TracFeed® SFA

Electromechanical remote motor drive

MANUAL

Version 1.3
English

⚠ Read the manual before carrying out any work.

Rail Power Systems GmbH
Garmischer Straße 35
81373 Munich
GERMANY
Telephone: +49 89 41999-0
Fax: +49 89 41999-270
Email: info@rail-ps.com
Internet: www.rail-ps.com

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Translation of the original

Purpose of this manual

This manual enables safe and efficient handling of the product. The manual is a component of the product and must be kept in the vicinity of the product where personnel can access it at all times.

Scope

This manual applies to the following product types:

- TracFeed® SFA – type 1.9-1
- TracFeed® SFA – type 1.11-1
- TracFeed® SFA – type 1.13-1 standard version
- TracFeed® SFA – type 1.22-1
- TracFeed® SFA – type 1.23
- TracFeed® SFA – type 1.24
- TracFeed® SFA – type 1.25

Illustrations

The illustrations in this manual are intended for a basic understanding and may vary from the actual style.

Target group

This manual is intended for the following target groups:

- Owner
- Assembly personnel
- Licensed electrician
- Authorised service personnel
- Instructed person responsible for packaging and transport work

For detailed information on the target groups and the qualifications they require for the work described in this manual, refer to ‘Qualification’ on page 19.

Supplemental directives

Limitation of liability

All the specifications and information in this manual were compiled in consideration of the applicable standards and regulations, the best available technology and our many years of expertise and experience.

The manufacturer accepts no liability for damage due to:

- Failure to comply with this manual
- Use contrary to the intended use
- Use of untrained personnel
- Unauthorised modifications
- Technical modifications
- Use of non-approved spare parts

In the case of special designs, if additional order options are chosen or due to the latest technical changes, the actual scope of supply may deviate from the explanations and information given here.

The obligations agreed in the delivery contract, the manufacturer's general terms and conditions and delivery conditions, and the applicable statutory regulations at the time of the signing of the contract shall all apply.

Copyright

Accompanying documents

In addition to this manual, also observe the accompanying documents and the included instructions and information.

NOTICE!
Find out about any country-specific regulations and take them into account.

List of applicable standards and regulations	
EN 50122-1 IEC 62128-1	Railway applications – Fixed installations – Electrical safety, earthing and the return circuit Part 1: Protective provisions against electric shock
EN 50122-3 IEC 62128-3	Railway applications – Fixed installations – Electrical safety, earthing and the return circuit Part 3: Mutual interaction of alternating current and direct current traction systems
EN 50110-1	Operation of electrical installations

List of applicable standards and regulations	
EN 50123-1	Railway applications – Fixed installations; D.C. switchgear Part 1: General
EN 50119	Railway applications – Fixed installations – Electric traction overhead contact lines

Additional project documentation	Note
Technical rules for electrical systems according to the German Federal Regulations on the construction and operation of light rail transit systems (BOStrab)	Only applicable in Germany
Technical Regulations for Electrical Systems (TR EA): ■ Part 1: Power supply systems ■ Part 2: Lighting systems	
Tests for electrical systems and equipment	
Accident prevention regulation “Electrical installations and equipment” (DGUV regulation 3)	www.dguv.de
Assembly drawings for applicable tightening torques: ■ RPS document number **3EGF002458D0025**	

Conformity

Depending on the project requirements, different EU Directives, standards and regulations apply. This can affect the content of the declaration of conformity. For this reason, the declaration of conformity is provided on a product-specific basis when the project is implemented.

The TracFeed® SFA – remote motor drives are homogenised in accordance with the EC low voltage directive **2006/95/EC** and **EN 61439-1:2009** and are certified in accordance with the EC design-examination certificate **3EGF002090D0016**.

Revision table

Date	Revision	Change
21/06/2021	1.0	Created
17/08/2022	1.1	SFA types expanded
18/04/2023	1.2	SFA types expanded
05/01/2024	1.3	SFA types expanded

Supplemental directives

General queries / training courses

Knowledge of the systems and materials and experience of installation are essential. We recommend arranging for at least one member of the contractor's personnel to be certified by Rail Power Systems GmbH as the person responsible for the work.

We are happy to answer general queries and enquiries regarding training.

Tel.: +49 89 41999-0

Fax: +49 89 41999-270

E-mail: info@rail-ps.com

In addition, our employees are always interested in new information and experiences gained from use and which could be of value to the improvement of our products.

Technical customer service

Our technical customer service is available to provide technical information.

Technical information can be requested from the sales department at Rail Power Systems GmbH.

Within Germany:

– *E-mail: vertrieb.komponenten@rail-ps.com*

International sales:

– *E-mail: sales.international@rail-ps.com*

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1 Overview

External overview

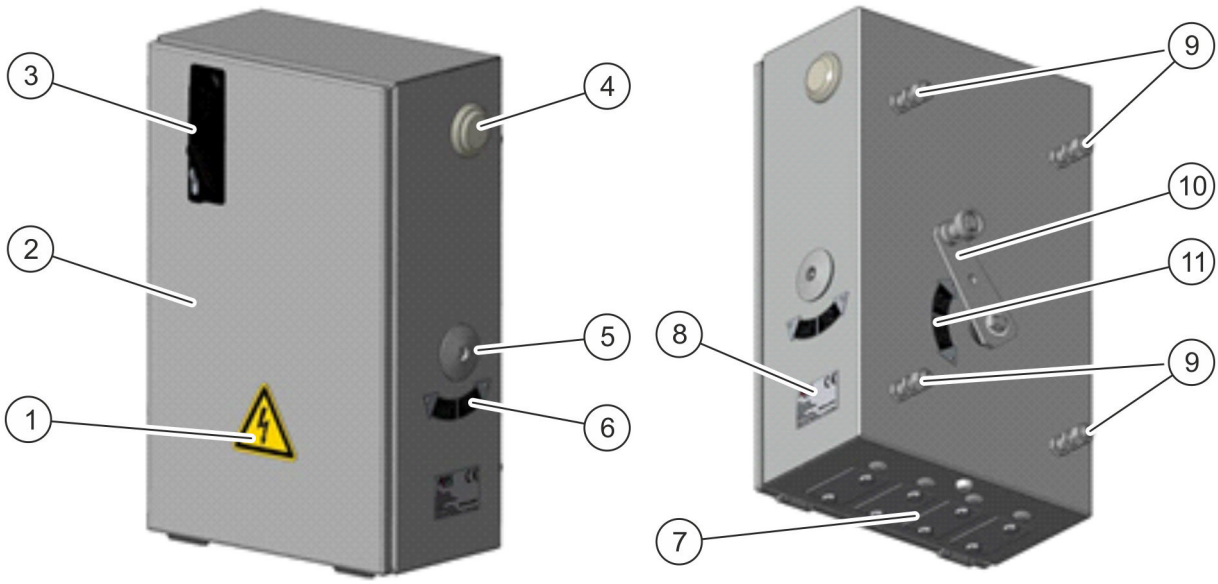

Fig. 1: Overview of TracFeed® SFA outside

1 Warning sign
2 Enclosure door
3 Lock
4 Pressure equalisation nozzle
5 Crank cover
6 “ON/OFF” label
7 Cable entry
8 Plate
9 Fastening bolt
10 Adjusting lever
11 “ON/OFF” label

Internal overview

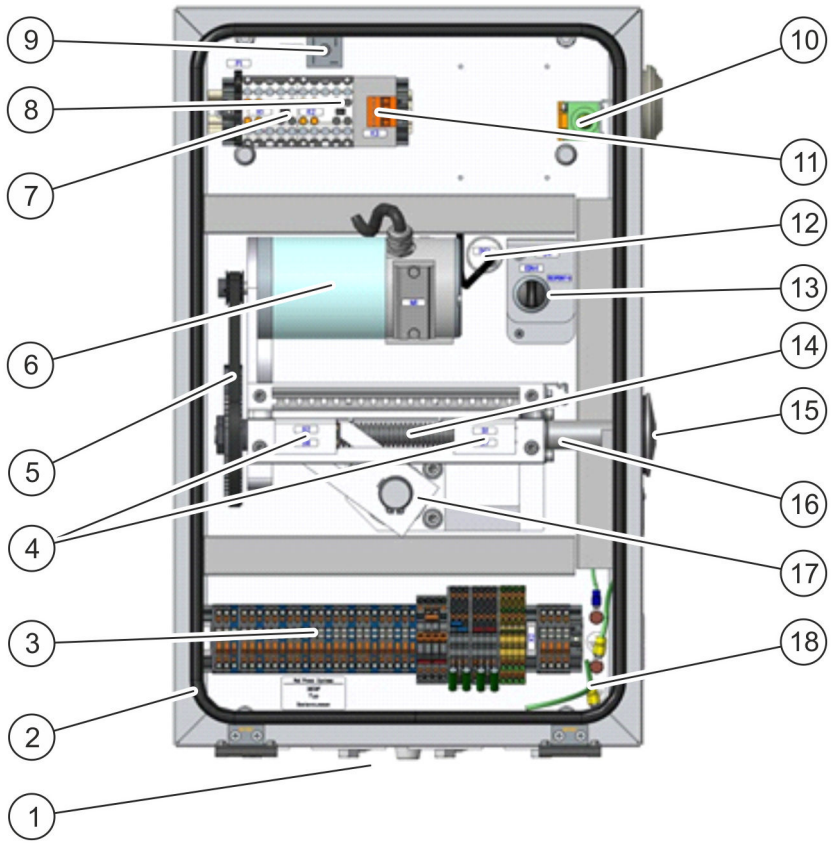

Fig. 2: Overview of TracFeed® SFA inside

1 Cable entry
2 Enclosure seal
3 Terminal strip X1
4 Limit switch on the gear unit
5 Tooth belt
6 Direct current motor
7 Power contactor K1
8 Power contactor K2
9 Rectifier
10 Door contact
11 Overcurrent relay K3
12 Capacitor
13 “ON/LOCKED” mode selection switch
14 Spindle gears
15 Crank cover
16 Crank cam
17 Adjusting lever
18 PE connection (door)

The X1 terminal strip in the enclosure is used for the electrical connection. Observe the schematic diagram!

Appendix ‘Schematic diagrams and special features’ on page 74

Short description

The TracFeed® SFA remote motor drive makes it possible to activate the switch disconnectors and earthing switches installed on the pole tips for intercity and mass transit overhead contact systems.

The TracFeed® SFA remote motor drive is installed on the contact line pole and it is connected to a switch by a final controlling element. A shift linkage provides the mechanical connection between the TracFeed® SFA remote motor drive and the adjusting lever of the switch.

The TracFeed® SFA remote motor drive is driven by a direct current motor. Power is transmitted by a tooth belt and then converted into linear motion by means of a threaded spindle. The linear motion of the threaded spindle creates a stroke at the adjusting lever. The stroke of the adjusting lever can be selected as 100 or 200 mm.

The TracFeed® SFA remote motor drive can be moved to its default position using the crank handle.

Field of application

The TracFeed® SFA is designed for use in the outdoor area of overhead contact line systems. The drive meets the requirements of **DIN VDE 0100** and the technical regulations of Deutsche Bahn AG.

Scope of supply

Order number	Designation
3EGF020334	TracFeed® SFA – type 1.9-1
3EGF021251	TracFeed® SFA – type 1.11-1
3EGF020333	TracFeed® SFA – type 1.13-1 standard version
3EGF021401	TracFeed® SFA – type 1.22-1
3EGF021394	TracFeed® SFA – type 1.23
3EGF021515	TracFeed® SFA – type 1.24
3EGF021676	TracFeed® SFA – type 1.25

The full scope of supply is specified in the contractual delivery and performance specifications or the resultant detailed design. The scope of supply for a delivery is documented by means of delivery notes and packing lists.

Accessories

The following accessories are available for the TracFeed® SFA:

Order number	Designation
Available on request	Second key
Available on request	Square socket key

Order number	Designation
Available on request	Fastening material for wall or pole mounting
Available on request	Short-circuit signalling relay
3EGF002076	Crank handle

2 Safety

2.1 Symbols used

Safety instructions

Safety instructions are indicated by symbols in this manual. The safety instructions are introduced by signal words that express the extent of the hazard.

DANGER!
This combination of symbol and signal word indicates an imminently hazardous situation that will result in death or severe injuries unless avoided.

WARNING!
This combination of symbol and signal word indicates a potentially hazardous situation that could result in death or severe injuries unless avoided.

CAUTION!
This combination of symbol and signal word indicates a potentially hazardous situation that could result in minor or slight injuries unless avoided.

NOTICE!
This combination of symbol and signal word indicates a potentially hazardous situation that could result in damage to property unless avoided.

ENVIRONMENT!
This combination of symbol and signal word indicates potential hazards to the environment.

Special safety instructions

The following symbol is used in safety instructions to draw attention to special dangers due to electric voltage:

Symbols used

DANGER!
This combination of symbol and signal word indicates hazards due to electric voltage.

Failure to comply with these safety instructions can result in severe to fatal injuries.

The following symbol is used in safety instructions to draw attention to special dangers due to working at height:

WARNING!
This combination of symbol and signal word indicates hazards due to working on ladders or lifting platforms without due care and attention.

Failure to comply with these safety instructions can result in severe injuries.

The following symbol is used in safety instructions to draw attention to special dangers due to falling objects:

WARNING!
This combination of symbol and signal word indicates hazards due to falling objects.

Failure to comply with these safety instructions can result in severe injuries.

The following symbol is used in safety instructions to draw attention to specific dangers due to suspended loads:

WARNING!
This combination of symbol and signal word indicates hazards due to load lifting procedures including suspended loads.

Failure to comply with these safety instructions will pose a danger of serious injuries.

Safety instructions in operating instructions

Safety instructions may refer to specific, individual instructions. Such safety instructions are incorporated into the instructions so that they do not interrupt the reading flow when carrying out the activity. The signal words described above are used.

Example:

1. Unscrew the screw.
2. 

CAUTION!
Risk of pinching at the lid!

Close the lid carefully.

3. Tighten the screw.

Tips and recommendations

This symbol highlights useful tips and recommendations as well as information for efficient and fault-free operation.

Bullet points

In order to highlight instructions, results, lists, references and other elements, the following markings are used in this manual:

Marking	Explanation
→	Step-by-step instructions
⇨	Results of actions
↳	References to sections of this manual and to other applicable documents
■	Lists without a specific order

2.2 Intended use

The TracFeed® SFA remote motor drive (referred to in the following as TracFeed® SFA) is used to activate the switch disconnectors and earthing switches installed on the pole tips for intercity and mass transit overhead contact systems. Power is transmitted mechanically by an adjusting lever on the back of the TracFeed® SFA, which is connected to the circuit breaker or earthing switch by a force-displacement transmission device.

The TracFeed® SFA is operated and monitored electronically from a remote location. In the event of a fault, the TracFeed® SFA can be operated manually using a crank handle.

The TracFeed® SFA has been designed and constructed solely for the intended use described here.

The intended use includes compliance with all the information in this manual, the information in the supplied documents and the documents listed in ↳ *'Accompanying documents' on page 4*.

Any use that exceeds or differs from the intended use shall be considered improper use.

Improper use

DANGER!

Danger due to improper use.

Improper use of the TracFeed® SFA can result in dangerous situations.

- Install and operate the TracFeed® SFA only in accordance with the technical data, the usage limitations, the contractually agreed specifications and the delivery conditions with the supplied accessories.
- Do not operate the TracFeed® SFA in areas at risk of explosion.
- Do not make any unauthorised modifications, manipulations or conversions.
- Never use the TracFeed® SFA for purposes other than the connection and segregation of feeding groups within overhead contact lines.

No claims of any kind will be entertained if such claims result from improper use.

2.3 Work and danger zone

Work range

The **work range** stretches along the track system and it must be defined by the person responsible for the work according to which work is to be carried out.

Danger zone

The **danger zone** includes adjacent areas because trains may be travelling on parallel/crossing tracks, for example, and the direct mounting area at the installation location.

2.4 Owner's responsibility

Owner

The owner is the natural person or legal entity who operates the product for commercial or economic purposes either for that person's own use or transfers it to a third party for use and who bears the legal product liability for the protection of personnel or third parties during operation.

Owner's obligations

The TracFeed® SFA is used in the commercial sector. The owner must therefore meet with the statutory occupational safety requirements.

In addition to the safety instructions in this manual, the applicable safety, accident prevention and environmental regulations for the area in which the TracFeed® SFA is used must be complied with.

The following applies in particular:

- The owner must keep themselves informed of the applicable occupational safety regulations and carry out a risk analysis to determine additional hazards that arise due to the specific working conditions at the area in which the TracFeed® SFA is used. The owner must then implement this information in the form of manuals governing operation of the TracFeed® SFA.
- The owner is obliged to confer with the office responsible for railway operation (control room) before beginning any work and to jointly agree on safety measures (e.g. flagmen or line closure). Before commencing work, ensure that the safety measures are effective.
- The owner must inform personnel sufficiently of any potential dangers that arise from railway operation and of protective measures. The owner must instruct personnel to follow the arrangements of the body responsible for railway operation.
- The owner must clearly lay down and define the responsibilities with respect to assembly, commissioning, operation, troubleshooting and maintenance of the TracFeed® SFA.
- The owner must provide personnel with the necessary protective equipment and instruct them to wear the necessary protective equipment.
- The owner must ensure that all personnel dealing with the product have read and understood this manual. In addition, the owner must provide personnel with training and information regarding hazards at regular intervals.
- The owner must arrange and operate the product such that it complies with the local regulations concerning interference emission and immunity in the event of electrical and magnetic fields.
- The owner must arrange the product such that it complies with the local regulations concerning electrical and magnetic fields in terms of their effect on people.
- Throughout the period that the TracFeed® SFA is in use, the owner must assess whether the manuals they have issued comply with the present status of regulations, and must update the manuals if necessary.
- The owner must notify the supervisory authorities without delay in the event of any accidents in which a person is killed or severely injured or the product suffers significant damage.
- The owner must notify the supervisory authorities without delay in the event of operating incidents that attract public attention.

