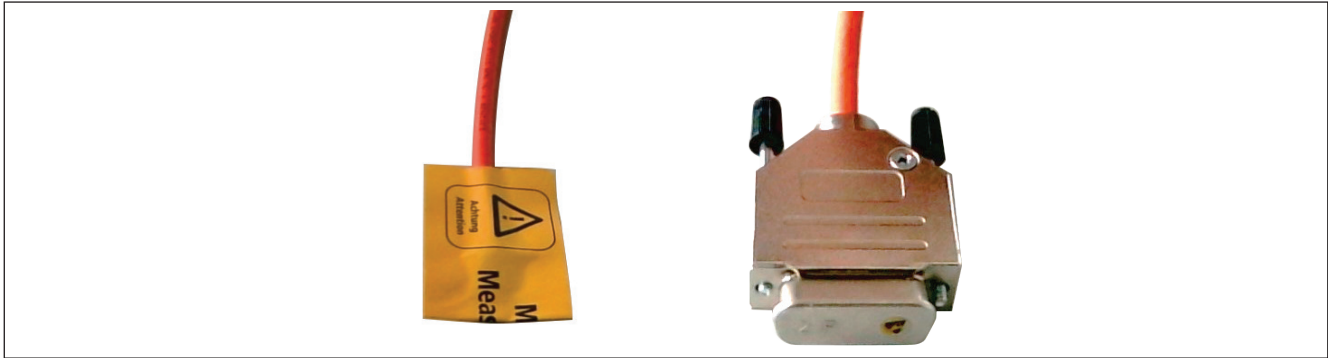


Fig. 10: Cable protection

NOTICE

Risk of damage due to improper mounting!

Damage to the product.

- ▶ Always handle the integrated measuring system with great care!
- ▶ Observe the instructions for profiled rail systems.
- ▶ The transport lock must remain in the runner block until the block is pushed onto the guide rail! Otherwise, the rolling elements may fall out.
- ▶ Only push on runner blocks if the magnetic strip is already glued into the guide rail slot.
- ▶ Do not push the runner block including the measuring system onto standard rails but only onto IMScompact rails.

7.4.1 Preconditions for proper mounting

NOTICE

Risk of damage due to incorrect mounting!

Damage to the product.

- ▶ Do not apply any tension and pressure forces on the scanner via the cable.
- ▶ Observe the smallest bending radius of the cable (25 mm static). With the smallest bending radius, dynamic forces impacting the cable must be avoided. This can be remedied by fixing it via a cable support, for example.

7.4.2 Mounting the runner block

Check the push-on direction according to the pictogram (2) on the magnetic strip. Position the runner block with transport lock (1) on the guide rail. Push the runner block onto the rail. Keep the transport lock (1) for later use during removal. After the assembly, secure both ends of the magnetic strip by means of strip clamps (3).

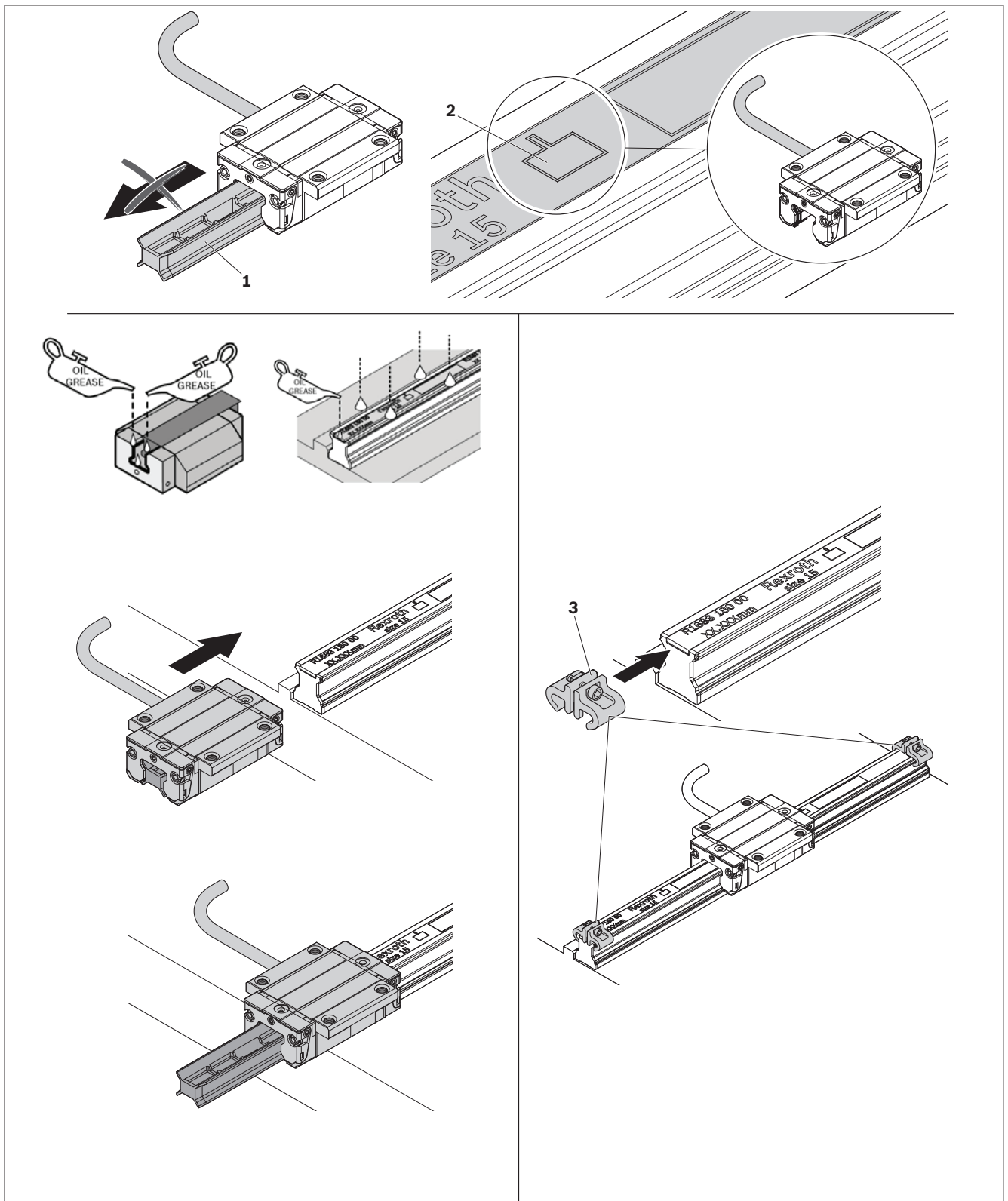


Fig. 11: Mounting the runner block

8 Commissioning



WARNING

Risk of injury due to moving parts!

Crushing.

- ▶ Do not reach into moving parts while the system is in operation.
- ▶ Do not stay in the hazard zone around moving parts.
- ▶ Make sure that no one is in the hazard zone before commissioning.

Do not commission the product until it has been verified that the end product (for example a machine or system) into which the Rexroth product has been installed complies with the country-specific requirements, safety regulations and standards for the application.



The runner block and guide rail shall be generally and sufficiently grounded. Danger to life in the event of energized components!

8.1 Checking the operating conditions

NOTICE

Risk of collision due to missing or wrongly set limit switches!

Damage to the product.

- ▶ Do not allow the product to collide with a stop.

Before commissioning, make sure the product has adequate basic lubrication (please refer to the corresponding catalog). Consider the operating conditions and technical data (e.g. ambient temperature, load, travel speed etc.).