Furthermore, the owner is responsible for ensuring that the product is always in technically perfect condition. The following therefore applies:

- The owner must have the product inspected for functionality and completeness by trained qualified personnel at regular intervals.
- The owner must have all safety features inspected for functionality and completeness by trained qualified personnel at regular intervals.

2.5 Personnel requirements

Insufficient qualification

DANGER!

Risk of injury if personnel are insufficiently qualified!

If unqualified personnel perform work on the system or enter the system's danger zone, dangers arise that could result in death or severe injuries. In addition, significant property damage may occur.

- All work must be performed by appropriately qualified or trained personnel only.
- All work on the electrical system must be performed by appropriately qualified electricians only.
- Unqualified/untrained personnel must be kept away from the danger zones.
- Once work on the system is complete, make sure that no tools are left behind.

General requirements

The minimum age for persons permitted to work as personnel and the requirements of employment medical examinations must comply with the locally applicable statutory regulations of the country in which the product is used.

Persons with impaired reactions due to, for example, the consumption of drugs, alcohol, or medication are prohibited.

Records must be kept of persons who work on controlling and monitoring the operating procedure. These records must clearly show the suitability, training, examination results, supervision, courses of instruction and training courses for these persons.

When selecting personnel, the applicable age-related and occupation-related regulations for the operating site must be observed.

Qualification

Personnel require the following qualifications:

Authorised service personnel
Authorised service personnel have been authorised by Rail Power Systems GmbH to perform servicing activities on the contact line system. The manufacturer's service personnel can prove their authorisation by presenting a dated certificate issued by Rail Power Systems GmbH that specifically names the personnel in question.

Fitter for contact line installations
Based on their technical training, knowledge, experience and knowledge of the applicable standards and regulations, fitters are able to assemble the contact line and they are able to independently recognise and avoid potential dangers.

Fitters are specially trained for the area of responsibility they are involved with and know the relevant standards and regulations.

Fitters must comply with the requirements of the applicable legal regulations for accident prevention.

Qualified electrician for high and medium voltage
Qualified electricians for high and medium voltage are able to carry out work on high and medium voltage installations safely due to their training, experience and knowledge. Qualified electricians for high and medium voltage avoid dangers to themselves, third parties and material property by implementing the measures for avoiding dangers as specified in the regulations and specifications for handling high and medium voltage applicable at the operating site when performing their tasks. Qualified electricians for high and medium voltage have been trained in relation to the special features of the Rail Power Systems GmbH product.

In particular, the qualified electrician for high and medium voltage has the following knowledge, which they can prove by means of a recognised certificate:

- Particular dangers when handling high and medium voltage components (e.g. arcing)
- Disconnection and earthing of high and medium voltage components
- Ensuring that high and medium voltage components are dead
- Reading and understanding circuit diagrams including the meaning of circuit symbols
- Function and design of high and medium voltage networks and railway power supplies
- Special features of high and medium voltage with AC and DC voltage
- Owner's specifications for disconnection and isolation from the power supply

On account of the aforementioned verifiable knowledge, electricians for high and medium voltage are able to perform the following activities without endangering themselves or third parties:

- On-site disconnection
- Ensuring that the installation is dead
- Switching controls manually

- Earthing and short-circuiting
- Performing certain maintenance activities

Trained qualified personnel
Based on their technical training, knowledge, experience and knowledge of the applicable standards and regulations, trained qualified personnel are able to perform assembly, operation, troubleshooting and maintenance work on the product and they are able to independently recognise and avoid potential dangers.

Trained qualified personnel are specially trained for the area of responsibility they are involved with and know the relevant standards and regulations.

Trained qualified personnel must comply with the requirements of the applicable legal regulations for accident prevention.

Unauthorised persons

WARNING!
Risk of fatal injury to unauthorised persons due to dangers in the vicinity of the working area!
Unauthorised persons who do not meet the requirements described here are not aware of the dangers in the vicinity of the working area. As a result, unauthorised persons face the risk of serious injuries or death.

– Keep unauthorised persons away from the vicinity of the working area.
– If in doubt, talk to persons and instruct them to leave the working area.
– Interrupt work while unauthorised persons are in the vicinity of the working area.

Training

The owner must train personnel on a regular basis. A training log is to be created to improve traceability. At the very least, this log must include:

- Date of the training
- Name of the trainee
- Contents of the training
- Name of the trainer
- Signatures of the trainee and trainer

Appendix 'Training log' on page 89

2.6 Personal protective equipment

Personal protective equipment protects people from adverse effects on safety and health when working.

Personnel must wear personal protective equipment when performing work on and with the product. The relevant equipment is indicated separately in the individual chapters of this manual.

- Always put on the required personal protective equipment before starting the task in question.
- Follow the instructions posted in the work area regarding personal protective equipment.

Description of personal protective equipment

The personal protective equipment is described below:

High-vis clothing
Wear high-vis clothing to make you more visible to others. Wear high-vis clothing in particular when working in the vicinity of rail tracks.

Dispose of high-vis clothing after use or have it cleaned professionally to maintain its high visibility.

Industrial safety helmet
Industrial safety helmets protect the head from falling objects, suspended loads and impact with stationary objects.

Protective clothing
Protective clothing is closely fitting clothing with a low tear resistance, narrow sleeves and without protruding parts. It primarily serves to protect against being trapped in moving machine parts. Do not wear rings, chains and other jewellery.

Protective gloves
Protective gloves protect the hands from abrasion, scrapes, punctures or deeper injuries as well as contact with hot surfaces.

Safety footwear
Safety footwear protects the feet from crushing by heavy falling parts and from slipping on slippery surfaces.

Safety helmet with visor
The safety helmet with visor provides protection against falling and flying parts and protection of the eyes and face against flames, sparks, embers, hot particles or exhaust gases.

2.7 Dangers

Voltage

DANGER!

Risk of fatal injury due to electric voltage!

Potentially fatal voltages occur on railway systems and in the vicinity of overhead contact lines.

- Permit only qualified electricians to perform work on live components. Personnel must be sufficiently informed of the potential hazards that may occur in railway operations.
- Before commencing any work, make sure that all the precautionary and safety measures have been taken.
- Before starting work on or near overhead contact line systems or active parts of electrical systems and equipment, verify that they are dead and secure them for the duration of the work. Observe the five safety rules here:
  - Isolate from the power supply
  - Securing against re-connection
  - Verify that the installation is dead
  - Earth and short-circuit
  - Cover or shield adjacent live parts

  Chapter 5 'Ensuring that the installation is dead' on page 37
- Never bypass or manipulate safety devices.

Rail traffic

DANGER!

Danger to life from rail traffic!

When work is carried out in the vicinity of rail tracks, rail traffic can result in severe to fatal injuries.

- Comply with the national regulations concerning work in the vicinity of rail tracks.
- Before beginning any work, confer with the office responsible for railway operation (control room) and jointly agree on safety measures (e.g. flagmen or line closure).
- Before commencing work, ensure that the safety measures are effective, e.g.:
  - Maintain visual contact and stay within hearing range of safety officer
  - Line closure

Working in the vicinity of rail tracks

DANGER!

Risk of fatal injury in the vicinity of rail tracks!

Carelessness when working in the vicinity of rail tracks can result in severe to fatal injuries.

- Only perform work on overhead contact lines in favourable weather conditions.
- When working in tunnels and at night, ensure sufficient illumination of the work area at all times.

Work at heights

WARNING!

Risk of injury due to work at heights being performed without due care and attention!

Working on ladders or lifting platforms without due care and attention during assembly and maintenance work can lead to injuries.

- Wear fall-arresting equipment when working at fall heights of 3 m or more.
- When working on ladders, make sure that the ladder stands securely on a solid and level surface.
- If necessary, have a second person secure the ladder.
- Comply with the national accident prevention and safety regulations for working with a lifting platform.

Falling components

WARNING!

Risk of injury due to falling components!

During assembly of components on the overhead contact line, falling parts can cause severe injuries.

- Always perform overhead assembly work with at least two persons.
- When working on subassemblies at height, make sure that there are no persons below the work range.
- Wear personal protective equipment when carrying out any work (protective clothing, safety footwear, safety helmet, high-visibility vest, protective gloves where applicable).
- Secure components against falling.

Heavy weight

WARNING!

Risk of injury due to heavy weight!

Lifting or moving parts with a high dead weight could cause back pain and injuries.

– Do not lift heavy parts alone.
– Use appropriate lifting technology or lifting tools.

Suspended loads

WARNING!

Risk of fatal injury due to suspended loads!

During lifting procedures, loads may swing out and fall down. This can cause severe to fatal injuries.

– Wear an industrial safety helmet for all work with suspended loads.
– Never walk under or inside the swivel range of suspended loads.
– Only move loads under supervision.
– Only use approved and tested hoists and load-carrying equipment with sufficient load-bearing capacity.
– Do not use torn or frayed load-carrying equipment.
– Do not place load-carrying equipment such as ropes and belts on sharp edges and do not knot or twist them.
– Set down the load before leaving the workplace.

2.8 Behaviour in the event of fires and accidents

Preventive measures

- Always be prepared for fire and accidents!
- Keep first-aid equipment (first-aid kits, blankets etc.) and fire-extinguishing equipment fully functional and within reach.
- Instruct personnel in the use of accident reporting equipment, first-aid equipment and life-saving equipment.
- Keep access routes clear for emergency vehicles.

Measures in the event of fire and accidents

- Immediately trigger an emergency shutdown by activating an emergency stop device, if present.
- If there is no risk to your own health, rescue persons from the danger zone.
- If necessary, initiate first-aid measures.
- Alert the fire brigade and/or emergency services.

- If a fire breaks out: If there is no risk to your own health, fight the fire with fire-extinguishing equipment and continue fighting the fire until the fire brigade arrives.
- Inform the person responsible at the operating site.
- Clear access routes for emergency vehicles.
- Explain the situation to the emergency services.

2.9 Environmental protection

ENVIRONMENT!

Danger for the environment due to improper handling of environmentally harmful substances!

Improper handling of environmentally materials, especially improper disposal, can lead to considerable damage for the environment.

– Always observe the instructions specified below for the handling of environmentally harmful substances and their disposal.
– If environmentally harmful substances are accidentally released to the environment, immediately take suitable measures. In case of doubt, inform the local authorities about the damage and inquire about the appropriate measures to be taken.

The following environmentally harmful substances are used:

Electronic components

Electronic components can contain toxic substances. They may not be released into the environment. Disposal must be carried out by a specialist disposal company.

Lubricants

Lubricants like greases and oils contain toxic substances. They may not be released into the environment. Disposal must be carried out by a specialist disposal company.

2.10 Safety devices

2.10.1 Location of the safety devices

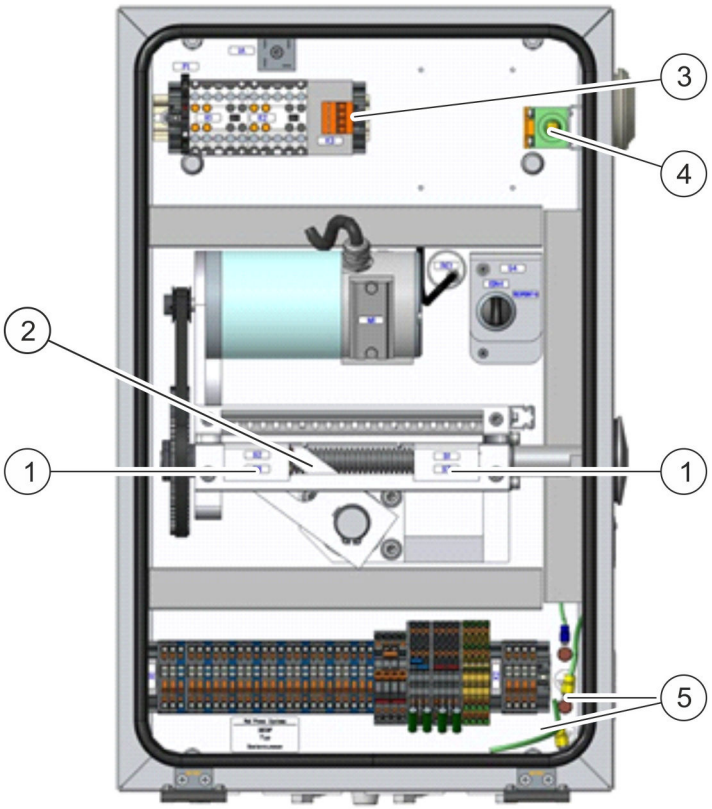

Fig. 3: Location of the safety devices

1 Limit switch on the gear unit
2 Lever with limit stop on the gear unit
3 Overcurrent relay
4 Door contact
5 Potential equalisation

2.10.2 Description of the safety devices

Overcurrent relay

The drive motor is protected against thermal overload and destruction by an overcurrent relay. The switch-off time for the overcurrent relay (Fig. 3/3) depends on the drive motor's current consumption. Overloading may occur due to mechanical sluggishness or blocking of the mast disconnector or the force-displacement transmission device.

After an overload occurs, the drive motor is switched off for approximately 2 s. After the switch-off, the mast disconnector remains in the same position. Further activation is not possible for at least 10 s and it involves a new switching command in the opposite direction to the original movement.

Door contact

To prevent electric activation of the TracFeed® SFA when the enclosure door is open, a door contact (Fig. 3/4) is installed. When the enclosure door is open, the door contact interrupts the power supply and it only enables the current when pressed.

Limit stop on the gear unit

The gearbox cannot be overwound when operated using the crank handle as it is fitted with a limit stop (Fig. 3/2). This limits the stroke movement of the adjusting lever, which prevents damage to the gearbox due to improper operation.

Potential equalisation

To protect personnel against touch voltage when working on the TracFeed® SFA, the enclosure is earthed. If assembled on a pole, the enclosure is earthed via the pole; if assembled on concrete walls, the remote motor drive must be connected to the railway earthing system.

Limit switch on the gear unit

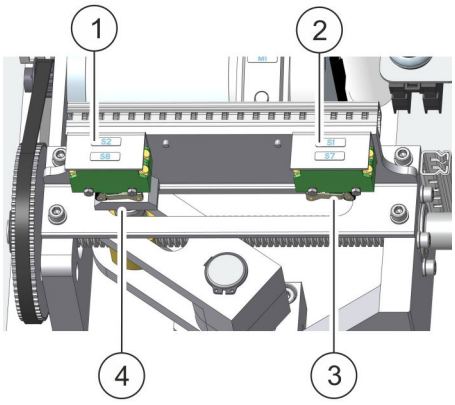

Fig. 4: Limit switch

1 Switch S2
2 Switch S1
3 Limit switch
4 Wedge

A wedge (Fig. 4/4) is attached to the gear unit; this moves when the gearbox moves if the adjusting lever moves to the “ON” or “OFF” position. For the electrical switch stroke, there are two limit switches (Fig. 4/3) fitted to the end positions of the gear; these interrupt the power supply when the corresponding end position is reached. Switch S1 (Fig. 4/2) activates in the “OFF” position, switch S2 (Fig. 4/1) activates in the “ON” position.

3 Technical data

3.1 Dimensions and weight

Specification	Value	Unit
Weight	31	kg
Width	380	mm
Height	600	mm
Depth	210	mm
Switch stroke	100 – 200	mm

3.2 Connected loads

Enclosure design

Specification	Value
Enclosure material	Stainless steel
Degree of protection	IP54
Cable entry	4 entries (up to ∅ 21 mm) for DB cable sealing terminals
	4 entries for M20 cable gland

Performance values

Specification	Value	Unit
Drive torque, approx.	450	Nm
Switch run-time, depending on load approx.	2 – 4	s

Connected loads

Specification	Value	Unit
Voltage	230	V AC
Voltage (alternative)	110/220	V DC
Mains frequency	50/60	Hz
Rated current	2.5	A

Electric motor

Specification	Value	Unit
Output	260	W
Rated voltage	200	V
Rated current	2.2	A

3.3 Ambient conditions

Operating conditions

Specification	Value	Unit
Temperature range	-30 – +50	°C
Relative humidity, maximum	95	%

Emissions

Specification	Value	Unit
Noise emission	75	dB(A)
Measurement uncertainty [KpA]	1.5	dB(A)

The TracFeed® SFA was designed to be low-noise in accordance with the normative specifications. The specified measured sound pressure level only occurs during switching.

The noise emission declaration was created in accordance with the harmonised standards listed below:

- *DIN EN ISO 3740:2001-03*
- *DIN EN ISO 11688-1:2009-11*
- *DIN EN ISO 11200:2014-10*

3.4 Rating plate

CE

Type:	3EGF014477
Serial number:	
Grid voltage:	230 V AC 50 Hz
Power consumption:	260 W
Year of construction:	2012
Operating instructions:	3EGF00xxxxD0014

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Fig. 5: Plate (example)

The plate is located on the outside of the enclosure and it contains the following information:

- Manufacturer
- CE mark
- Type designation
- Serial number
- Grid voltage
- Power consumption
- Year of construction
- Number of the manual
- Manufacturer’s address

3.5 Labelling

The following labelling can be found on and in the TracFeed® SFA. The labels refer to the immediate vicinity in which they are attached.