8.2 Initial commissioning

Perform the following checks before putting the machine into service:

- ▶ Proper functioning of safety-critical assemblies (protective doors, emergency stop switches, etc.).
- ▶ Proper mounting of guide rails and cover strips.
- ▶ Ensure that all components have initial lubrication (➡ Documents Table 1 on page 4).
- ▶ Tidy installation of connection cable.
- ▶ Unit is connected to the drive controller.
- ▶ No contamination or obstacles in the working zone / travel range.

8.3 Electrical connection of the IMScompact

The connectors may only be connected up by specialist personnel.

For transport and assembly purposes, the contacts of the connector are protected by an ESD protective cap. Leave this on the plug connector until you are ready to connect the IMS to the drive controller.

Always make sure the power is off (no voltage) before connecting the connectors.

With open cable ends, ESD protection must be ensured.

In the case of absolute systems, the power supply must be provided by the evaluating unit (e.g. drive controller, controller, measurement display). In the case of an external power supply, additional EMC protective measures must be taken.

NOTICE

Risk of damage due to incorrect contacting!

Damage to the product.

- ▶ An incorrect connection (e.g. wrong pin assignment, voltage supply to one of the signal lines) can lead to the destruction of the scanner electronics.
- ▶ For EMC-compliant use, only the extension cables described in the catalog may be used. The filter plug included in the scope of delivery must be used for absolute systems.
- ▶ When installing the connection cable, make sure that its metallic connector is electrically isolated from other current-carrying plug connections.
- ▶ Ensure the voltage supply in accordance with the operating conditions.
- ▶ Short-circuiting lines between the scanner and the connector electronics of absolute systems (e.g. cutting the line, battery supply voltage to one of the signal lines) can destroy the electronics.
- ▶ Separating the connection between the scanner and the connector electronics of absolute systems will lead to loss of the buffer supply, so that a new referencing will be required. It is recommended to mark mating points against unintentional disconnection.

Requirements on the power supply of the IMS compact measuring systems (from the point of view of EMC):

The measuring systems are designed to be operated directly via a point-to-point connection with the evaluating unit, for example a drive controller. In this case, the evaluating unit takes over the DC voltage supply in the defined range (see chapter "Technical data") of the measuring system. The connection is considered as signal interface. The evaluating unit, the product, must comply with the relevant harmonized standards (generic or product standards) in accordance with the currently valid EMC Directive as specified in the Declaration of Conformity.

As an example of the evaluating unit for Bosch Rexroth drive systems, EN 61800-3: Variable speed electrical drive systems applies. To other products, EN 61000-6-2: Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity standard for industrial environments may apply. Related detailed information can be found in the operating instructions of the evaluating unit.

If you use the measuring system in a way that deviates from the installation instructions given here (point-to-point connection) or if you do not have any information about the evaluating unit used, e.g. the drive system used, or if the EMC environment at the place of use is difficult or hard to evaluate, it is for IMScompact absolute systems necessary to use an additional filter plug to comply with the requirement of the currently valid EMC directive according to the declaration of conformity. This plug is available under R168393010 (see chapter "Accessories in the catalog").

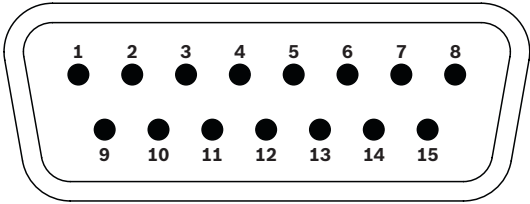
8.4 Connectors and cable routing

8.4.1 Connector types

Interface I9 (1Vss), connector option E: D-SUB 15-pin pin contact, EC assignment

Table 6: I9 interface

Pin	Cable color	Signal, incremental 1Vss
1		
2	Green	A+
3	Yellow	A-
4	Blue	0V
5	Brown	B+
6	White	B-
7		
8		
9	Pink	R+
10	Gray	R-
11	Red	10 ... 30VDC
12		
13		
14		
15		
Housing	Shield	GND

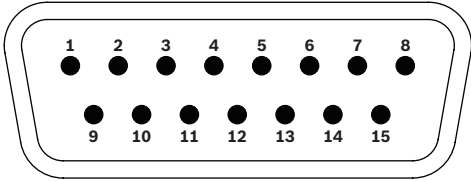


D-Sub 15-pin contacts

I4 interface (TTL), connector option F: D-SUB 15-pin pin contact, EC assignment

Table 7: I4 interface

Pin	Cable color	Signal, incremental TTL
1		
2		
3		
4	Blue	0V
5		
6		
7	Green	A+TTL
8	Yellow	A-TTL
9	Pink	R+
10	Gray	R-
11	Red	10 ... 30VDC
12		
13	Brown	B+TTL
14	White	B-TTL
15		
Housing	Shield	GND

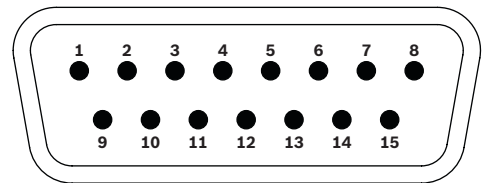


D-Sub 15-pin contacts

S1 interface, connector option G: D-SUB 15-pin pin contact, EC assignment

Table 8: S1 interface

Pin	Cable color	Absolute SSI signal
1		
2	Green	A+
3	Yellow	A-
4	Blue	0V
5	Brown	B+
6	White	B-
7	Black	EncData+
8	Purple	EncData-
9		
10		
11	Red	10 ... 30VDC
12		
13	Pink	EncCLK+
14	Gray	EncCLK-
15		
Housing	Shield	GND



D-Sub 15-pin contacts

I4 and I9 interfaces, connector option O:

Open cable end with cable routing according to the tables above.

8.4.2 Making plug connections

Connect the plugs. The strain relief is implemented by means of knurled screws (1).

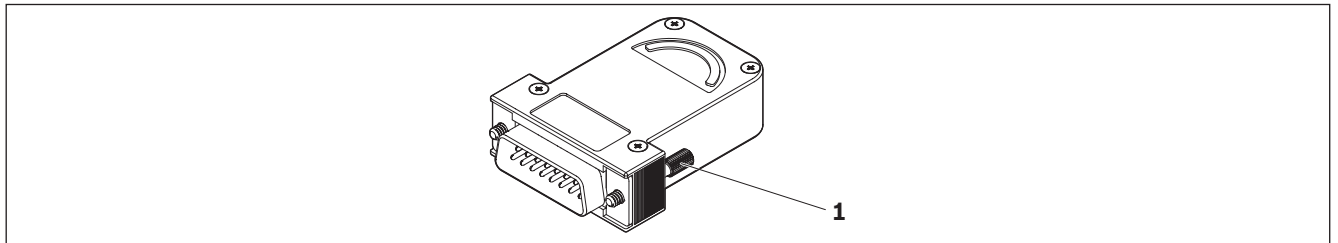


Fig. 12: Making plug connections

8.5 Definition of counting direction

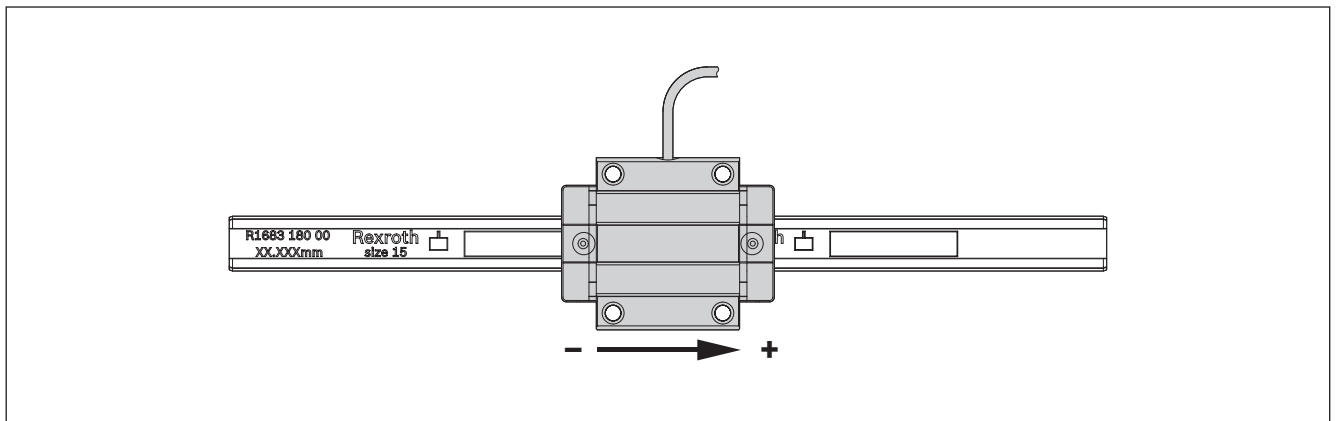


Fig. 13: Definition of counting direction

8.6 IMScapact incremental

8.6.1 Signal types

Incremental systems, I9 interface (1Vss)