WARNING!

Danger if labelling is illegible!

Over time, the labelling may become soiled or otherwise illegible, with the danger that hazards cannot be detected and the necessary operating instructions cannot be followed. This results in a danger of injury.

– Keep all notices in an easily legible state at all times.
– Replace damaged labelling immediately.

Voltage

Fig. 6: Marking of the voltage

Work on and in the TracFeed® SFA may only be performed by trained qualified personnel.

Unauthorised persons must not open the TracFeed® SFA.

Earthing/potential equalisation clamp

Fig. 7: Marking of the earthing/potential equalisation clamp

- An earthing or potential equalisation conductor must be connected inside the enclosure. The corresponding bolt is marked in accordance with Fig. 7.
- The cross sections of the earthing conductors are specified in EN 60079-0 section 15.3.

Labelling of the cranking direction

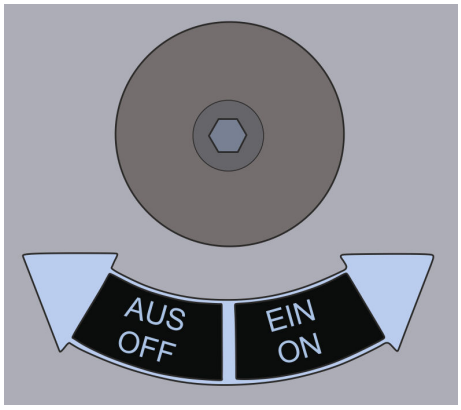


Fig. 8: Labelling of the cranking direction

The labelling of the cranking direction for switching the mast disconnector on and off manually using the crank handle is located under the crank cover.

- The “EIN/ON” cranking direction switches the mast disconnector on.
- The “AUS/OFF” cranking direction switches the mast disconnector off.

Labeling of the switch stroke

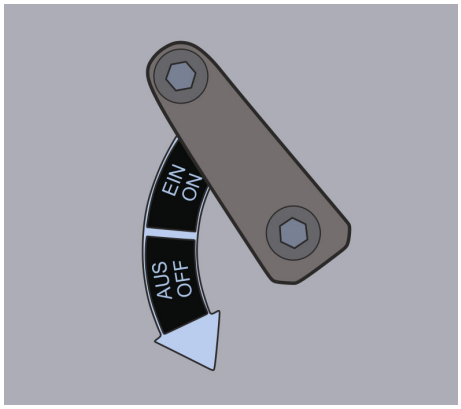


Fig. 9: Labeling of the switch stroke

The labelling for the direction in which the adjusting lever switches the mast disconnector on or off is located on the back of the TracFeed® SFA.

Terminal allocation diagram

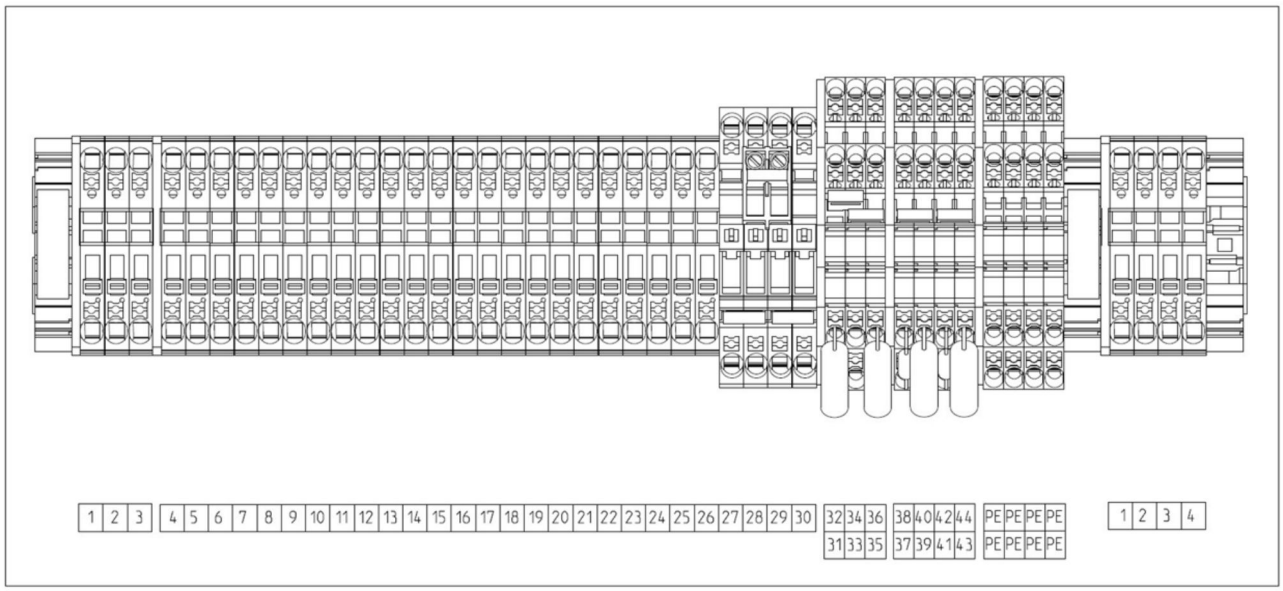


Fig. 10: Terminal allocation diagram

On the inside of the enclosure door, there is a terminal allocation diagram that provides information about the energy supply connection to the terminal strip.

4 Transport, packaging and storage

4.1 Inspection on delivery

On receipt, immediately inspect the delivery for completeness and transport damage.

Proceed as follows in the event of externally apparent transport damage:

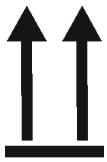
- Do not accept the delivery or accept it only conditionally.
- Note the extent of damage on the transport documents or on the carrier’s delivery note.
- Initiate a complaint.

Initiate a complaint in respect of each defect immediately upon detection. Claims for damages can only be asserted within the applicable complaint periods.

4.2 Symbols on the packaging

The following symbols are affixed to the packaging. Always observe the symbols during transport.

Top



The arrowheads of the symbol indicate the top side of the package. They must always point upwards, otherwise the contents could be damaged.

Fragile

Identifies packages with fragile or sensitive contents.

Handle the package with caution, to not allow it to fall and do not subject it to impact.

Protect against wetness

Protect packages against wetness and keep them dry.

Attachment points

Only attach sling gear (sling chain, lifting belt) to the points marked with this symbol.

Weight, attached load

Marks the attachment point for exact weight specifications.

Handle the marked package in accordance with its weight.

4.3 Transporting the packages

Improper transport

NOTICE!

Property damage due to improper transport!

Packages can fall or topple over during improper transport. This can result in extensive property damage.

- When unloading the packages on arrival, as well as during transport, proceed with caution and observe the symbols and instructions on the packages.
- Note the weight of the packages. Always use suitable materials handling technology when transporting the packages. If the packages are transported by persons, note the weight and dimension of the packages and transport them with other people if necessary.
- Only remove the packaging immediately prior to assembly.
- Only use the intended attachment points.
- Avoid hard impacts; do not throw the packages, and avoid damage in general.
- If the packages are shipped by sea, seal them in foil to prevent corrosion due to contact with salty air.

Transporting pallets with a forklift or pallet truck

Packages that are attached to pallets can be transported with a forklift or pallet truck under the following conditions:

- The forklift or pallet truck must be designed for the weight of the packages.
- The package must be securely attached to the pallet.
- The forklift operator must be authorised to operate the forklift or pallet truck in accordance with the locally applicable regulations.

Transporting

1. Drive the forklift or pallet truck with the forks between or under the bars of the pallet.
2. Insert the forks so that they protrude from the opposite side.
3. Ensure that the pallet cannot tip over if there is an eccentric centre of gravity.
4. Lift the pallet with the package and transport it to the intended location.
5. 

   WARNING!
   Risk of injury from heavy loads!

   When packages are transported in the vicinity of the rail track, have them carried by two people.

4.4 Storage of the packages

Store the packages under the following conditions:

- Do not store outdoors.
- Store in dry and dust-free conditions.
- Do not expose to aggressive media.
- Avoid mechanical shocks.
- Storage temperature: -30 to +50 °C
- Relative humidity: ≤ 95% non-condensing
- Make sure that the package is not damaged or soiled.
- If storing for longer than three months, check the general condition of all parts and the packaging on a regular basis.

Under certain circumstances, more stringent storage instructions than the requirements specified here may be affixed to packages. Observe this information accordingly.

4.5 Packaging

About the packaging

The product is packaged in cardboard in accordance with the expected transport conditions. Recyclable materials are used in the packaging.

The packaging is intended to protect the individual components from transport damage and other damage prior to assembly. For this reason, do not destroy the packaging and only remove it shortly before assembly.

Handling packaging materials

Dispose of packaging materials according to the applicable legal provisions and local regulations.

Transport, packaging and storage

Packaging

ENVIRONMENT!

Danger to the environment due to incorrect disposal.

Packaging materials are valuable raw materials and can often be re-used or treated and recycled. Incorrect disposal of packaging materials may pose risks to the environment.

– Dispose of packaging materials in an environmentally friendly manner.
– Observe the locally applicable disposal regulations. If necessary, commission a specialist company with the disposal.

5 Ensuring that the installation is dead

Personnel:
- Qualified electrician for high and medium voltage

Protective equipment:
- Safety helmet with visor
- Protective clothing
- Protective gloves
- Safety footwear

5.1 Isolate from the power supply

The part of the system on which work is to be performed must be disconnected from all infeeds.

The disconnection must involve isolating distances in the air or equivalent insulation to ensure that no flashover takes place.

5.2 Securing against re-connection

Re-connection must be reliably prevented.

Depending on the legal situation, it may be necessary to attach a prohibition sign, for example.

5.3 Verifying that the installation is dead

Tool:
- Voltage tester

→ Verify that all poles in the work range are dead using suitable measuring/testing equipment or voltage testers.

5.4 Earthing and short-circuiting

In high-voltage systems and some low-voltage systems, all parts on which work is to be carried out must be earthed and short-circuited at the work location.

Prerequisite:

- The earthing and short-circuiting equipment, cables and connections must be suitable and designed for the short-circuit stress at the installation location.

1. First connect the earthing and short-circuiting equipment to the earthing system and then to the parts to be earthed.
2. If possible, attach the earthing and short-circuiting equipment so that it is visible from the work location. If this is not feasible, attach it as close as possible to the work location.

5.5 Cover or shield adjacent live parts.

If it is not possible to disconnect parts of the system in the vicinity of the work location, additional safety measures must be taken before commencing work, as defined for “working near live parts”.

The safety distances that must be kept from active (live) parts, as specified under “Protection by means of distances and oversight”, must be maintained at all times.

Persons without special electrical instruction must maintain a minimum distance of 3 m and persons with special training must maintain a minimum distance of 1.5 m.

1. Cover adjacent live components with suitable insulating materials such as rubber mats.
2. In addition, indicate the hazard area, for example with barrier tape.

6 Assembly

6.1 Tools and materials

Tools

The following tools are required during assembly:

Drill

Dust extraction
Suitable dust extraction for drilling work in a tunnel.

Hand tools
- Open-end/ring spanner, A/F 17 to 32
- Lever/changeover ratchet with torque limitation
- Triangular wrench, A/F 13 to 32
- Spirit level
- Folding rule, 2 m
- Cutter knife
- Screwdriver set
- Rubber mallet
- Hammer
- Set of universal pliers
- Multi-part hexagonal wrench
- Keys for remote motor drive (depending on version)

Installation tester
The installation tester is used to check that electrical switching operations and installations are functioning correctly.

A suitable measuring device must be tested in accordance with IEC 61557-3 (DIN EN 61577-3, DIN VDE 0413-3).

Measuring device for earthing resistance
A suitable measuring device for the earthing resistance must be tested in accordance with IEC 61557-3 (DIN EN 61577-3, DIN VDE 0413-3).

Megohmmeter
The megohmmeter is used to measure the insulation resistances.

A suitable measuring device must be tested in accordance with IEC 61557-3 (DIN EN 61577-3, DIN VDE 0413-3).

Voltage tester
Suitable for the system’s operating voltage.

Materials

The following materials are required during assembly and maintenance:

Fastening brackets
Heavy load anchors, adhesive anchors, threaded anchors

Grease
Shell Retinax EP2 grease

6.2 Requirements for the installation location

Prior to beginning the assembly work, make sure the measures for establishing and securing a de-energised state at the workplace have been carried out.

The following activities have been completed:

- The pole for assembling the TracFeed® SFA have been installed.
- Mast disconnectors and connecting rods have been installed.

6.3 Assembly preparation

To fasten the TracFeed® SFA to poles or (tunnel) walls, you require retaining brackets for offset mounting in order to connect the force-displacement transmission device that needs to be connected to the back.

Corresponding retaining brackets are available for different pole types as accessories from Rail Power Systems GmbH customer service.

NOTICE!

Property damage from excessively long bolts!

If the bolts chosen are too long, there is a risk of property damage to the components of the TracFeed® SFA.

– Do not screw in bolts deeper than 17 mm.
– Do not forcibly screw in bolts deeper than flush with the base plate.

Personnel:	■ Trained qualified personnel
Protective equipment:	■ Protective clothing ■ Industrial safety helmet ■ Protective gloves ■ Safety footwear ■ High-vis clothing
Tool:	■ Hand tools

The TracFeed® SFA has assembly points on the back of the enclosure.

Depending on the local conditions, it may be useful to either first install the retaining brackets on the TracFeed® SFA or first attach the retaining brackets to the pole or structure. This decision should be made in advance.

1. Attach retaining brackets to the back of the TracFeed® SFA with M16 fastening bolts.
2. Screw the TracFeed® SFA and the retaining brackets onto the previously installed fastening brackets.
3. Connect the TracFeed® SFA to the railway earth for potential equalisation.

6.4 Assembly

6.4.1 Assembly on a lattice steel mast or flat-frame mast

Overview

The TracFeed® SFA has to be installed on the side of the pole containing the switch crossbar with the mast disconnector.

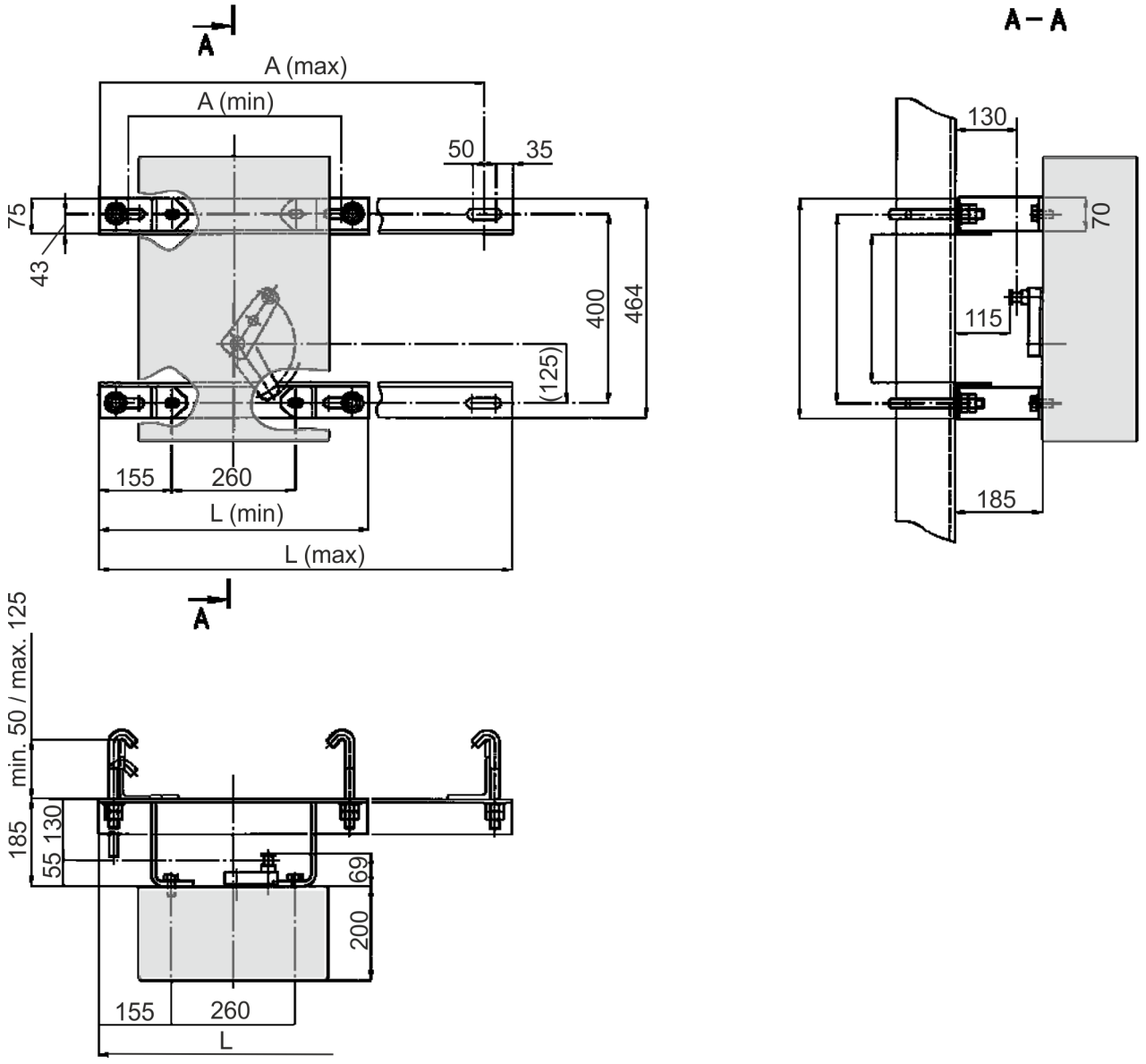


Fig. 11: Examples for assembling the TracFeed® SFA on a lattice steel mast or flat-frame mast

Assembly on a pole

To fasten the TracFeed® SFA to a lattice steel mast or flat-frame mast, you need two retaining brackets of different lengths.