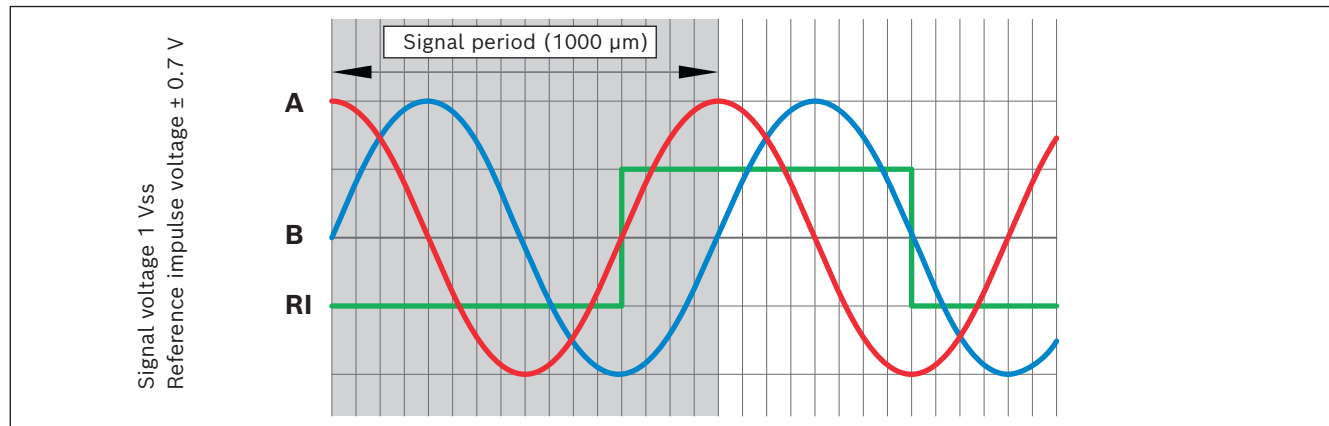


Fig. 14: Interface I9; signal sequence with positive direction of travel

Incremental systems, I4 interface (TTL)

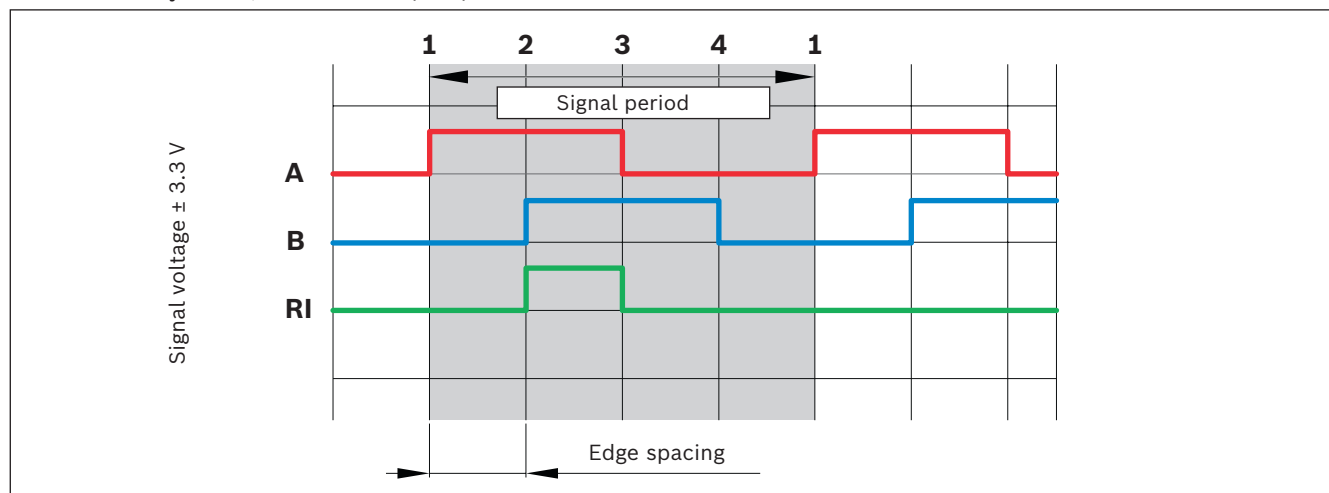


Fig. 15: Interface I4; signal sequence with positive direction of travel

8.6.2 Notices and electrical data of the signal types

- Terminate the signal outputs with a load resistance of 120 Ω .

An oscilloscope with differential scanner is suitable for measuring the signals.

The edge spacing corresponds to the TTL resolution, e.g. TTL 10 μm has an edge spacing of 10 μm

NOTICE

Risk of damage due to incorrect signal measurement!

Short-circuit.

- Ensure that a differential scanner is used for measuring! Otherwise, one of the signals to be measured could be short-circuited by the ground connection of the oscilloscope.

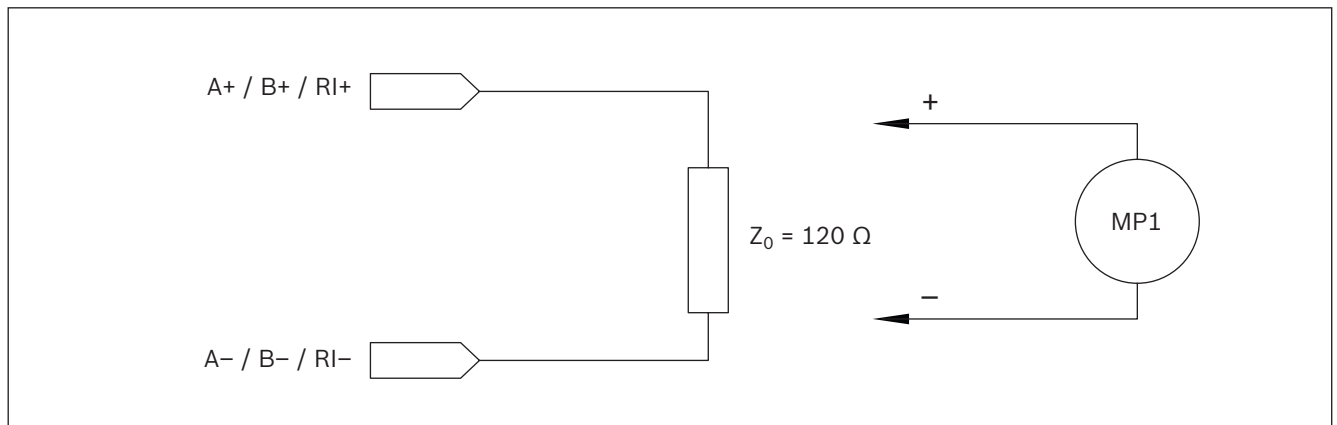


Fig. 16: Signal measurement

Table 9: Electrical data of the signal types

Symbol	Parameters	Unit	Min.	Nom.	Max.	Remark
Incremental analog I9/1Vss interface						
$U_{A/B}$	Differential signal voltage	Vss	0.6	1	1.2	
U_{RI_LOW}	Differential low level of reference voltage	V	-0.7	-	-0.4	
U_{RI_HIGH}	Differential high level of reference voltage	V	0.4	-	0.7	
$T_{A/B}$	Signal period	μm	-	1000	-	
B_{RI}	Reference signal pulse width	μm	500	1000	1500	
$f_{A/B \ A}$	Analog signal frequency at V_{max}	kHz	0	-	5	
$t_{RI \ A}$	RI pulse duration at V_{MAX} (analog)	μs	50	50	200	
Incremental digital I4/TTL interface						
$U_{A/B/RI_LOW}$	Differential low level of signal voltage	V	-3.3	-	-2	
$U_{A/B/RI_HIGH}$	Differential high level of signal voltage	V	2	-	3.3	
$T_{A/B \ TTL}$	Signal period	μm	-	40	-	10 μm TTL
$B_{RI \ TTL}$	Reference signal pulse width	μm	-	10	-	10 μm TTL
$f_{A/B \ TTL}$	Square frequency displacement signals	kHz	-	-	125	10 μm TTL
$t_{RI \ TTL}$	RI pulse duration at V_{MAX} (digital)	μs	-	2	-	10 μm TTL

The switching response times are $\leq 100 \text{ ns}$ at a capacitive load of $\leq 1000 \text{ pF}$.

8.6.3 Distance-coded reference marks

IMScompact magnetic strips are distance-coded. After passing over two reference marks, an absolute position value is available.

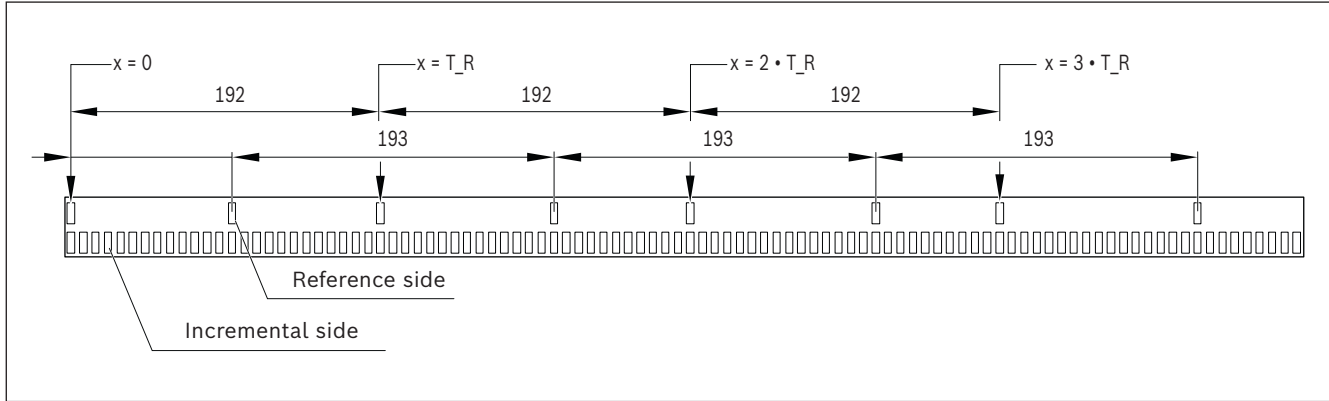


Fig. 17: Distance-coded reference marks

For the parameterization in the Rexroth drive controller, the following input values are to be provided:

- S-0-0165 Distance-coded reference dimension A (larger distance)
- S-0-0166 Distance-coded reference dimension B (smaller distance)
- S-0-0277 Bit 1 1= Distance-coded reference marks
- Bit 5 1 = Negative counting direction

For example, for a magnetic strip with $T_R = 192$ mm and an I9 interface with a pitch period of 1 mm, the controller values 192 and 193 should be input.

Maximum coding length	Reference marks T_R	Controller value: S-0-0165/S-0-0166	
		1Vss	TTL 10 μ m
18.000 mm	192 mm	192/193	4800/4825

► Controller values in Indraworks for 1Vss to EC interface:

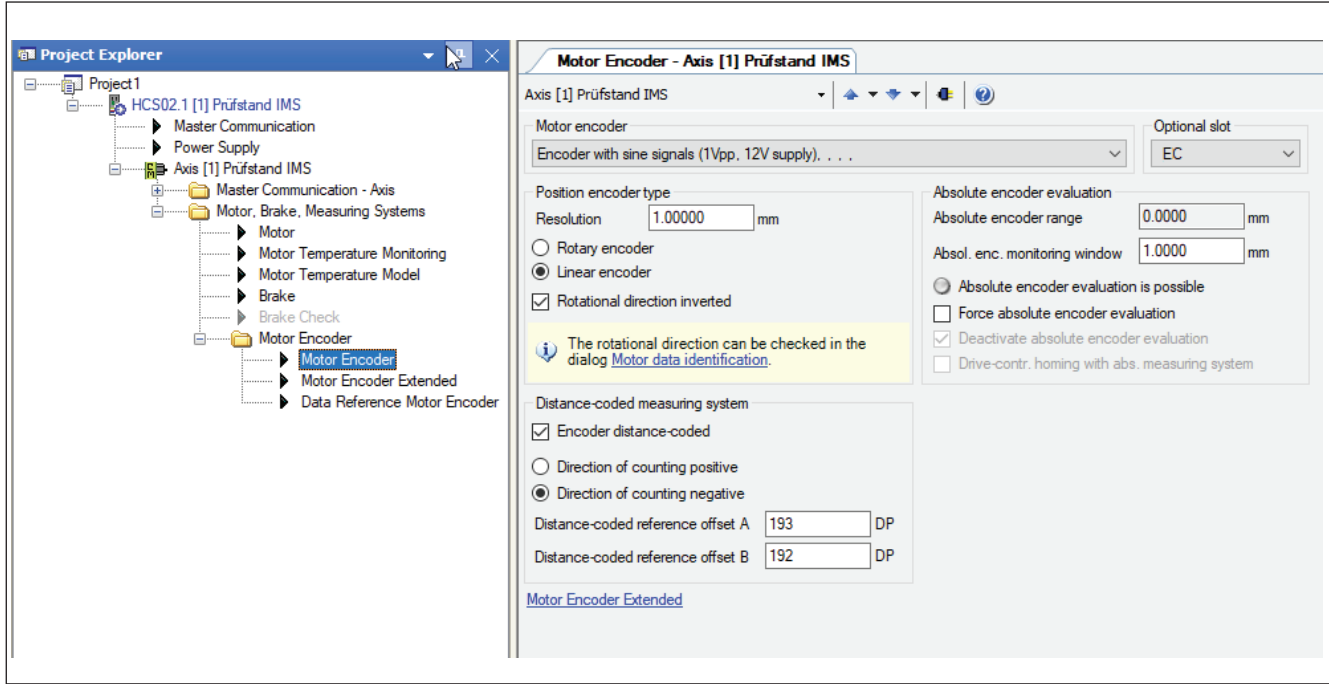


Fig. 18: Indraworks parameterization for 1Vss at EC interface

► Controller values in Indraworks for TTL 10 µm to EC interface:

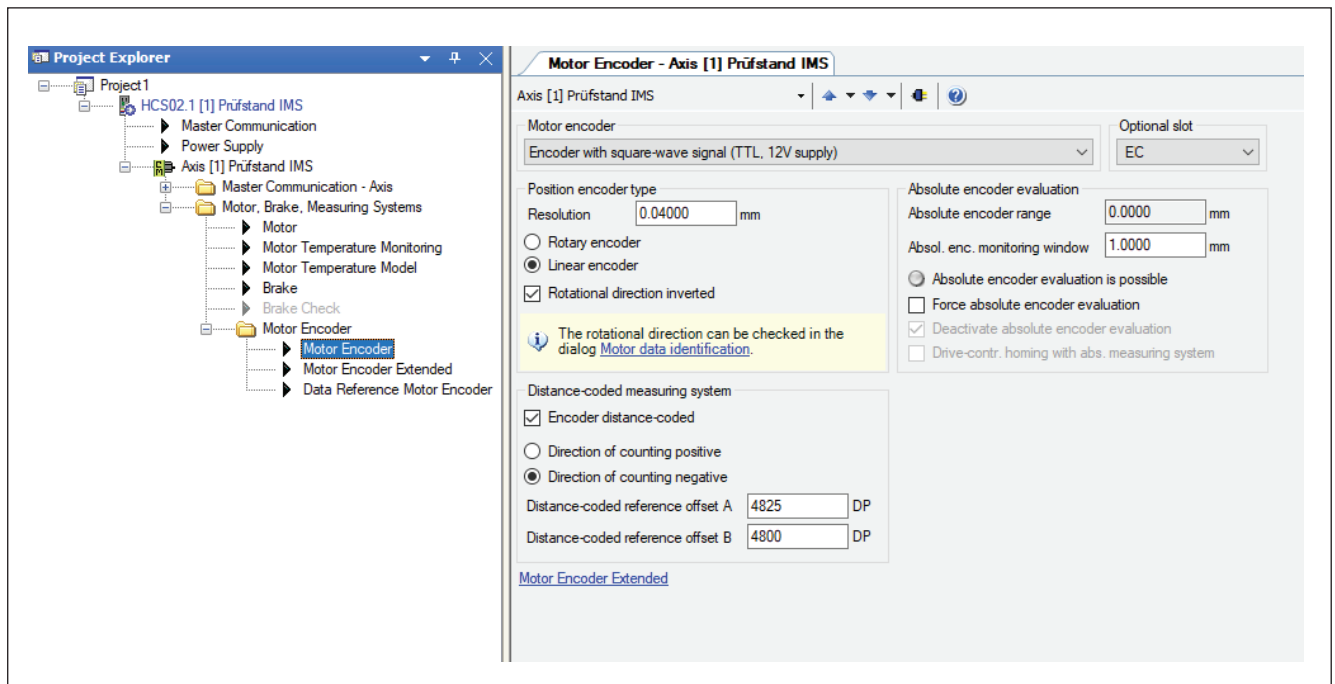


Fig. 19: Indraworks parameterization for TTL 10 µm to EC interface:

8.6.4 Adjusting the absolute offset value

In every absolute strip, an arbitrary absolute code section (between 0 meters and 18 meters) is installed. This leads to an absolute offset, which the customer first needs to correct to the machine-specific value in order to set the absolute zero point dimension to the required position.

In practice, the determination of the absolute offset is easily implemented via the continuously imprinted position value in mm.

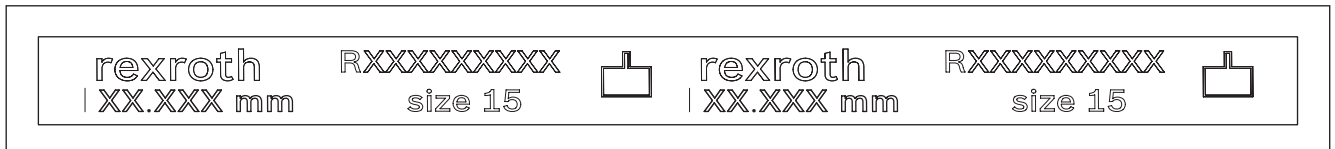


Fig. 20: Absolute strip

Even when re-ordering an absolute strip or absolute rail with the same material number, the absolute offset dimension needs to be corrected again by the customer.

8.7 IMScmpact absolute

8.7.1 Signal types

Absolute systems, interface S1 (SSI with 1Vss)

With the synchronous serial interface (SSI), the absolute position information is transferred to higher-level evaluation electronics via serial data transmission.

Parallel to the serial data transmission, the incremental sinusoidal and cosine signals (analog option I9) are also available for enhancing the control performance.

Table 10: Electrical data of the signal types

Option	S1
Coding	Binary
Number of position / data bits	22
Number of special bits	3
Total number of bits	25
Parity	Straight
Error bit	Yes
Warning bit	Yes
Resolution of the digital interfaces	10 µm
Max. clock frequency	500 kHz
Voltage supply	10 ... 30V
Current consumption	Max. 100 mA
Maximum measuring speed	5 m/s
Monoflop time tm	20 µs
Special bits	S0: Parity S1: Warning bit S2: Error bit

The signals A+, A-, B+ B- correspond to the interface I9, see description of incremental signal types.