Corresponding retaining brackets are available for different pole types as accessories from Rail Power Systems GmbH customer service.

Personnel:
- Trained qualified personnel

Protective equipment:
- Protective clothing
- Industrial safety helmet
- Protective gloves
- Safety footwear
- High-vis clothing

Tool:
- Hand tools

Requirement:

- The appropriate retaining brackets have been installed, if necessary.
  ↬ *Chapter 6.3 'Assembly preparation' on page 40*

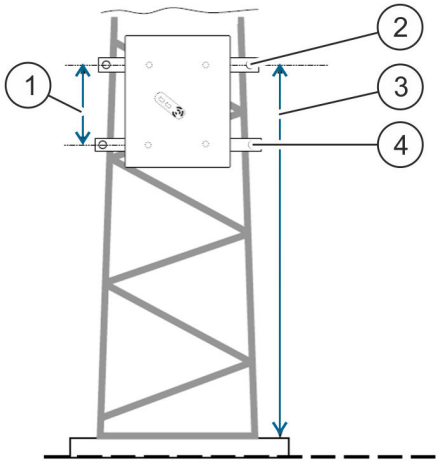


Fig. 12: Assembly on a pole

1. If it was not already installed in ↬ *Chapter 6.3 'Assembly preparation' on page 40*, mount the shorter retaining bracket (Fig. 12/2) with M16 fastening bolts to the top of the back of the TracFeed® SFA.
2. If it was not already installed in ↬ *Chapter 6.3 'Assembly preparation' on page 40*, mount the longer retaining bracket (Fig. 12/4) with M16 fastening bolts to the bottom of the back of the TracFeed® SFA.
3. Install the retaining brackets with a distance of 400 mm (Fig. 12/1) between them.
4. Fasten the TracFeed® SFA and the retaining brackets to the corner upright of the overhead contact line with the help of claws and clamps. Make sure that the upper retaining bracket is installed horizontally and at a distance of 1 200 mm (Fig. 12/3) to the top edge of the foundation.

6.4.2 Assembly on a concrete pole with embedded threaded sleeves

To fasten the TracFeed® SFA to a concrete pole, you need two identical retaining brackets.

Corresponding retaining brackets are available for different pole types as accessories from Rail Power Systems GmbH customer service.

Personnel:
- Trained qualified personnel

Protective equipment:
- Protective clothing
- Industrial safety helmet
- Protective gloves
- Safety footwear
- High-vis clothing

Tool:
- Hand tools

Requirement:

- The threaded sleeves have been installed.

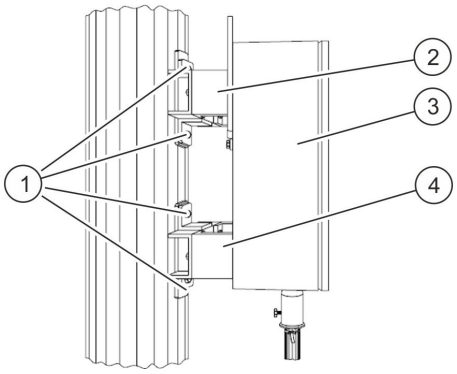


Fig. 13: Assembly on a concrete pole (side view)

1. Install the TracFeed® SFA (Fig. 13/3) on the retaining brackets (Fig. 13/2 and 4).
2. Screw the retaining brackets (Fig. 13/2 and 4) to the embedded threaded sleeves (Fig. 13/1) using M20 fastening bolts.
3. Connect the TracFeed® SFA to the railway earth for potential equalisation.

6.4.3 Assembly on a wall or in tunnels

Two identical retaining brackets are required to fasten the TracFeed® SFA to a wall.

Corresponding retaining brackets are available for different pole types as accessories from Rail Power Systems GmbH customer service.

Personnel:
- Trained qualified personnel

Protective equipment:
- Protective clothing
- Industrial safety helmet
- Protective gloves
- Safety footwear
- High-vis clothing

Tool:
- Hand tools
- Drill
- Dust extraction

Material:
- Fastening brackets

Prerequisite:

- The wall has been checked to ensure it has a sufficient load-bearing capacity.

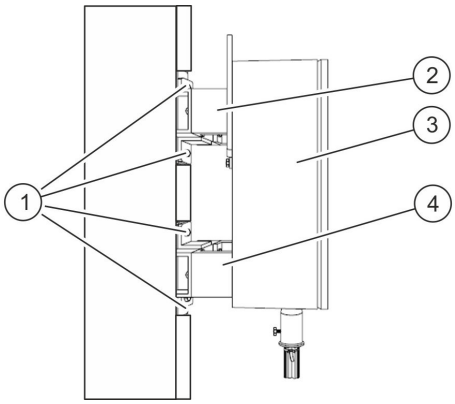


Fig. 14: Assembly on a wall

1. Choose suitable fastening brackets for the surface in question (e.g. heavy load anchors, adhesive anchors, threaded anchors).
2. Draw holes (Fig. 14/1) for the retaining brackets (Fig. 14/2 and 4).

The vertical distance between the holes must be 400 mm. Make sure the upper retaining bracket is installed horizontally at a distance of 1200 mm to the top edge of the foundation.

3. Create bore holes appropriate to the fastening brackets and insert the fastening brackets into the bore holes in accordance with the manufacturer's specifications.
4. Fasten the retaining brackets (Fig. 14/2 and 4) to the back of the TracFeed® SFA (Fig. 14/3) with the M16 fastening bolts.
5. Screw the retaining brackets (Fig. 14/2 and 4) onto the inserted fastening brackets.
6. Connect the TracFeed® SFA (Fig. 14/3) to the railway earth for potential equalisation.

6.4.4 Assembly of the force-displacement transmission device

Personnel:
- Trained qualified personnel

Protective equipment:
- Protective clothing
- Industrial safety helmet
- Protective gloves
- Safety footwear
- High-vis clothing

Tool:
- Hand tools

Prerequisite:

- The TracFeed® SFA has been installed.

When assembling the force-displacement transmission device, observe the manual from the manufacturer of the force-displacement transmission device (e. g. Flexball).

6.4.5 Connecting the force-displacement transmission device by means of a shift linkage

Personnel:
- Trained qualified personnel

Protective equipment:
- Protective clothing
- Industrial safety helmet
- Protective gloves
- Safety footwear
- High-vis clothing

Tool:
- Hand tools

Material:
- Grease

Requirement:

- The force-displacement transmission device has been installed in accordance with the manufacturer’s specifications.
  Chapter 6.4.4 ‘Assembly of the force-displacement transmission device’ on page 46

The following section describes how to connect to a shift linkage. If alternative force-displacement transmission variants are used, these must have suitable interfaces. They are assembled in the same way.

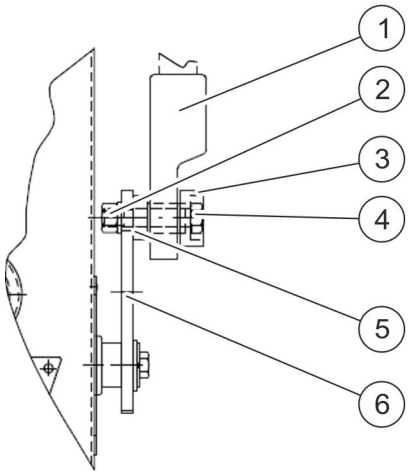


Fig. 15: Installing the connecting rods

1 Lower section of the shift linkage
2 Nut
3 Locking ring
4 M12 bolt
5 Retaining bolt
6 Adjusting lever

1. Secure the lower section of the shift linkage (Fig. 15/1) onto the retaining bolt (Fig. 15/5) with a locking ring (Fig. 15/3). Secure the bolt (Fig. 15/4) with a nut (Fig. 15/2) (tightening torque 50 Nm).
2. After completing the adjustment work, make sure that the retaining bolt is fitted securely.
3. Lubricate the hinge joint, retaining bolt on the adjusting lever and the linkage guide.

Lubricate with Shell Retinax EP2 grease, for example.

6.5 Electrical connection

6.5.1 Connecting the electromechanical remote motor drive

The assembly process described here is merely an example. Due to the individual circumstances at the installation location, we cannot provide a detailed description.

The cables are routed through a protective duct that is attached to the cable termination. If the protective duct has a diameter of 42 mm, a maximum of three cables with a 14 mm outer diameter or two with a 21 mm outer diameter can be used.

Cable entry

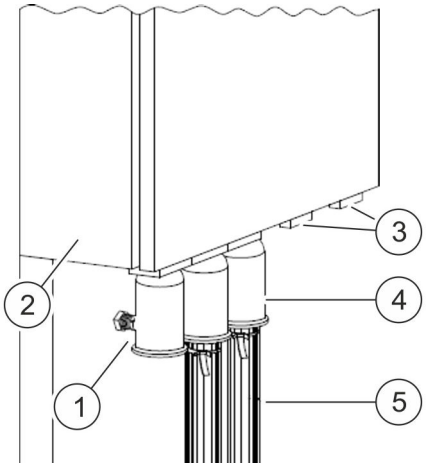


Fig. 16: Electrical connection

Personnel:
- Trained qualified personnel

Protective equipment:
- Protective clothing
- Industrial safety helmet
- Protective gloves
- High-vis clothing

Tool:
- Hand tools

Requirement:

- The TracFeed® SFA has been installed.
  ↳ *Chapter 6 'Assembly' on page 39*

1. Remove the dummy plugs (Fig. 16/3) from the enclosure (Fig. 16/2).
2. Place the sealing underlay from the inside of the enclosure on the cone of the cable termination (Fig. 16/4).
3. Secure the cable termination (Fig. 16/4) with the sealing underlay on top of it to the underside of the enclosure (Fig. 16/2) using two screws (M10).

   The sealing underlay must be between the enclosure and the cable termination.

4. Lead the cable into the enclosure from below, through the protective duct (Fig. 16/5) and the cable termination (Fig. 16/4).
5. To ensure strain relief and sealing, fix the cable in the cable termination (Fig. 16/4).
6. Fasten the protective duct (Fig. 16/5) to the cable termination with the cup point screw (Fig. 16/1).
7. Seal the unused cable terminations with a dummy plug (Fig. 16/3).

6.5.2 Connecting the terminal allocation

Personnel:
- Qualified electrician for high and medium voltage

Protective equipment:
- Protective clothing
- Industrial safety helmet
- Protective gloves
- High-vis clothing

Prerequisite:

- The TracFeed® SFA has been connected.
  Chapter 6.5.1 'Connecting the electromechanical remote motor drive' on page 47

→ Connect the control cable to the terminal strip.

For the terminal allocation, see the terminal allocation diagram and the schematic diagram for the respective TracFeed® SFA.

6.6 Final checks

6.6.1 Mechanical tests and stroke setting

Personnel:
- Trained qualified personnel

Protective equipment:
- Protective clothing
- Industrial safety helmet
- Protective gloves
- Safety footwear
- High-vis clothing

Tool:
- Hand tools

Requirement:

- The force-displacement transmission device is connected to the TracFeed® SFA.

1. Attach the crank handle to the crank cam and perform multiple mechanical test switching operations.
2. **NOTICE!**

   Property damage to the TracFeed® SFA due to overwinding!

   Do not continue to wind the TracFeed® SFA beyond the bedstop.

   If the TracFeed® SFA operates sluggishly or tension occurs, determine the cause and rectify it.

3. Observe the movement of the force-displacement transmission device and the position of the contact blade on the mast disconnector and check whether the contact blade reaches its end positions securely.

When the end position is reached, you should hear an audible clicking in the TracFeed® SFA.

6.6.2 Electrical measurements and function tests

In the context of commissioning of the TracFeed® SFA, electrical function tests have to be carried out from the control room.

In accordance with the IEC 60364-6-61 (DIN VDE 0100-610), the following electrical measurements and tests have to be carried out **before** the function test:

- Measurement of the control cables' grid loop impedance
  'Measurement of the grid loop impedance' on page 51
- Measurement of the insulation resistance between the wires of a control cable and against the earthing potential
  'Measurement of the insulation resistance' on page 52
- Measurement of the earthing resistance
  'Measurement of the earthing resistance' on page 53
- Documentation of the measurements

Measurement of the grid loop impedance

The measurement of the grid loop impedance has to be carried out at the end of the control cable on the TracFeed® SFA.

Personnel:
- Qualified electrician for high and medium voltage

Protective equipment:
- Protective clothing
- Industrial safety helmet
- Protective gloves
- Safety footwear
- High-vis clothing

Tool:
- Installation tester

1. 

WARNING!
Risk of fatal injury due to electric shock on unearthed enclosure door!

Earth the enclosure door of the TracFeed® SFA before opening it.

2. Measure the grid loop impedance.

For this measurement, use a suitable measuring device tested in accordance with IEC 61557-3 (DIN EN 61577-3, DIN VDE 0413-3).

3. Measure the loop impedance between the phase conductors and the protective earth to check the effectiveness of the protective measure.
4. Log the measured values.

Measurement of the insulation resistance

The insulation resistance must be measured on de-energised control cables.

Personnel:	■ Qualified electrician for high and medium voltage
Protective equipment:	■ Protective clothing ■ Industrial safety helmet ■ Protective gloves ■ Safety footwear ■ High-vis clothing
Tool:	■ Hand tools ■ Megohmmeter

1. De-energise the control cable at both ends and secure it against re-connection.

2. **NOTICE!**
   Property damage due to improper procedure!

   Disconnect the wires of the control cable from the TracFeed® SFA terminal box.

3. Measure the insulation resistance between the individual wires of a cable and against the earthing potential. Next, measure the insulation resistance between the available back-up wires and the other wires in the cable. To do this, use a test voltage of 1 000 V with an insulation resistance greater than or equal to 1 MΩ.

   For this measurement, use a suitable measuring device tested in accordance with IEC 61557-3 (DIN EN 61577-3, DIN VDE 0413-3).

4. Log the measured values.

If cable distances of more than 1 000 m are planned, multiple cable lengths are connected with cable couplers. Before the cables are connected, the insulation resistance of the individual cable lengths must be measured. After the individual cable lengths are connected, the insulation resistance of the entire cable length must be measured again. This procedure makes it easy to identify insulation faults.

Measurement of the earthing resistance

If overloading or a short circuit occur in the TracFeed® SFA, it has to be securely switched off by a safeguard. An overcurrent protection device is installed in the TracFeed® SFA for this purpose. The overcurrent protection device can only trigger if a sufficiently large current can flow over a defined period of time. Among other factors, the size of the current depends on the earthing resistance.

Perform the earthing measurement only in consultation with the responsible energy provider company.

Personnel:	■ Qualified electrician for high and medium voltage
Protective equipment:	■ Protective clothing ■ Industrial safety helmet ■ Protective gloves ■ Safety footwear ■ High-vis clothing
Tool:	■ Measuring device for earthing resistance

Prerequisite:

- Before the start of measurement, the supply grid connected to the earthing switch must be isolated.

1. Measure the earthing resistance.

The earthing resistance must be less than 2 Ω.

For this measurement, use a suitable measuring device tested in accordance with IEC 61557-3 (DIN EN 61577-3, DIN VDE 0413-3).

2. After completing the measurement, check that the earthing switch is connected to the supply grid again.

3. Log the measured values.

7 Commissioning

7.1 Prerequisites

Before commissioning and before the electrical voltage is connected, all short-circuit-proof bypasses at insulators and mobile earthing fittings must be removed.

7.2 Putting into operation

Commissioning normally takes place according to a commissioning programme created in accordance with the owner’s processes and adapted to the local situation; it can also include dynamic test runs along the contact line installation.

8 Preventive servicing

8.1 Maintenance plan

Interval		Personnel
24 months	State check Z *Chapter 8.1.1 'State check Z' on page 55*	Authorised service personnel
Every 5 years or after 10 000 switching cycles	Lubricate the gear spindle *Chapter 8.1.2 'Lubricate the gear spindle' on page 56*	Authorised service personnel
After extraordinary events	Extraordinary check	Authorised service personnel

8.1.1 State check Z

The remote motor drive can only be inspected in connection with the shift linkage and the mast disconnector. Check the external state of the remote motor drive and shift linkage in accordance of the applicable regulations for visible damage.

Scope of check:

- Check that the remote motor drive is fastened horizontally to the overhead contact line mast or concrete wall.
  - Visible damage to the remote motor drive on the overhead contact line mast.
  - Damage to the concrete wall or pole.
- Check shift linkage and mast disconnector.
  - Visible damage on the shift linkage and mast disconnector.