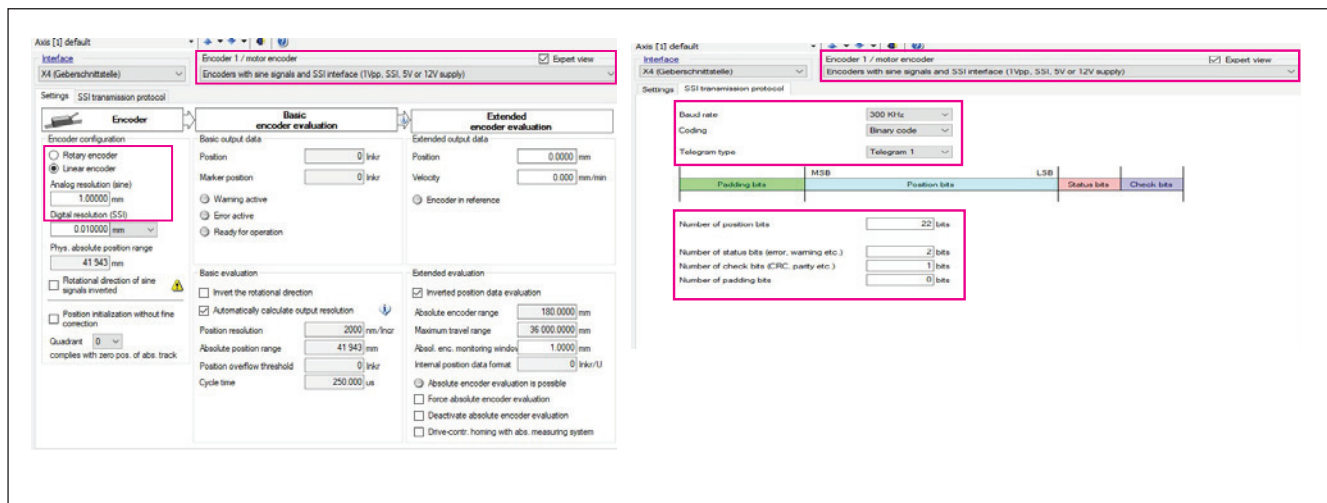


Fig. 21: Configuration example S1

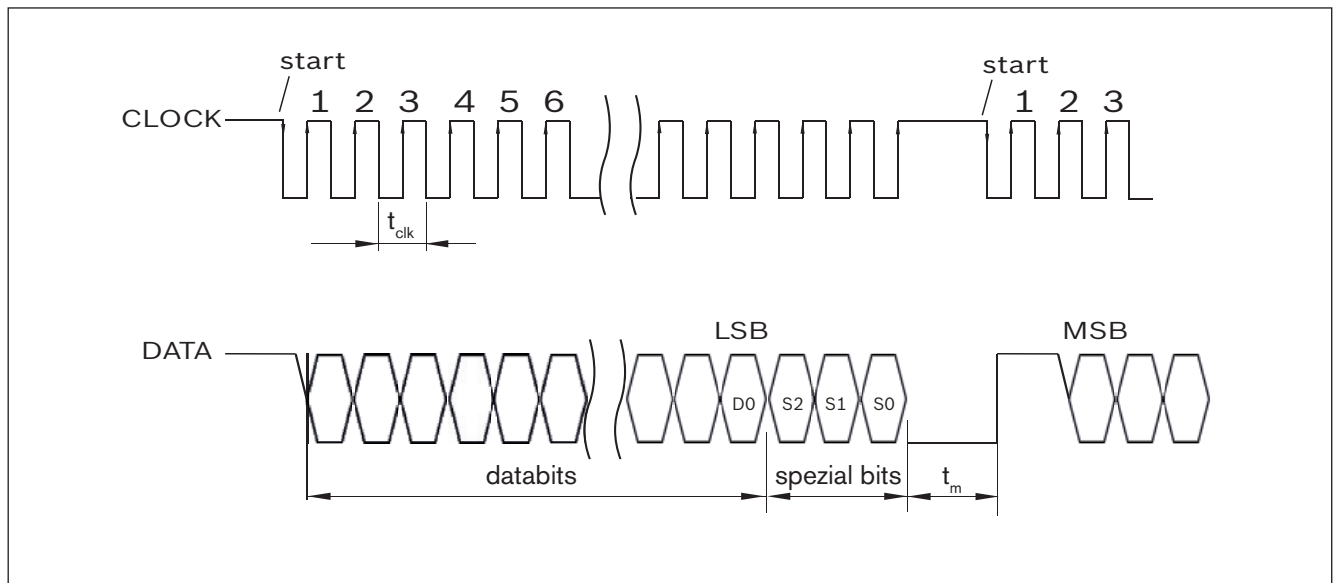


Fig. 22: Timing diagram

8.7.2 Operating modes

Commissioning mode

LED	Red/green, flashing
Warning bit	Off
Error bit	Off
SSI output	On (frozen to last value)
Causes	- Initial commissioning - Condition after reset - Condition after error mode with subsequent power down (VDC=0V)

The commissioning mode is exited with commissioning (➡ 8.7.3).

Operating mode

LED	Green (battery fully charged) or flashing green (battery charging)
Warning bit	Off
Error bit	Off
SSI output	On

Error mode

LED	Red
Warning bit	On
Error bit	On
SSI output	On
Causes	- Reading in the distance coding with invalid code sequence or change of direction during the reading process - Scanner pulled from rail under voltage supply - Exceeding the maximum permissible battery buffer time - Excessive acceleration during battery buffer operation - Scanner defective or temporarily disconnected from the connector

The error mode can be reset to commissioning mode via Power Down (VDC = 0V) or pressing the Reset button.

8.7.3 Commissioning

WARNING

Crushing.

- ▶ Do not reach into moving parts while the system is in operation.
- ▶ Do not stay in the hazard zone around moving parts.
- ▶ Make sure that no one is in the hazard zone before commissioning.
- ▶ During commissioning of the axis, only move manually at limited speed (e.g. max. 0.05 m/s).
- ▶ Consider position jump in SSI output after completion of commissioning.
- ▶ Do not pull referenced systems off the rail without recommissioning. Reset disconnected systems for error-free recommissioning to the shipping condition.

Scenario A: Referencing by means of distance coding of the scale

1. Connect VDC (reference mode, red/green LED flashing)
2. Slide the runner block at least 400 mm without changing direction (pass over three distance-coded reference marks).

LED status green or flashing green ➡ Commissioning successful.

Referencing by means of distance coding enables a reproducible absolute position even after scanner exchange or repeated commissioning.

For full buffer time, it is recommended to disconnect the voltage supply only once the LED is permanently lit in green (battery fully charged).

Scenario B: Manual referencing from the installation situation (e.g. end position/stop/defined position value)

WARNING

Risk of injury due to moving parts!

Severe injury or death.

- ▶ Manual referencing is only allowed while the drive is enabled
- ▶ Manual referencing must not be carried out in active position control mode

1. Move runner block to desired zero position (e.g. end position, stop, defined position value)
2. Connect VDC (reference mode, LED flashing red/green)
3. Hold down the reset button for at least 5 seconds: when the reset button is released, the absolute value is set to 0 at the current position of the runner block.

LED status green or flashing green ➡ Commissioning successful.

If stroke lengths of at least 400 mm are not available or a strip-independent zero point is desired from the installation situation, manual referencing is recommended.

For full buffer time, it is recommended to disconnect the voltage supply only once the LED is permanently lit in green (battery fully charged).

8.7.4 Reset to shipping condition (= RESET)



WARNING

Risk of injury due to moving parts!

Severe injury or death.

- ▶ Reset to shipping condition (= RESET) is only allowed while the drive is enabled
- ▶ Reset to shipping condition (= RESET) must not be carried out in active position control mode

By pressing the reset button, the shipping condition can be restored when the supply voltage is applied and an existing referencing can be deleted.

Actuation time of reset button > 1 second and < 5 seconds

LED lights up yellow during actuation time.

After release, the commissioning mode (LED flashing red/green) (➡ 8.7.3) is active.

8.8 Cables, extension cables

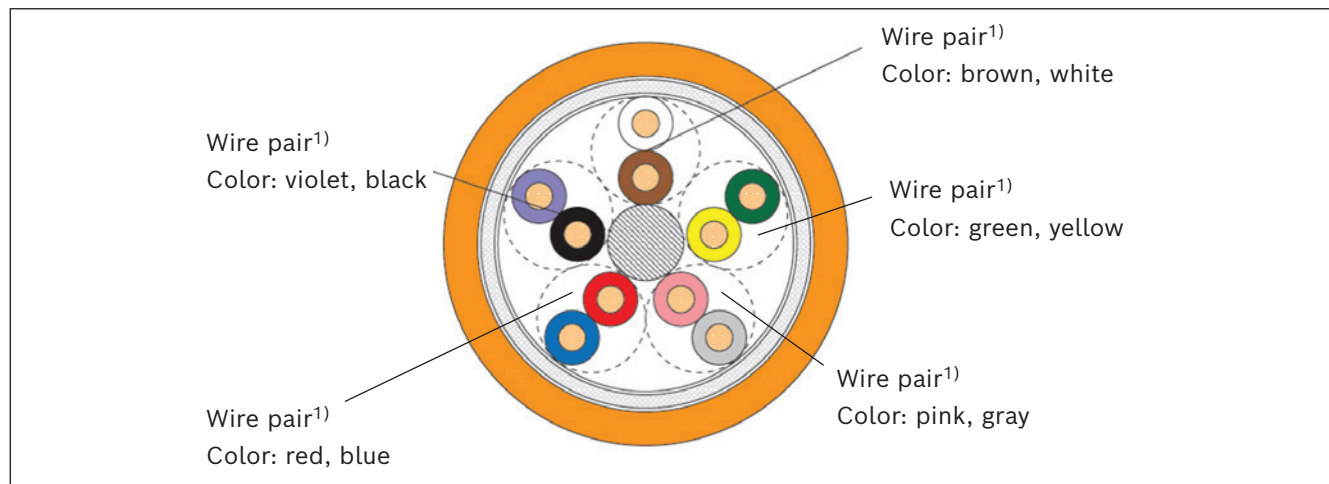


Fig. 23: Cable design

¹⁾ 2 x 0.09 mm²

Specification

- Lif9YC11Y 5x2x0.09 mm² (AWG28), suitable for drag chains
- Minimum length 0.2 m
- Cable diameter d: 5.0–0.2 mm
- Wires stranded in pairs, pairs stranded
- Wire insulation PP
- Wire colors DIN 47100
- Shield: Tin-coated CU mesh with non-woven banding and polyester foil
- Sheath: PUR color: Orange RAL2003
- UL 20549/10954
- Recommended bending radius for one-time bending (stationary): 5 x d
- Recommended bending radius for alternating bends (drag chain): 10 x d

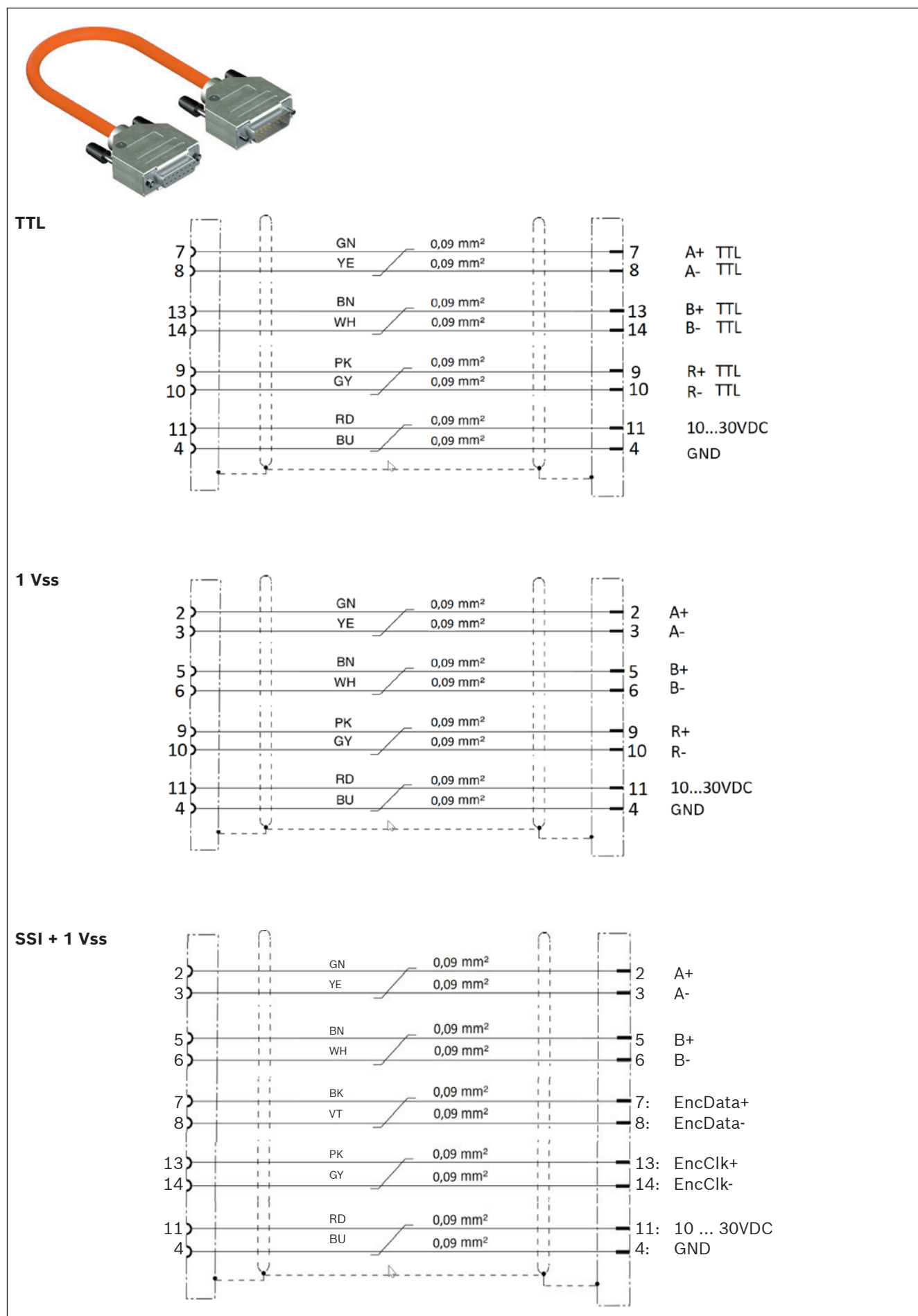


Fig. 24: Extension cable/interfaces

9 Operation



WARNING

Risk of injury due to moving parts!

Crushing.

- ▶ Do not reach into moving parts while the system is in operation.
- ▶ Do not stay in the hazard zone around moving parts.



CAUTION

Hot surfaces

Risk of burns.

- ▶ The scanner and runner block may heat up under certain circumstances.
- ▶ Wear appropriate protective clothing or allow the system to cool down before beginning any maintenance work.

NOTICE

Insufficient lubrication!

Damage to the product.

- ▶ While the equipment is in service, comply with the lubrication and maintenance intervals for ball and roller rail systems.

9.1 Operating conditions

Table 11: Operating conditions

Symbol	Parameters		Unit	Min.	Nom.	Max.	Remark
VDD	Voltage supply		V	10	12 ... 24	30	
I	Current consumption 1Vss	with VDD 12 V	mA	18	19	21	
		with VDD 24 V		10	11	12	
	Current consumption TTL 10 μm	with VDD 12 V		48	51	54	
		with VDD 24 V		27	28	30	
	Current consumption SSI + 1Vss	with VDD 12 V		–	83	100	
		with VDD 24 V		–	43	100	
v	Measuring speed		m/s	–	–	5	
Vref	Homing cycle speed		m/s	–	–	≤0.5	
	Extension cable		m	–	–	75	At I9 interface (1Vss), I4 (TTL 10 μm) and S1 (SSI)
General							
IP	Protection class of scanner			IP67	–	–	
IP	Protection class of DSUB connector			IP40	–	–	
Pabs	Ambient air pressure		hPa	800	1013	1200	
d _a /d _t	Shock (EN 60068-2-27)		m/s²/ms	–	–	500/11	½ sinus, 500 shocks, all axes
a _{VIB}	Vibration load (EN 60068-2-6)		m/s²	–	–	100	55 - 2000 Hz, all axes, 10 cycles
	Operating hours		1000 h	80	–	–	
MTTF	Mean time to failure		a	in preparation			
Absolute system							
VPUFF	Maximum speed in buffer operation		m/s	–	–	5	Only with absolute systems
aPUFF	Maximum acceleration rate in buffer operation, with VDC OFF		m/s²	–	–	30	
tPuff	Nominal buffer time with maximum motion time of 5 hours		months		6		
Q	Energy content of buffer battery ¹⁾		Wh			0.9	
T0_S	Operating temperature range of connector electronics		°C	0	–	40	
Storage							
TT	Transport and storage temperature range		°C	-10	–	80	IMScompact incremental
TT	Transport and storage temperature range		°C	-10	–	60	IMScompact absolute (connector electronics)
ρT	Relative humidity during storage		%	–	–	95	at 20°C
Operation							
Vmax	Travel speed		m/s	–	–	5	BSHP
T0	Operating temperature range Measuring block		°C	0	–	80	IMScompact incremental
T0	Operating temperature range Measuring block		°C	0	–	40	IMScompact absolute (connector electronics)
ρ0	Relative humidity in operation		%	–	–	80	at 20°C

¹⁾ The battery used is checked according to UN 38.3 and registered. The battery is a single-cell lithium-ion battery (integrated into the device). The battery does not exceed the relevant energy content limit of 100Wh for transports.

In the case of absolute systems, the power supply must be switched on when the system is at a standstill in order to form the correct position value.

The accuracy of the IMScompact is only assured when the operating conditions are complied with and the unit has been properly installed.