Check interval:

- 24 months

8.1.2 Lubricate the gear spindle

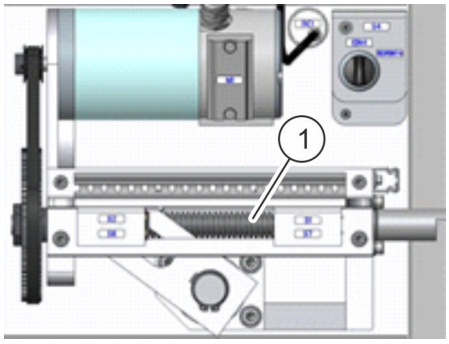


Fig. 17: Lubricate the gear spindle

1. Have the control room disconnect the power supply to the TracFeed® SFA.
2. Clean the gear spindle (Fig. 17/1) with a cloth.
3. Lubricate the gear spindle (Fig. 17/1) with a brush and lubricant *'Gleitmo 805'*.
4. Have the control room reconnect the power supply to the TracFeed® SFA.

8.1.3 Extraordinary check

This check is carried out after extraordinary events, e.g.:

- Short circuits
- Extreme weather situations (storm, heat, ice, hail > 4 cm)
- Fire below and in the immediate vicinity (< 50 m) of the contact line (effects of heat, soot deposit) and contact with extinguishing agent (foam)

Scope of check:

- Inspection of the area in question as per state check Z.

Check interval:

- As needed.

9 Corrective servicing

9.1 Behaviour in the event of faults

If faults occur increasingly, reduce the maintenance intervals accordingly.

If faults occur and they cannot be rectified with the help of the information below, contact the manufacturer *'Technical customer service' on page 6*.

The following applies in general:

1. In the event of faults that present an immediate danger to persons or material property, halt operation of the contact line system.
2. Identify the cause of the fault.
3. Immediately inform the person responsible at the operating site of the fault.
4. Depending on the type of fault, have it rectified by authorised specialist personnel or rectify it yourself.

9.2 Possible faults

Personnel:
- Fitter for contact line installations

Protective equipment:
- Industrial safety helmet
- Protective clothing
- Protective gloves
- Safety footwear
- High-vis clothing

Tool:
- Hand tools

Fault description	Cause	Remedy
Motor drive will not move to one or both end positions.	Shift linkage is distorted, bent or not installed vertically	Straighten or replace the shift linkage and readjust the stroke
	The mast disconnector has a mechanical fault or is sluggish	Check the stroke of the shift linkage Check the mechanical function
	The gear was cranked up to the bedstop	Crank the remote motor drive by one rotation in the opposite direction
	Tooth belt defective	Replace tooth belt *Chapter 9.2.1 'Replace tooth belt' on page 58*

Fault description	Cause	Remedy
Motor drive will not move electrically to one or both end positions. No electrical feedback	Stroke of shift linkage too small, mast disconnector does not reach the end position	Readjust the shift linkage stroke (if necessary, adjust the limit switches in the drive) Check the mechanical function
	Fault in the electrical feedback	Check electrical function/notification
Motor drive will not move mechanically to one or both end positions. No electrical control possible	Enclosure cover not closed, normally closed contact not assigned	Check door limit switch, replace if defective
	After a switching command is triggered, no control voltage on the remote motor drive	After a switching command is triggered, check the control voltage on the remote motor drive
	Wire break in the control cable	Repair the control cable
	Control voltage automatic fuse for the relevant remote motor drive has tripped	Determine the reason for tripping of the automatic fuse
	Rectifier defective (in the motor drive)	Replace the rectifier *Chapter 9.2.2 'Replacing the rectifier' on page 59*
	Fuse defective (in the motor drive)	Replace fuse
	Motor defective	Replace motor *Chapter 9.2.3 'Replace motor' on page 60*

9.2.1 Replace tooth belt

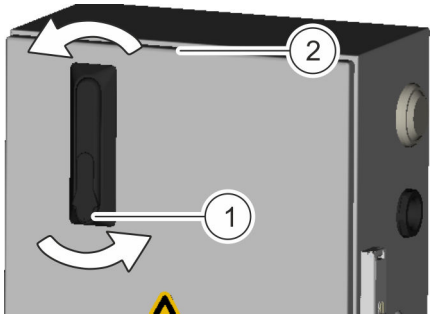


Fig. 18: Opening the enclosure door

1. Have the control room disconnect the power supply to the TracFeed® SFA.
2. Open the enclosure door. To do this, first fold out the swivel lever (Fig. 18/1) and then rotate it anti-clockwise (Fig. 18/2).

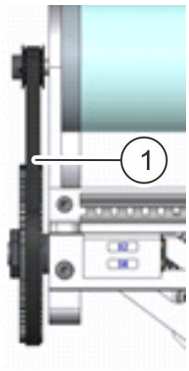


Fig. 19: Replacing the tooth belt

3. Remove the old tooth belt (Fig. 19/1).
4. Position the new tooth belt (Fig. 19/1).
5. Carry out a manual function test with the crank handle.
6. Remove the crank handle.
7. Close the enclosure door again.
8. Have the control room reconnect the power supply to the TracFeed® SFA.
9. Have the control room carry out an electrical function test.

9.2.2 Replacing the rectifier

Tool: ■ Hand tools

1. Have the control room disconnect the power supply to the TracFeed® SFA.
2. Open the enclosure door. To do this, first fold out the swivel lever (Fig. 20/1) and then rotate it anti-clockwise (Fig. 20/2).

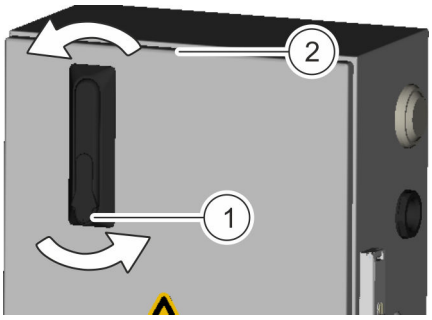


Fig. 20: Opening the enclosure door

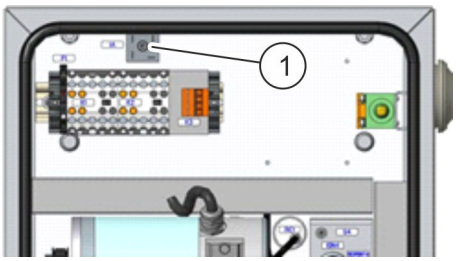


Fig. 21: Replacing the rectifier

3. Individually disconnect and mark the cable plug connections on the rectifier (Fig. 21/1) and plug them into the new rectifier in the correct position.
4. Remove the defective rectifier. To do this, undo the M5x8 hexagon bolt (Fig. 21/1).
5. Install the new rectifier.

> **NOTICE!**
> Take care with the cable routing to ensure there are no kinks in the cable and no strain on the cable lugs.

6. Close the enclosure door again.
7. Have the control room reconnect the power supply to the TracFeed® SFA.
8. Have the control room perform an electrical function test.

9.2.3 Replace motor

Tool: ■ Hand tools

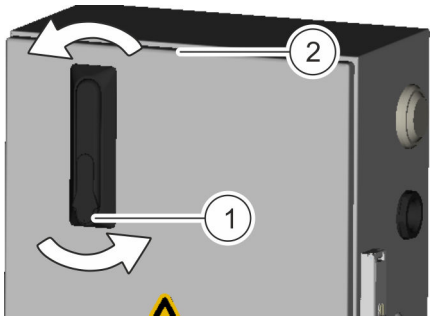


Fig. 22: Opening the enclosure door

1. Have the control room disconnect the power supply to the TracFeed® SFA.
2. Open the enclosure door. To do this, first fold out the swivel lever (Fig. 22/1) and then rotate it anti-clockwise (Fig. 22/2).

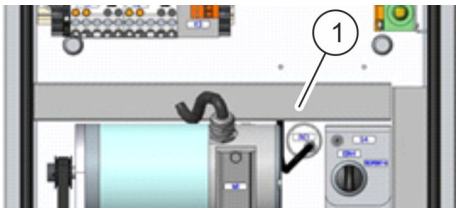


Fig. 23: Opening the cable duct

3. Open the cable duct (Fig. 23/1).
4. Follow the motor cables and at the ends of the cables, mark the connections according to the terminal connection on the relay.
5. Undo the cable connections.

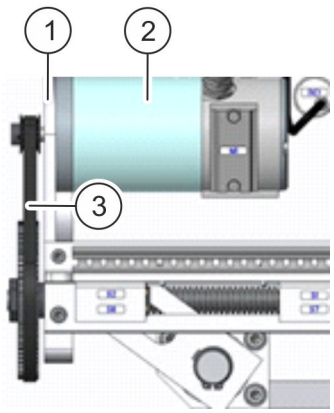


Fig. 24: Undoing the motor fastening

6. Undo the screws for the motor fastening (Fig. 24/1).
7. Remove the tooth belt (Fig. 24/3).
8. Remove the motor (Fig. 24/2).
9. Insert the new motor (Fig. 24/2) and attach it loosely to the motor fastening (Fig. 24/1) with the screws.

> *The old screws can be reused if they are not damaged.*

10. Position the new (Fig. 24/3) tooth belt.
11. Tighten the screws for the motor fastening (Fig. 24/1) (tightening torque 12–16 Nm).
12. Reconnect the motor cables.
13. Close the cable duct.
14. Perform a manual function test with the crank handle.
15. Remove the crank handle.
16. Close the enclosure door again.
17. Have the control room reconnect the power supply to the TracFeed® SFA.

18. Have the control room perform an electrical function test.

9.3 Commissioning after clearance of a fault

1. Close the enclosure door again.
2. Have the control room enable the power supply to the remote motor drive.
3. Have the control room carry out an electrical function test.

10 Spare parts

Incorrect spare parts

WARNING!

Risk of injury due to the use of incorrect spare parts!

The use of incorrect or defective spare parts can cause dangers for personnel and result in damage, malfunctions or total failure.

– Only use spare parts approved by Rail Power Systems.
– If in doubt, contact customer service at Rail Power Systems.

'Technical customer service' on page 6

NOTICE!

Loss of warranty!

Use of non-approved spare parts will result in a loss of warranty.

Spare parts list

RPS material number	Designation
3EGT219250-001	Direct current motor GNM 5440 E
3EGT219249-001	Rectifier bridge
3EGF019224	Threaded spindle TR20x4 SFA
3EGF020461	Complete door, with swivel lever
3EGF012099	Tooth belt

11 Decommissioning, disassembly and disposal

11.1 Decommissioning

Personnel:
- Qualified electrician for high and medium voltage

Protective equipment:
- Protective clothing
- Protective gloves
- Safety footwear

1. Have the control room disconnect the power supply to the TracFeed® SFA.
2. Open the TracFeed® SFA enclosure.
3. Undo the current cables.

DANGER!
Risk of fatal injury due to electric voltage!

4. If present, disconnect the cables for the signal control.
5. Determine the position of the mast disconnector and move the mast disconnector to the desired position with the help of the crank handle. Observe the mast disconnector and rotate until the desired position is reached.

   ⇨ The shift linkage is lowered manually.

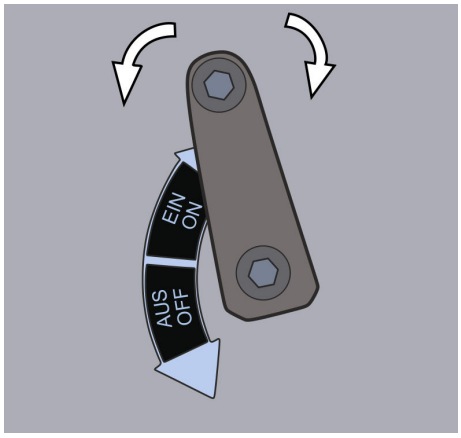


Fig. 25: Moving the crank handle

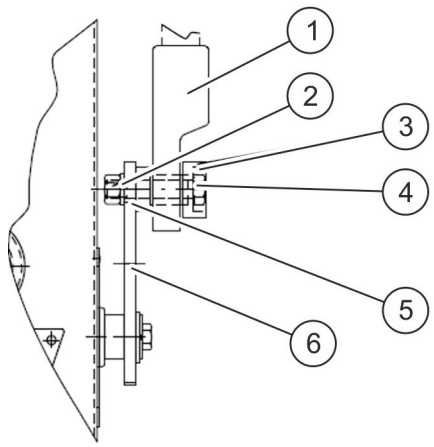


Fig. 26: Removing the connecting rods

1 Lower section of the shift linkage
2 Nut
3 Locking ring
4 M12 screw
5 Retaining bolt
6 Adjusting lever

6. Undo the screw (Fig. 26/4) and nut (Fig. 26/2) on the lower section of the shift linkage.
7. Remove the lower section of the shift linkage (Fig. 26/1).
   ⇨ The TracFeed® SFA is out of operation.

11.2 Disassembly

Improper disassembly

WARNING!

Risk of injury due to improper disassembly!

Stored residual energy, angular components, points and corners can cause injuries.

- Ensure sufficient space before starting work.
- Handle exposed, sharp-edged components with care.
- Ensure orderliness and cleanliness in the workplace. Loosely stacked or scattered components and tools could cause accidents.
- Disassemble the components properly. Note that some components are heavy. If necessary, use hoists.
- Secure components so that they cannot fall down or topple over.
- If in doubt, contact customer service at Rail Power Systems.

↬ *'Technical customer service' on page 6*

Electrical system

DANGER!

Risk of fatal injury due to electric current!

Contact with live parts poses a risk of fatal injury. Electrical components that are switched on can execute uncontrolled movements and lead to severe injuries.

– Only allow trained electricians to execute work on electrical parts.
– Before starting disassembly, switch off the electricity supply and disconnect it permanently.

Personnel:	■ Qualified electrician for high and medium voltage
Protective equipment:	■ Protective clothing ■ Protective gloves ■ Safety footwear
Tool:	■ Hand tools

Requirement:

■ The TracFeed® SFA is out of operation.

Chapter 11.1 'Decommissioning' on page 63

1. Dispose of the remaining supports and assembly accessories.
2. Remove operating supplies and auxiliary materials and remaining processing materials and dispose of these in an environmentally friendly manner.
3. Properly clean the assemblies and components and dismantle them in observance of applicable local occupational and environmental safety regulations.

11.3 Disposal

At the end of its useful life, the device has to be disassembled and disposed of in an environmentally friendly manner.

If no return or disposal agreement was signed, send the disassembled components for recycling:

■ Have metals scrapped.
■ Send plastic elements for recycling.
■ Dispose of the remaining components sorted by material characteristics.

Decommissioning, disassembly and disposal

Disposal

ENVIRONMENT!

Danger to the environment due to incorrect disposal.

Incorrect disposal may pose risks to the environment.

– Have electronic scrap, electronic components, lubricants and other auxiliary materials disposed of by specialist companies.
– If in doubt, contact your local authority or specialist disposal companies for information about environmentally sound disposal.

12 Glossary

AC

The term “alternating current” is used to refer to AC current as well as AC voltage.

DC

The term “direct current” is used to refer to DC current as well as DC voltage.

Earthing

Earthing establishes a defined reference potential or equipotential loading.

Extraordinary check

This check is carried out after extraordinary events, e.g.:

- Short circuits
- Extreme weather situations (storm, heat, ice, hail > 4 cm)
- Fire below and in the immediate vicinity (< 50 m) of the contact line (effects of heat, soot deposit) and contact with extinguishing agent (foam)

Perform an inspection of the area in question as per state check Z.

Miniature circuit breaker

Overcurrent protection device in the electric installation (also known as an automatic circuit breaker). The cables are protected against excessive current and the related damage caused by excessive heating. Miniature circuit breakers have to be reset after they trip. Miniature circuit breakers can have trip characteristics.

Overcurrent protection

Protects the power equipment against thermal overloading and it protects the line section against impermissible current loads.

RAMS

The term “RAMS” stands for Reliability, Availability, Maintainability, Safety.

RAMS is a process as per EN 50126 that is intended to prevent errors in the project planning phase. RAMS can already be applied during the planning, development, realisation and introduction of new products and systems. RAMS management ensures that systems are defined, risk analyses carried out, hazard rates determined, detailed checks performed and that safety certificates are compiled.

Relay

A usually electromagnetically acting switch which is actuated by electric current. The control circuit and the power circuit to be switched can thus be galvanically isolated. Power circuits with high power can be switched by power circuits with low power.

Shift linkage

Connection between the control lever and the object to be switched.

State check Z

Visual inspection of the state of catenary systems (fixed points, section insulators, section insulation, neutral sections, retensioning devices, points spans), support points and retensioning equipment and distances to active parts.

Switchgear

The device can perform switching operations in DC switchgear assemblies.