The IMScompact has passed the EMC tests according to the generic standards EN 61000-6-2, EN 61000-6-3, and/or the product standard EN 61326-1 in partial tests according to the following basic standards without any abnormalities, even beyond the permissible limit values.

EN 61000-4-2 ESD; EN 61000-4-3 HF Fields (ext.); EN 61000-4-4 Burst; EN 61000-4-5 Surge
EN 61000-4-6 HF Line; EN 61000-4-8 Magnetic fields; EN 55016-2 Emission (EN 55011)

10 Maintenance and repair

10.1 Cleaning and care

NOTICE

Risk of damage to the surface from solvents and aggressive detergents!

Destruction of seals and functional failure of the product.

- ▶ Use only a lint-free cloth to clean the product.

Dirt can settle and encrust on guide rails, especially when they are not enclosed.

- ▶ To ensure that seals and cover strips retain their functionality, contaminations must be removed at regular intervals.
- ▶ It is advisable to perform at least one full cleaning cycle over the entire travel range at least twice a day or every 8 hours at the latest.
- ▶ Before shutting down the machine, always perform a cleaning cycle.
- ▶ Check that the seals and closures of the plug connectors fit tightly to ensure that no moisture can penetrate the system during cleaning.

10.2 Maintenance/lubrication

The only maintenance required comprises the regular lubrication of the runner block and possibly the exchange of sealing elements.

The scanner of the IMScompact is without (physical) contact and thus maintenance-free.



WARNING

Risk of injury due to moving parts!

Crushing.

- ▶ Do not reach into moving parts while the system is in operation.
- ▶ Do not stay in the hazard zone around moving parts.

11 Removal and replacement



WARNING

Danger of uncontrolled movements due to lack of arrestor devices in vertical or slanting installations!

Severe injury or death.

- ▶ In vertical or slanting installations, secure the product so that it cannot drop.
- ▶ Do not stay within the hazard zone.



CAUTION

Risk of lubricant leak

Contamination of soil and water.

- ▶ Always use a collecting container.

Risk of skin irritation

- ▶ Wear protective gloves.

Hot surfaces

Risk of burns.

- ▶ The scanner and runner block may heat up under certain circumstances.
- ▶ Wear appropriate protective clothing, or
- ▶ allow the system to cool down before beginning any maintenance work.

Sharp edges

Risk of injury

- ▶ Wear protective gloves.

- ▶ Make sure that the machine is secured and in a safe state before starting the removal of individual components.
- ▶ Safety interlocks must be provided to prevent inadvertent switching on of the machine or system part.
- ▶ The rail with magnetic strip and the runner block with scanner can be replaced separately (interchangeable design).
- ▶ When a runner block is replaced, check the wear on the guide rail running tracks and replace the rail, if necessary.
- ▶ After the removal of the magnetic strip and before mounting a new strip, remove all adhesive residues by means of solvents.

11.1 Recommissioning after removal

- ▶ When recommissioning the unit, proceed as described in the chapter "Initial commissioning".

12 Disposal

The IMScompact is constructed from various materials: steel, plastics, grease and electronic components. The runner block (with integrated scanner) must be recycled as electronic waste.

NOTICE

Environmentally hazardous materials can pollute the environment if not disposed of properly.

Environmental pollution.

- ▶ Collect any leaking lubricant and dispose of it correctly.
- ▶ The product and its components must be disposed of correctly and in compliance with all applicable national and international guidelines and regulations.
- ▶ For absolute systems, remove the buffer battery from the housing and dispose of it separately.

12.1 Batteries and accumulators



Batteries and accumulators can be marked with this symbol. The symbol of the crossed-out waste bin on wheels indicates that batteries are to be collected separately. Within the EU, the end user is legally obliged to return used batteries. The relevant regulations must be observed outside of the validity of the EU Directive 2006/66/EC. Used batteries may contain toxic substances that can harm the environment or human health if not stored or disposed of properly. The batteries or accumulators contained in Rexroth products are to be properly disposed of after use, according to the country-specific return systems.

13 Technical data

For technical data, please refer to the "IMScompact" catalog and the catalog "Ball rail systems BSHP".

14 Ordering spare parts

For spare parts, please refer to the "IMScompact" catalog and the catalog "Ball rail systems BSHP".

15 Troubleshooting and fault clearance

Table 12: Troubleshooting and fault clearance

Fault	Possible cause	Remedies
The IMS is not transmitting signals	Runner block incorrectly mounted (pushed on).	Check runner block orientation relative to rail ➡ 7.3 on page 14.
		Remove runner block.
		Turn the runner block around and mount it ➡ 7.4 on page 18.
	The plug-and-socket connections are not properly tightened/seated.	Check the connectors.
	The supply voltage at the scanner is too low.	Check the voltage supply and adjust it if necessary.
	The standard cover strip is used instead of the IMScompact cover strip.	Replace the cover strip.
	The extension cable is too long.	Adapt the voltage supply.
		Increase the cable cross-section.
		Shorten the cable length.
Reference signals are not recognized by the controller	The plug-and-socket connections are not properly tightened/seated.	Check the connectors.
	Do not use the IMScompact cover strip.	Replace the cover strip.
	Incorrect parameter set for evaluating the reference marks.	Check the control parameters.
The absolute dimension is incorrectly calculated	Incorrect parameters set, e.g. incorrect absolute offset value or incorrect pitch periods.	Check the control parameters. Correct the absolute offset value. Enter the correct pitch period.
Unstable control	Positive feedback in control loop. Encoder inversion activated.	Check the control parameters.
	Motor phases interchanged.	Check the wiring.
Absolute accuracy of the system not achieved	Incorrect bolting or adhesive bonding of the guideway and the magnetic strip, not according to the mounting instructions.	Produce the screw connection of the rail according to the mounting instructions; produce the adhesive bonding of the magnetic strip according to the mounting instructions.
	Specifications for parallelism, flatness, bolting, strength of the linear guide not complied with.	Install the components according to mounting instructions. Follow the notices.
Sensor is touching the rail	Non-permissible load of the runner block.	Take note of the catalog information regarding max. load and reduced load capacity.
		Rule out any load on the scanner due to cable bend!
Resistance to environmental influences not assured	Specifications for parallelism, flatness, bolting, strength of the linear guide not complied with.	Install the components according to mounting instructions. Follow the notices.
	Contamination too high at the operating location.	Protect the component against contamination.
	Unsuitable media at the location of use.	Protect the component against media contamination.
	Excessive mechanical load on the runner block.	Observe the catalog information regarding max. load and reduced load capacity.

► Continued on next page

Absolute system error diagnosis

Fault	Possible cause	Remedies
Function not assured at maximum cable length	Failure to comply with defined maximum length and type of extension cable.	Use only original extension cables.
	The supply voltage is outside of the tolerance range.	Check the voltage supply and adjust it if necessary.
Red/green LED flashing SSI output value frozen	- Initial commissioning - Condition after Reset "Scenario A" - Condition after error mode with subsequent power down (VDC=0V)	The commissioning mode is exited with commissioning (⇒ 8.7.3).
LED red Error bit on SSI output value frozen	- Reading in the distance coding with invalid code sequence - Reversal of direction during the reference run - Scanner pulled from rail under voltage supply - Maximum permissible buffer time exceeded - Excessive acceleration during buffer operation (at VDC=0V) - Scanner defective or temporarily disconnected from the connector	The error mode can be reset to commissioning mode via power down (VDC=0V) or pressing the reset button. Reset options ⇒ 8.7.4

16 Service and support

16.1 Assembly videos



IMScmpact assembly videos are available on YouTube:

www.boschrexroth.com/how-to-LT



16.2 Service hotline

Our service hotline will be happy to assist you in any way they can.

You can call us at: +49 (0) 9352 40 50 60

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