Glossary

TSI	Technical Specifications for Interoperability of the railway system

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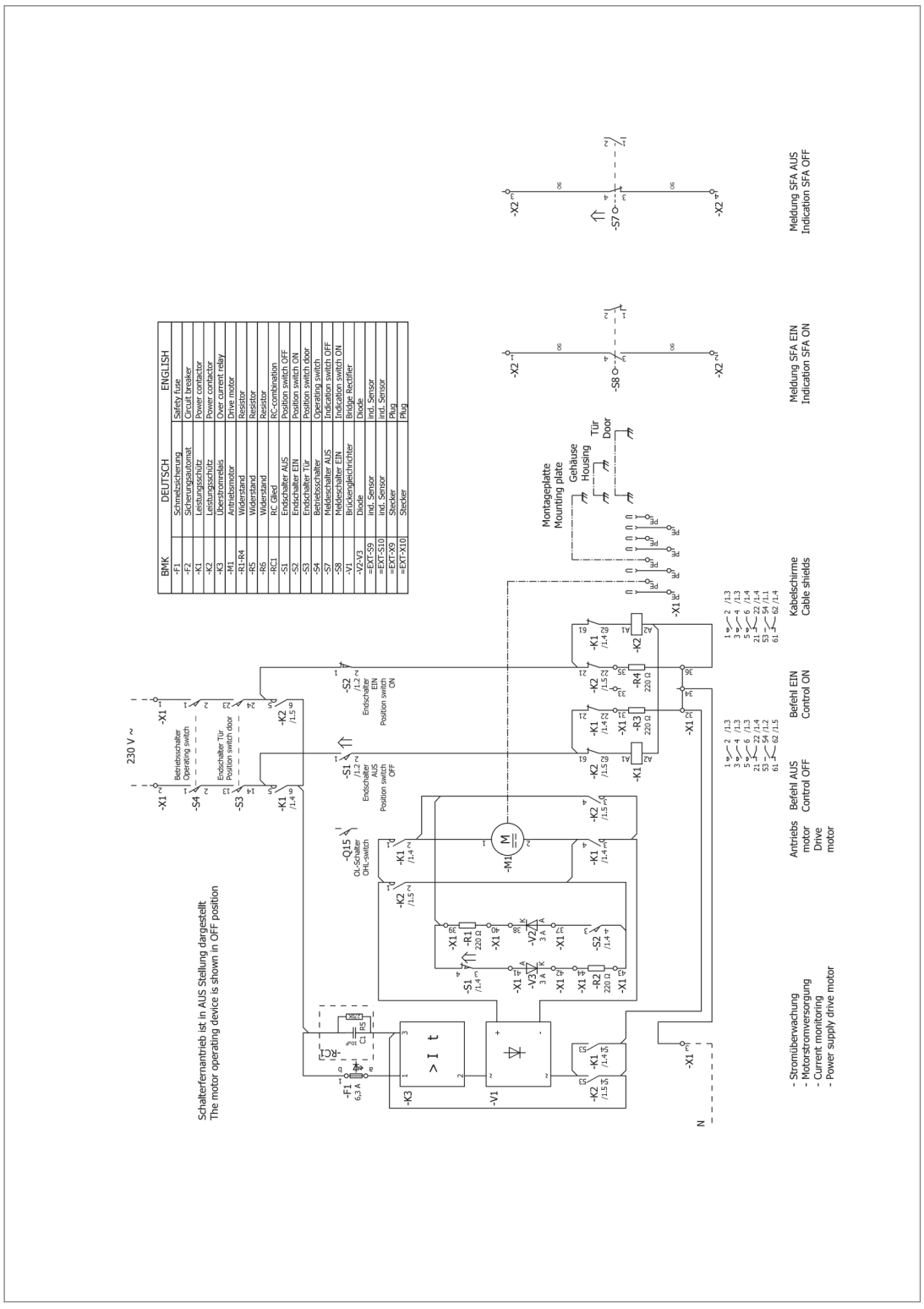
Appendix

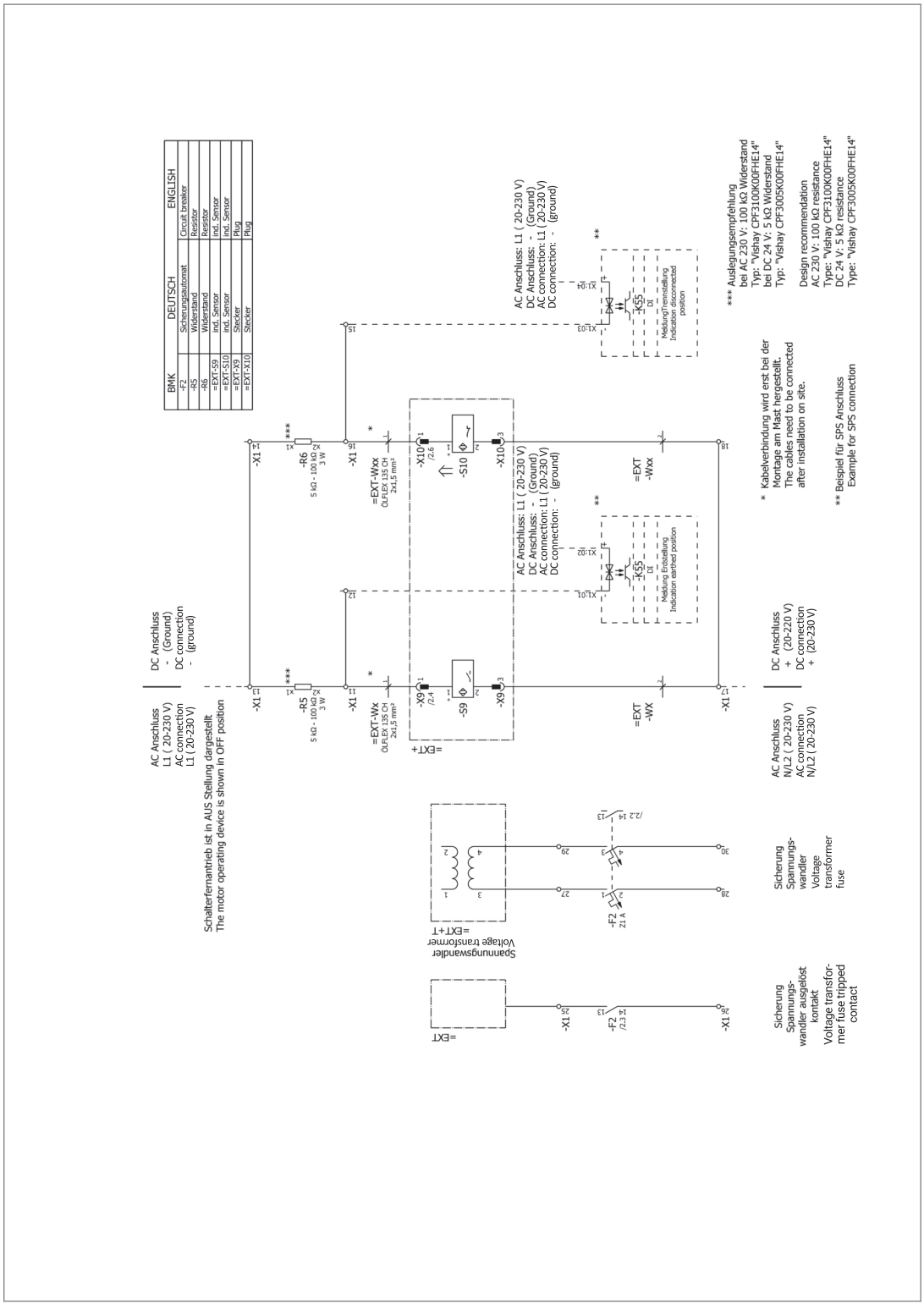
Contents

A Schematic diagrams and special features

TracFeed® SFA – type 1.9-1 – standard



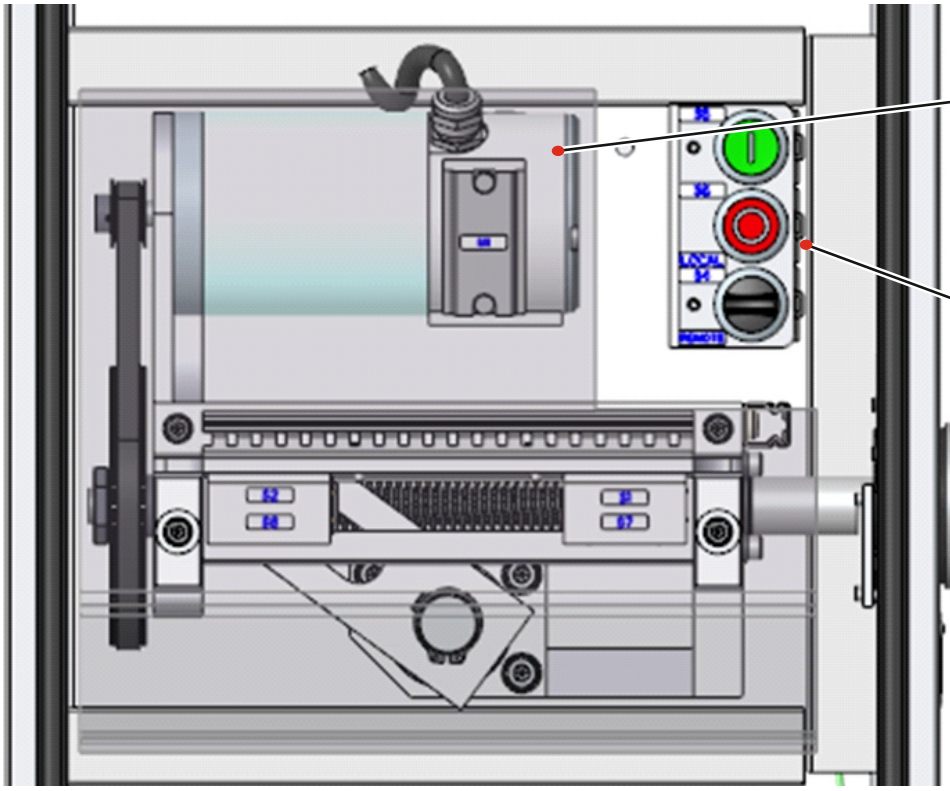
**TracFeed® SFA – type 1.9-1 –
external connections OLSP**



Schematic diagrams and special features

TracFeed® SFA – type 1.11-1

The TracFeed® SFA type 1.11-1 (reference application in mass transit Vienna) has a safety cover over the gears to prevent hazards during on-site operation (push-button function with automatic latching control).

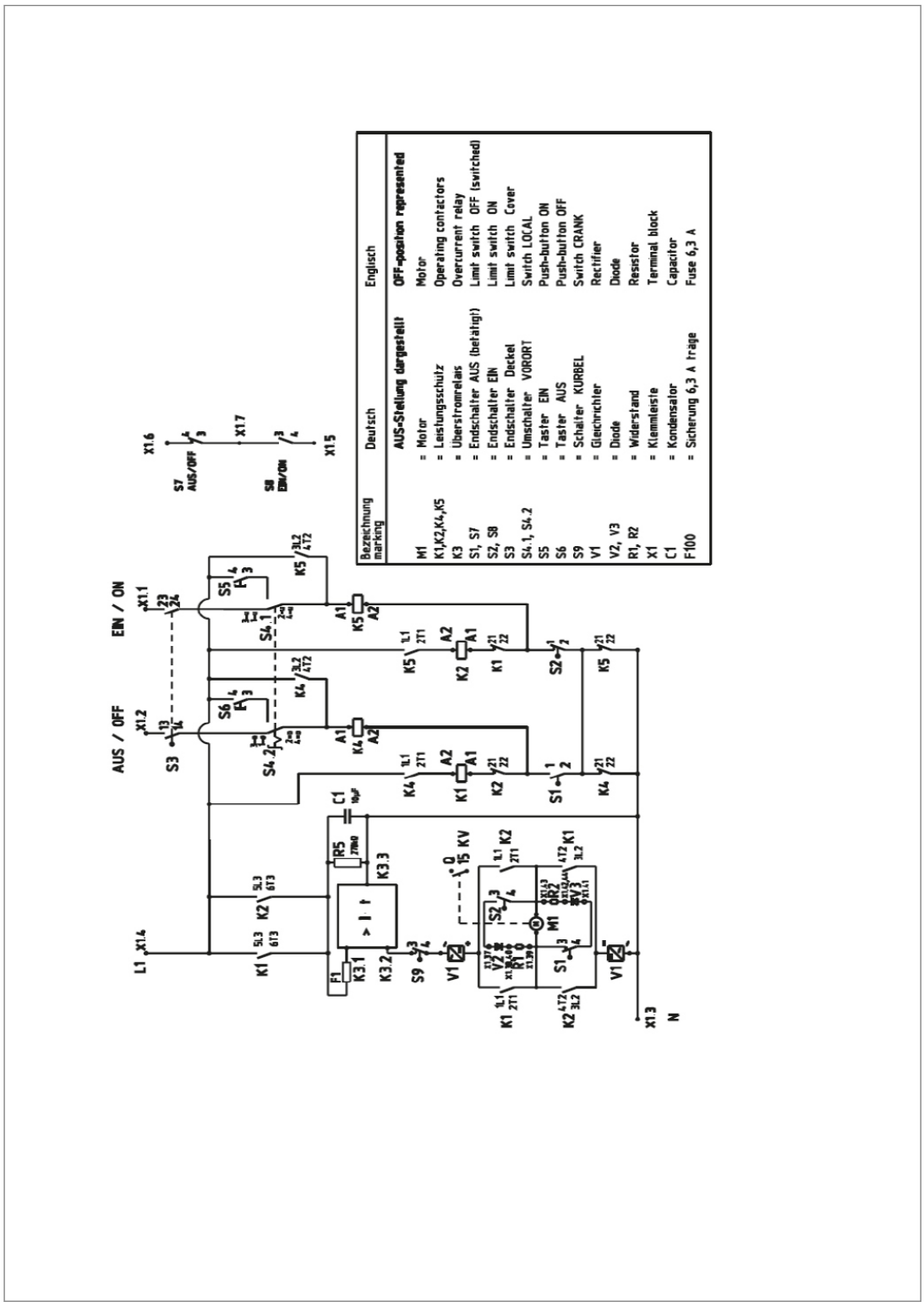


Safety cover (made of transparent polycarbonate)

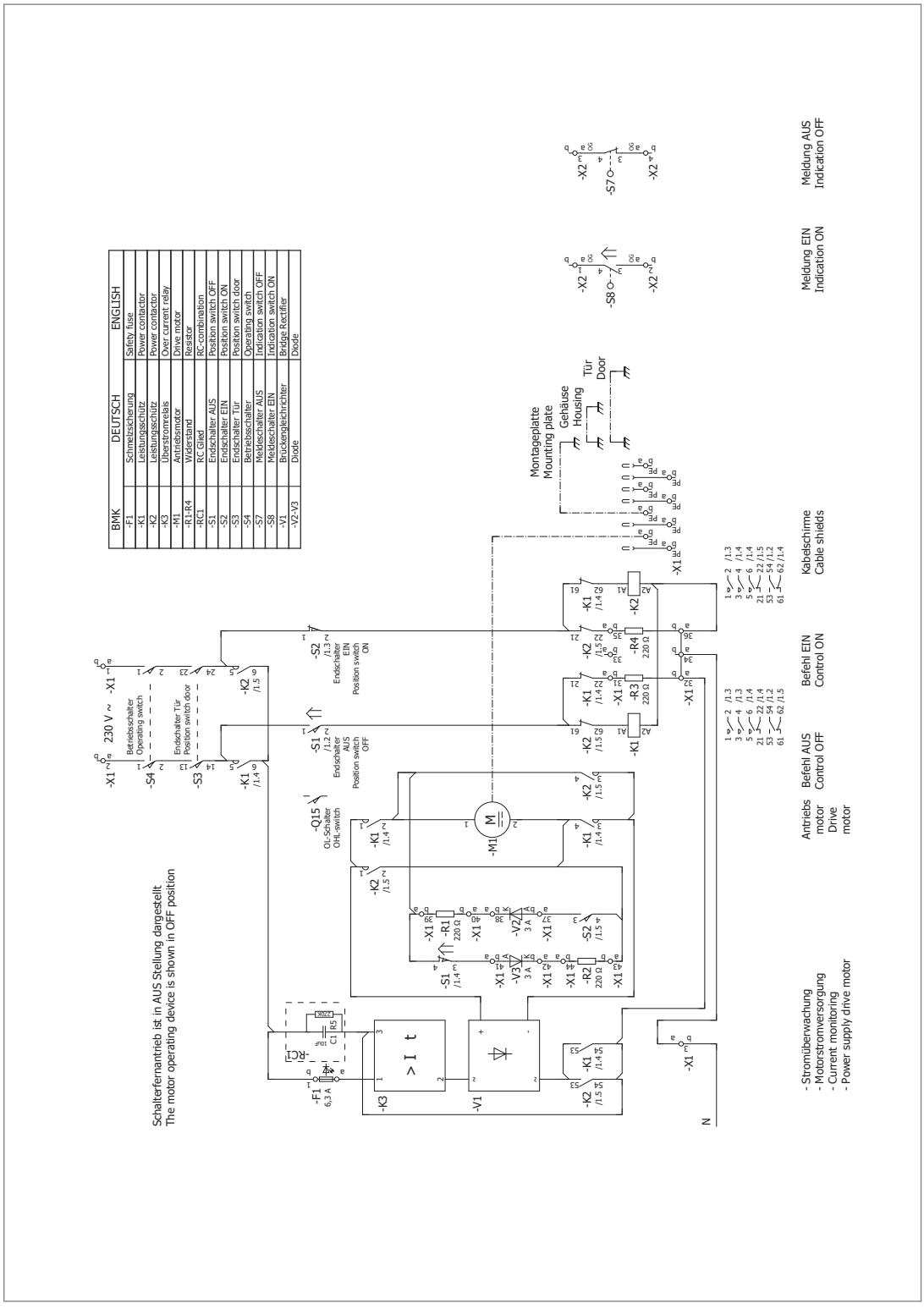
Local operation
LOCAL:
--> *"ON"* (S5) and *"OFF"* (S6) push-buttons are active
REMOTE:
--> Remote control is active

Opening the crank cover interrupts the motor current circuit (S9).

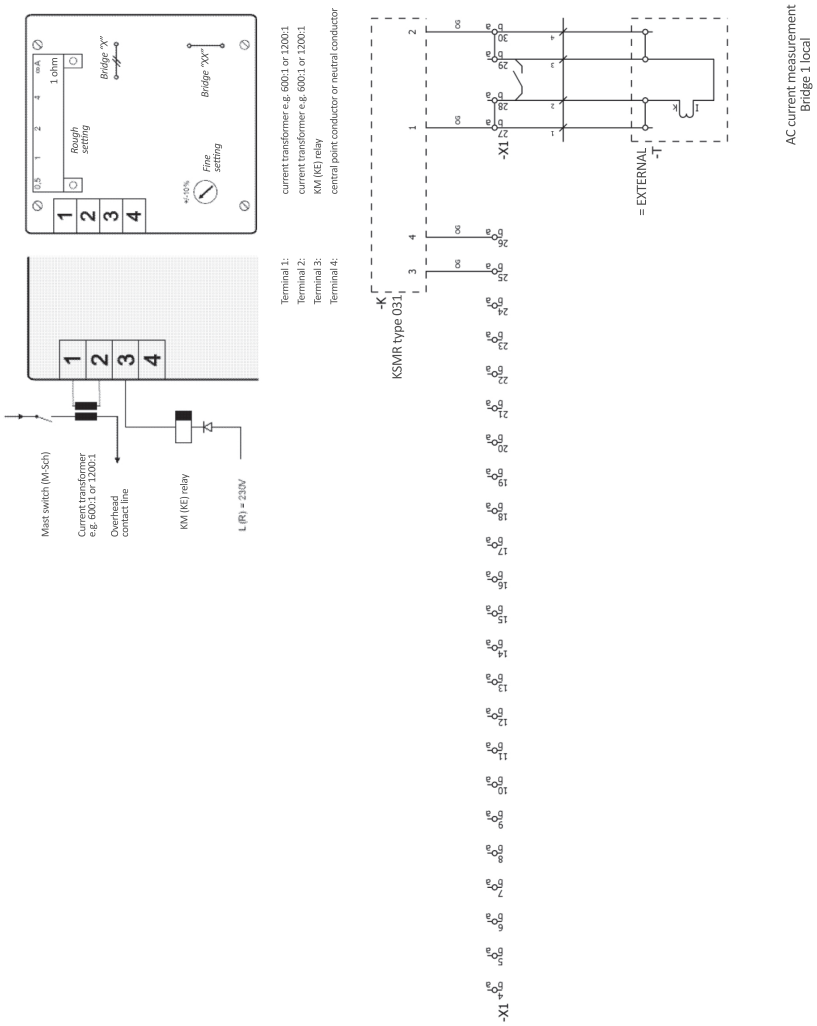
Schematic diagrams and special features



TracFeed® SFA – type 1.13-1 – standard version



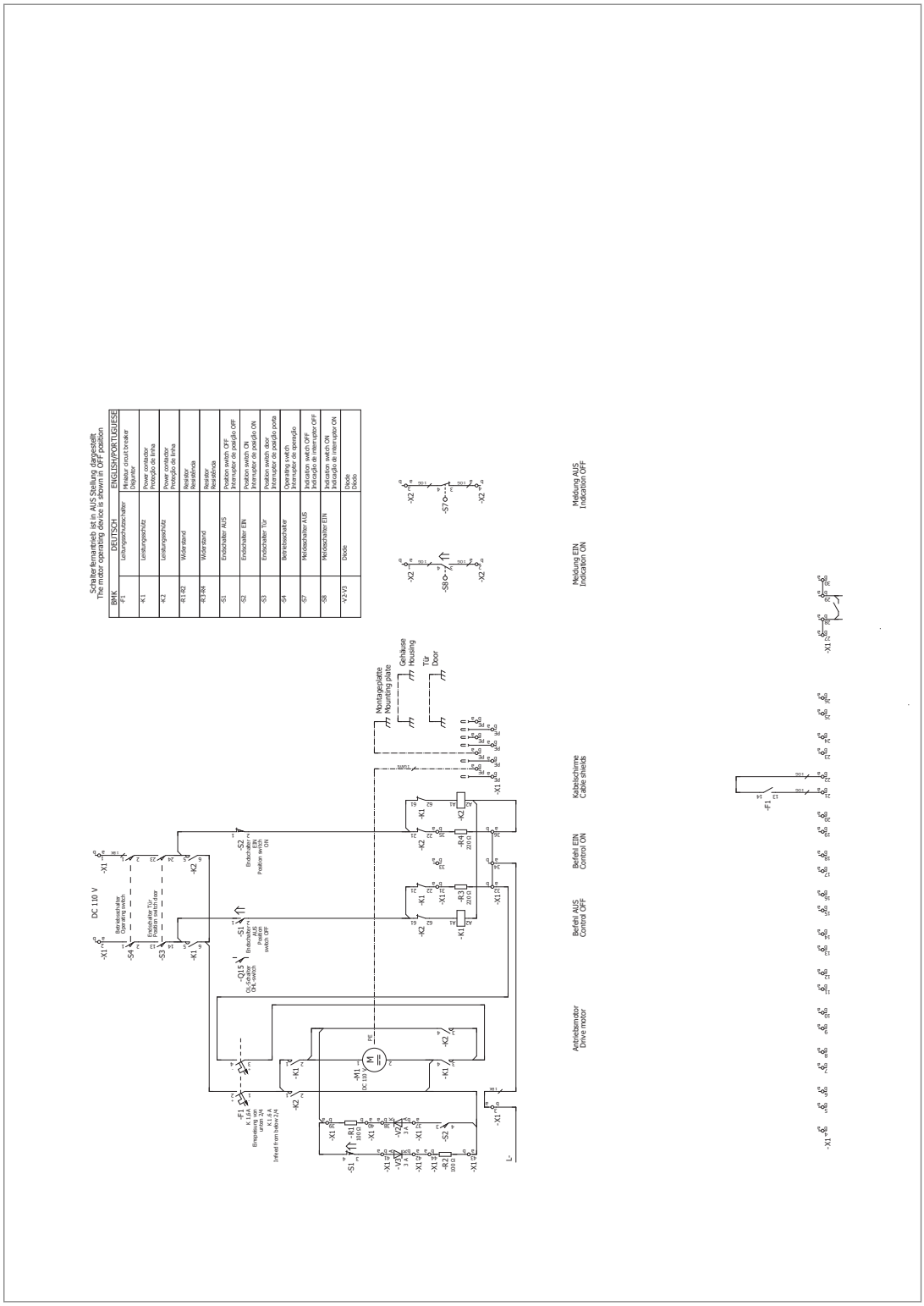
**TracFeed® SFA – type 1.13-1 –
for optional short-circuit signalling
relay**



TracFeed® SFA – type 1.22-1

Reference application in Portugal.

In contrast to the standard, a 110 VDC motor is used here.



TracFeed® SFA – type 1.23

The schematic diagram corresponds to the standard design of the TracFeed® SFA type 1.13-1.

'TracFeed® SFA – type 1.13-1 – standard version' on page 79

The TracFeed® SFA type 1.23 (reference application in the Netherlands) has a triangular actuation for both the door lock and for the crank cover. Due to the different pole fastening, a modified swivel lever is used. The TracFeed® SFA type 1.23 is delivered without studs.

Door lock and crank cover with triangular actuation

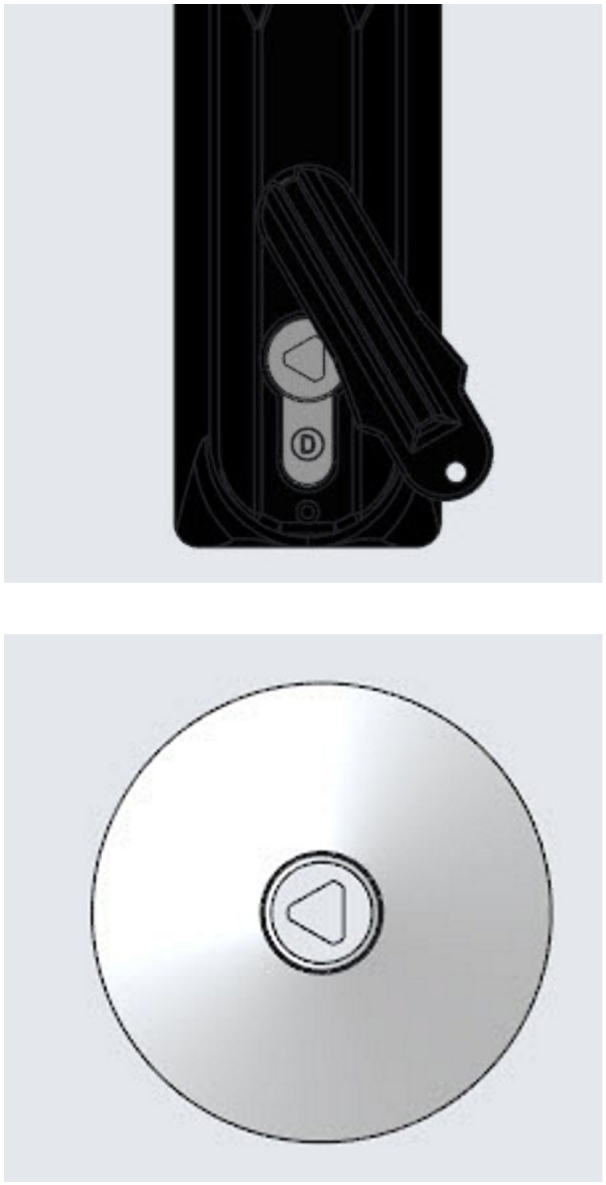


Fig. 27: Door lock with triangular actuation

Adjusted swivel lever

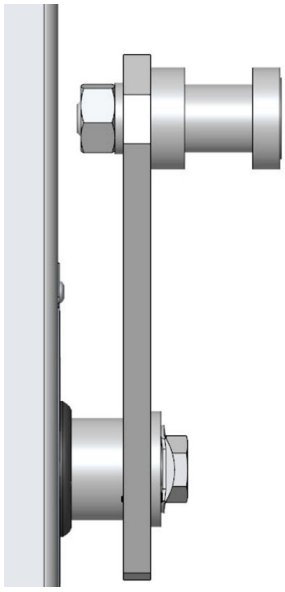


Fig. 28: Adjusted swivel lever

Terminal allocation diagram

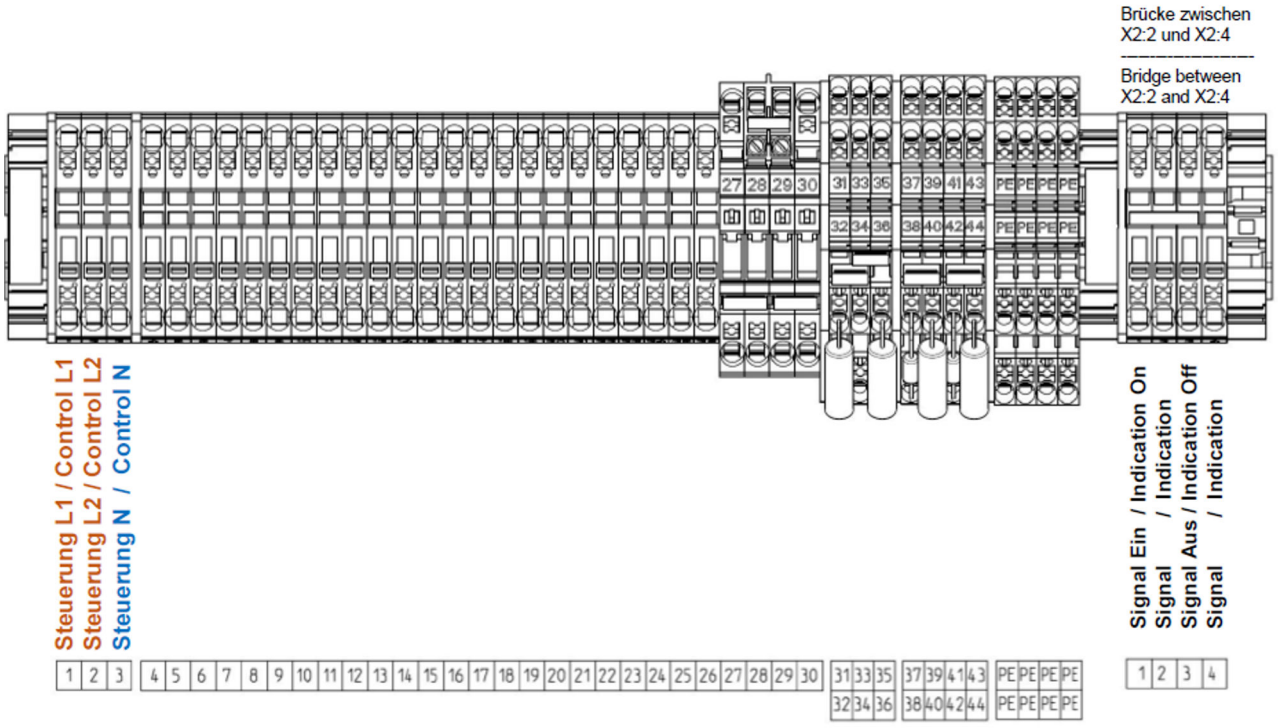


Fig. 29: Terminal allocation diagram type 1.23

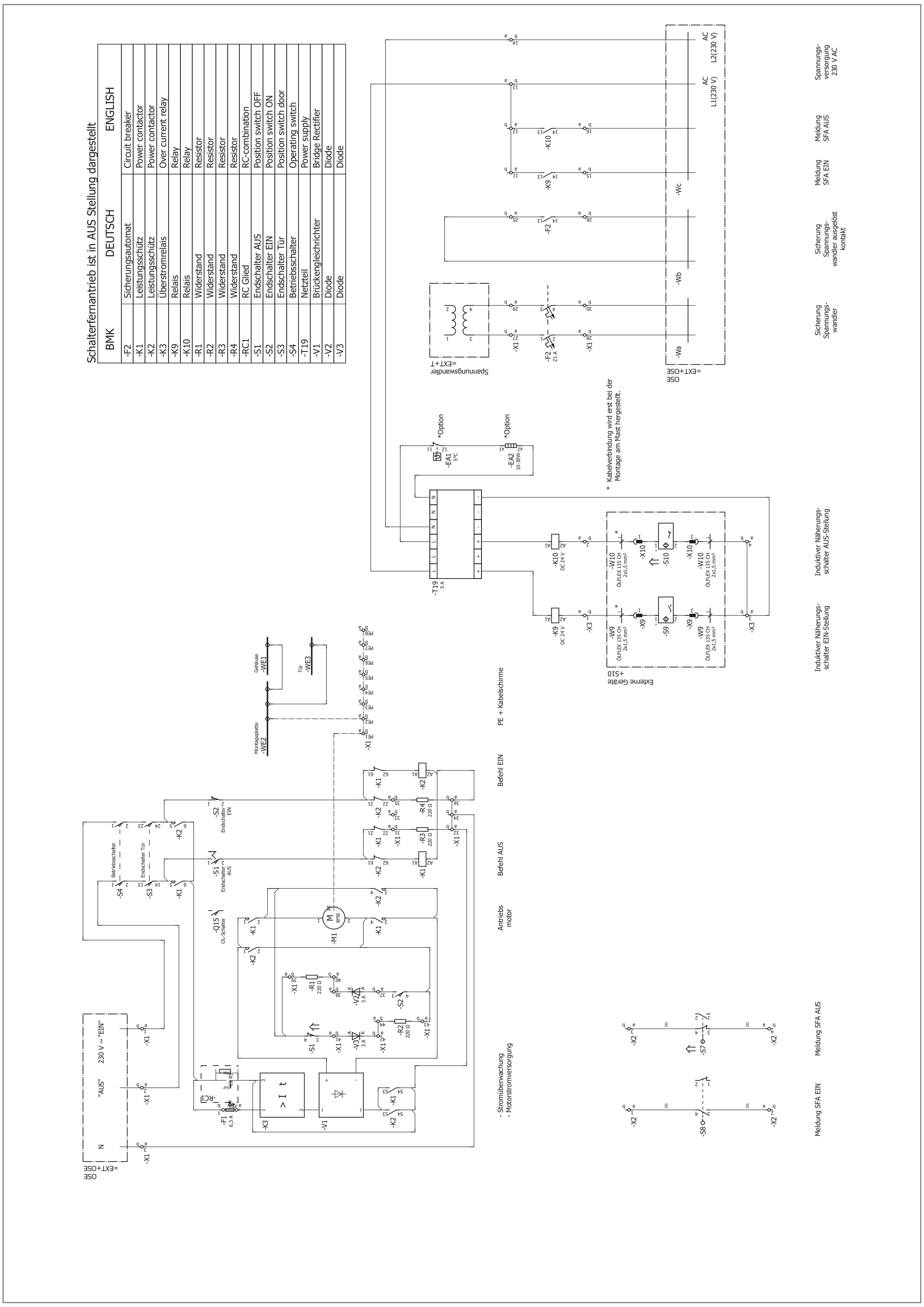
Schematic diagrams and special features

TracFeed® SFA – type 1.24

The TracFeed® SFA type 1.24 is used in combination with the TracFeed® ETS (earthing switch).

The schematic diagram corresponds to the standard design of the TracFeed® SFA type 1.13-1.

In addition, there are a miniature circuit breaker for the voltage transformer and components for activating the sensors for the earthing switch. The activation of the sensors for the earthing switch consists of a power supply unit (230 V) and two coupling relays (24 V). The sensors for activation of the earthing switch are galvanically isolated from the connections for the remote motor drive.



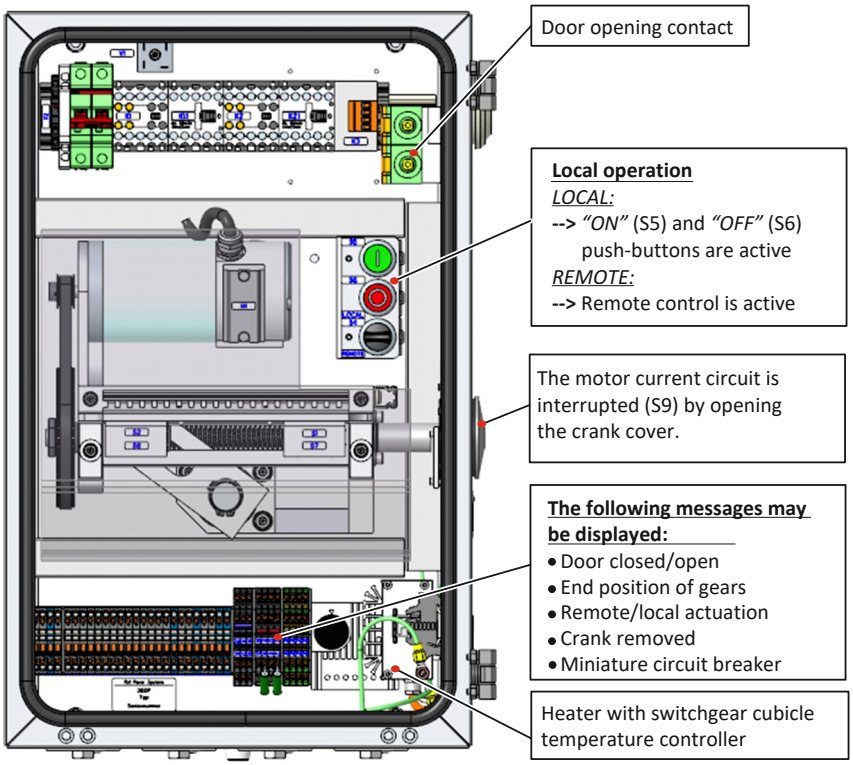
Schalterfernantrieb ist in AUS Stellung dargestellt

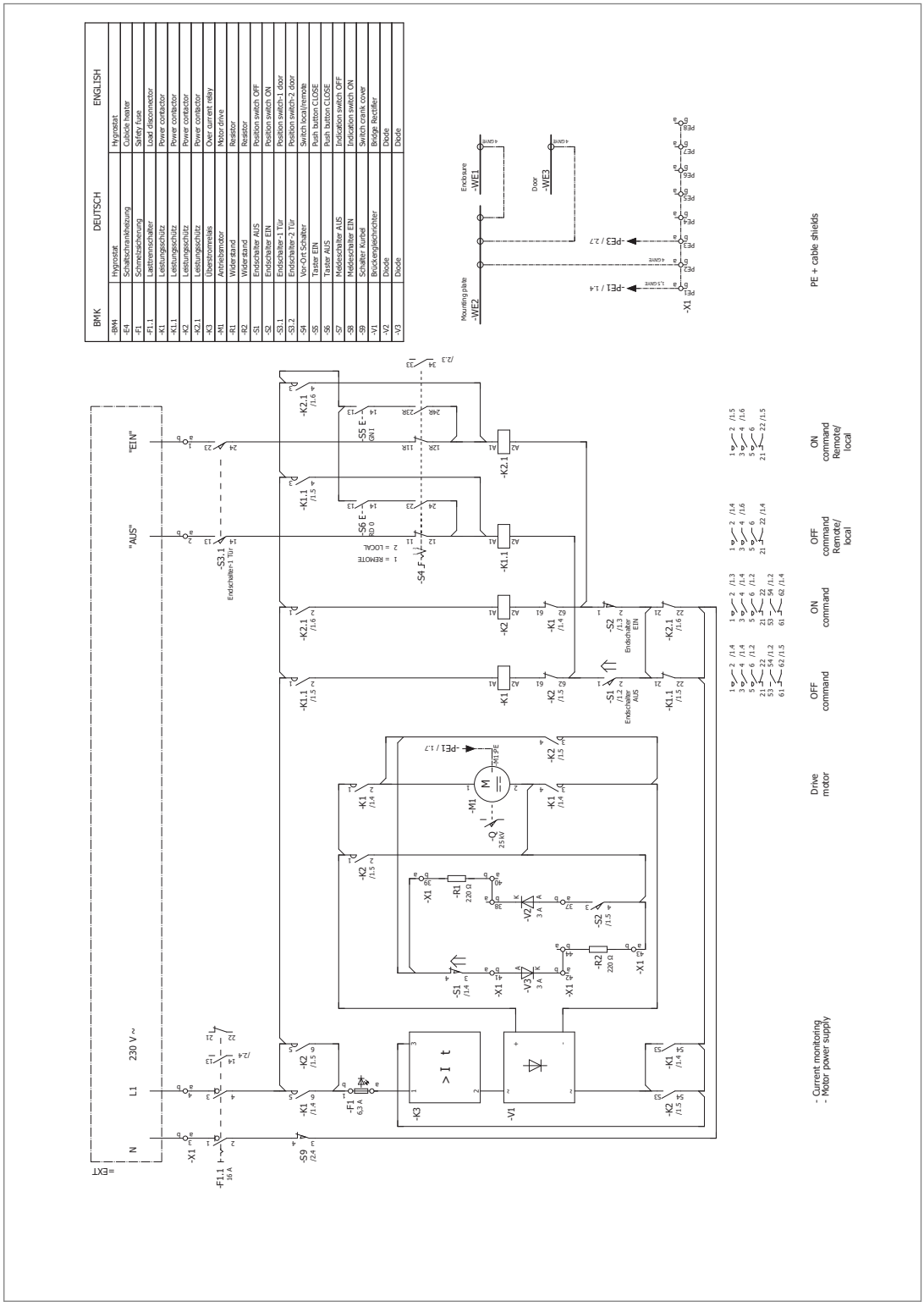
BMK	DEUTSCH	ENGLISH
-F2	Sicherungsautomat	Circuit breaker
-K1	Leistungsschütz	Power contactor
-K2	Leistungsschütz	Power contactor
-K3	Überstromrelais	Over current relay
-K9	Relais	Relay
-K10	Relais	Relay
-R1	Widerstand	Resistor
-R2	Widerstand	Resistor
-R3	Widerstand	Resistor
-R4	Widerstand	Resistor
-RC1	RC Glied	RC-combination
-S1	Endschalter AUS	Position switch OFF
-S2	Endschalter EIN	Position switch ON
-S3	Endschalter Tür	Position switch door
-S4	Betriebsschalter	Operating switch
-T19	Netzteil	Power supply
-V1	Brückengleichrichter	Bridge Rectifier
-V2	Diode	Diode
-V3	Diode	Diode

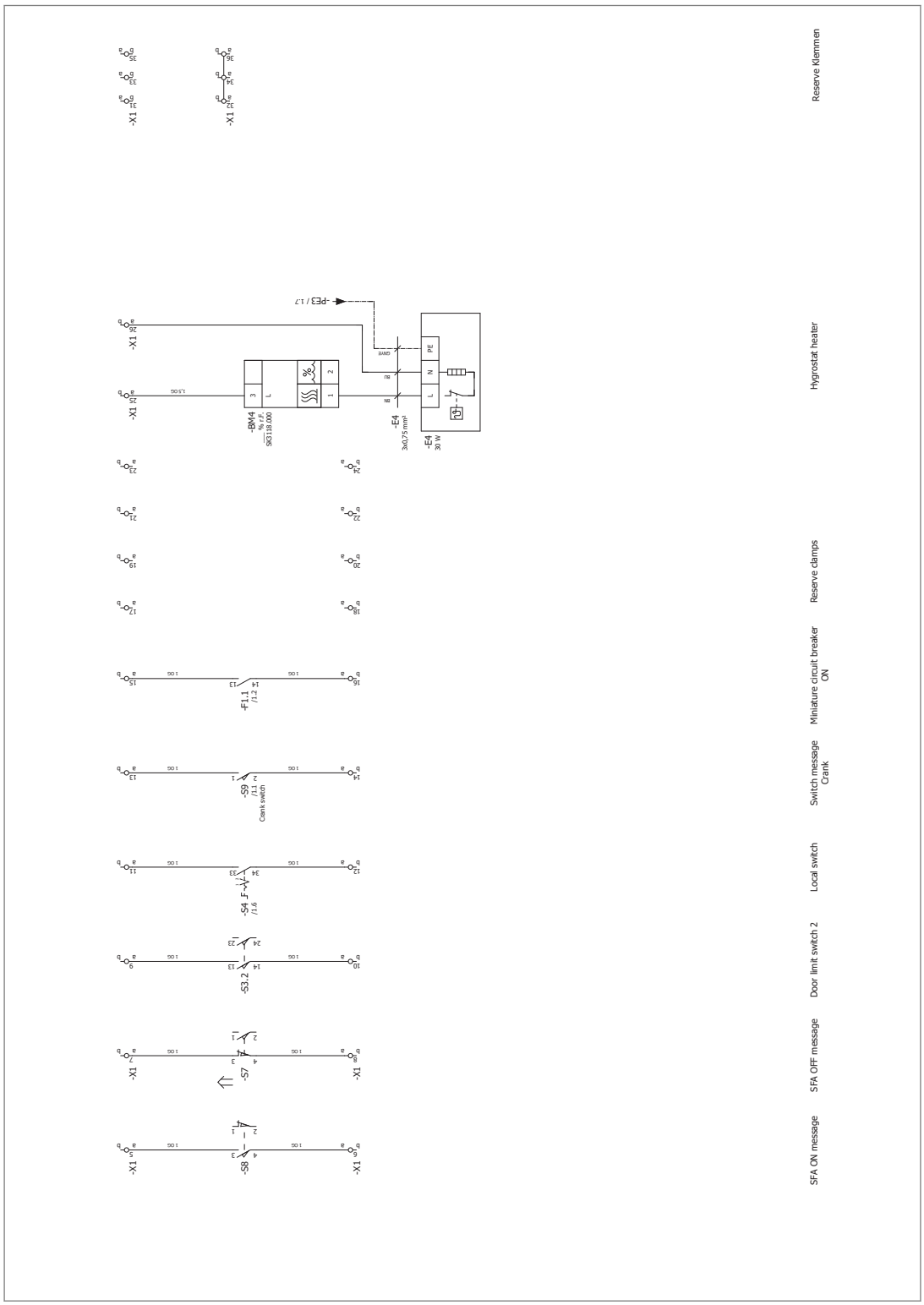
TracFeed® SFA – type 1.25

The TracFeed® SFA type 1.25 has a safety cover over the gears to prevent hazards during on-site operation (push-button function with automatic latching control).

The TracFeed® SFA type 1.25 has a lateral door opening.




BMK DEUTSCH ENGLISH
-BM4 Hygrostat Hygrostat
-E4 Schaltschrankheizung Cubicle heater
-F1 Schmelzsicherung Safety fuse
-F1.1 Lasttrennschalter Load disconnector
-K1 Leistungsschütz Power contactor
-K1.1 Leistungsschütz Power contactor
-K2 Leistungsschütz Power contactor
-K2.1 Leistungsschütz Power contactor
-K3 Überstromrelais Over current relay
-M1 Antriebsmotor Motor drive
-R1 Widerstand Resistor
-R2 Widerstand Resistor
-S1 Endschalter AUS Position switch OFF
-S2 Endschalter EIN Position switch ON
-S3.1 Endschalter 1 Tür Position switch-1 door
-S3.2 Endschalter 2 Tür Position switch-2 door
-S4 Vor-Ort-Schalter Switch local/remote
-S5 Taster EIN Push button CLOSE
-S6 Taster AUS Push button CLOSE
-S7 Meldeschalter AUS Indication switch OFF
-S8 Meldeschalter EIN Indication switch ON
-S9 Schalter Kurbel Switch crank cover
-V1 Brückengleichrichter Bridge Rectifier
-V2 Diode Diode
-V3 Diode Diode
Enclosure -WE1
Door -WE3
Mounting plate -WE2
-PE3 / 2.7
-PE1 / 1.4
-X1
PE + cable shields
=EXT
"EIN"
"AUS"
L1 230 V ~
N
-X1
-F1.1 16 A
-S9 /2.4
-K2 /1.5
-F1 6.3 A
-K3
-V1
-K1 /1.4
-K2.1 /1.6
-K1.1 /1.5
-S3.1 Endschalter 1 Tür
-S6 E- NO 0
-S5 E- NO 1
-S4 F-
1 = REMOTE
2 = LOCAL
-S2 /1.3 Endschalter EIN
-S1 /1.2 Endschalter AUS
-M1
-Q 25 kV
-PE1 / 1.7
-R1 220 Ω
-V2 3 A
-R2 220 Ω
-V3 3 A
-S1 /1.4
-S2 /1.5
ON command
OFF command
ON command Remote/ local
OFF command Remote/ local
Drive motor
- Current monitoring
- Motor power supply


Reserve Klemmen
Hygrostat heater
Reserve clamps
Miniature circuit breaker ON
Switch message Crank
Local switch
Door limit switch 2
SFA OFF message
SFA ON message
-X1
-PE3 / 1.7
-BM4
-E4
-F1.1
-S9
-S4
-S3.2
-S7
-S8

B Checklists and logs

B.1 Training log

Personnel must be trained by the owner on a regular basis. A log must be kept of this training to enable better tracking.

Date	Type of training	Name of the trainee	Signature of person trained	Training provided by	Signature of trainer

B.2 Test and inspection plan

Doc. no.: 3EGF002774D0029
Content: Test and inspection plan SFA-MTS

General Data			
Offer/Order No.:	Purchase Order No.:	System:	
Customer:	Supplier:	Contact/Contact Details:	
Material No.:	Drawing No.:	Product:	
Name of Creator:	Org. Unit:	Date:	

Specific Data			
Designations MTS / SFA:		Purchase Date:	
		Installation Date:	
Serial No. (a).:			

It is essential that the current manuals are available for the inspection. Only those manuals contain instructions for installation, settings, and helpful illustrations!

Checks		No.	OK	Not OK	Comment
Visual Checks:	MTS / SFA manuals are available		☐	☐	
	External damage to the enclosure, door		☐	☐	Flash rust, verdigris, dents, warping, door gap (7 mm ± 1.5 mm) etc.
	Visual inspection of system		☐	☐	Pollution, rust, cabling, etc.
	Door contacts		☐	☐	Bent out of shape, etc.
	Gasket		☐	☐	Cracks, verdigris, moss, circumferential contact with enclosure, etc.
	Bolting, covers		☐	☐	Complete, damage, etc.
	Gears		☐	☐	Lubrication, damage
	Flexball /Shift linkage		☐	☐	Routing / guide as per manuals and switching instructions
	Stop screw		☐	☐	Removed or correctly adjusted
	MTS lubrication		☐	☐	Lubrication as per manual
	Earthing connection		☐	☐	As per manual
	Overhead contact line connection		☐	☐	As per manual
	SFA connection to OSE		☐	☐	Maximum cable cross section 6 mm² for rigid cable, max. line impedance described in manual
Mechanical Checks:	Door is operational		☐	☐	Open / closed / no jamming when closing
	Lock; swivel lever operational, locking system		☐	☐	Blocking / interlocking / counterlocking
	Crank handle operational		☐	☐	Cranking possible, sluggish, smooth running
	Cranking – end positions reached		☐	☐	(b)

Doc. no.: 3EGF002774D0029
Content: Test and inspection plan SFA-MTS

Checks		No.	OK	Not OK	Comment
Electrical Checks:	Electrical function test – motor is running		☐	☐	Gears are running / limit switches are reached
	Electrical switching – end positions reached		☐	☐	Complete retraction of the mast switch / multiple switching operations for checking purposes
	Contact blade inlet		☐	☐	Minimum specifications as per MTS manual or to the bedstop
	Flexball / connecting rods		☐	☐	Flexball / connecting rod abnormalities during electrical switching
	Door contact signal		☐	☐	No flutter message in the control system /multiple opening and closing for checking purposes
	ETS sensor signal (optional)		☐	☐	Corresponding sensor signal is present in the control system

No.	Detailed error description if Not OK

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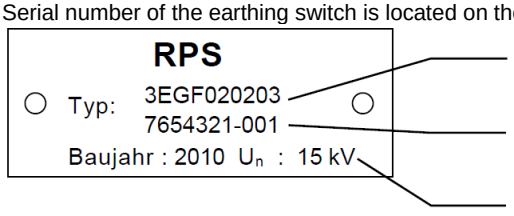
Acceptance of the RPS components is hereby confirmed:

Accepting Party	**Assembly Company**
Date / Signature	**Date / Signature**

Doc. no.: 3EGF002774D0029
Content: Test and inspection plan SFA-MTS

Appendix

(a) Serial number of the earthing switch is located on the swivel base:



Identification resp. drawing number

Serial number

Rated voltage

Serial number of the remote motor drive is located on the right-hand side of the enclosure:

- Type
- Serial number
- Grid voltage
- Power consumption
- Year of construction
- Operating instructions

(b) Cranking is only permissible until you hear the electric limit switches “click”. Correspondingly, the earthing switch/mast disconnector must be fully retracted, provided that it has been correctly adjusted.

C Directory of other documents and descriptions

D List of drawings stated in the text

E Information about the order