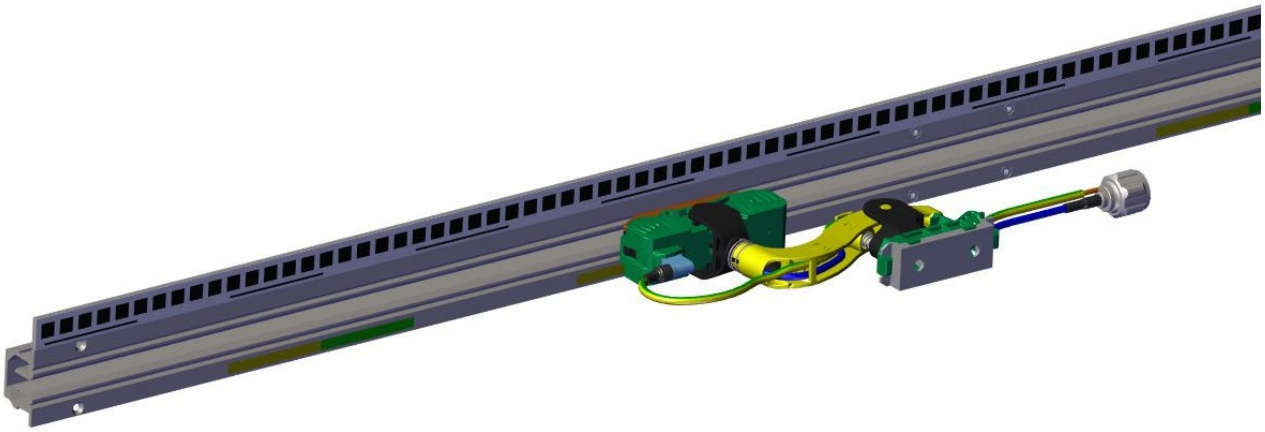
Mounting Instructions

ProfiDAT®*compact*
Data Transmission System
Program 0515



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Contents

1 General Information

1.1 About this document

This document facilitates the safe and efficient handling of the ProfiDAT®*compact* Data Transmission System.

This document is a component of the system and must be kept accessible to personnel at all times in its immediate vicinity. Personnel must read this document carefully and understand it before starting any work. Compliance with all safety and handling instructions provided in this document is a basic prerequisite for safe working.

Local accident protection regulations and general safety guidelines for the area of use of the device also apply.

The illustrations in this document are provided for basic understanding and may deviate from the actual implementation of the system.

In addition to these mounting instructions, the instructions located in the appendices for the individual assembled components also apply.

1.2 Limitation of liability

All data and information in these mounting instructions have been compiled while taking the valid standards and regulations as well as the state-of-the art and our long years of experience and knowledge into consideration.

The manufacturer accepts no liability for damages resulting from:
- Failure to follow these mounting instructions
- Improper use
- Use by untrained personnel
- Unauthorized modifications
- Technical changes
- Use of unauthorized replacement parts or accessories

The actual scope of delivery may differ from the explanations and descriptions provided here if the model in question is a special one, if additional equipment has been ordered, or is due to recent technical changes.

The obligations agreed upon in the delivery agreement and our General Terms and Conditions of business apply, as do the delivery conditions of the manufacturer and the legal regulations applicable at the time the contract was concluded.
All products are subject to technical changes and the many years of technical expertise and experiences within the context of improvement of function and further development.

1.3 Copyright

1.4 Replacement parts

WARNING!

Incorrect replacement parts are a safety hazard!

Incorrect or faulty replacement parts can impair safety and result in damage, malfunctions or complete failure.

→ Always use original replacement parts from the manufacturer!

Order replacement parts from your contracted dealer or directly from the manufacturer.
Contact information: See the last page of this document.
For further documents, see Section 11.

1.5 Material defects

The terms governing material defects can be found in the General Terms and Conditions of Business.

1.6 Technical support

Our Customer Support staff is available for technical support.
Contact information: See the last page of this document.
We are also always interested in new information, experiences and feedback from the field that can help us improve our products.

2 Safety Information

2.1 Explanation of symbols

Safety information is identified in these mounting instructions using symbols. The safety information is introduced using signal words that indicate the degree of the hazard. Always observe safety information and work carefully to avoid accidents, bodily injury and material damage!

DANGER!

... indicates an immediately hazardous situation, which if not avoided, may result in death or serious injury.

DANGER!

... indicates an immediately hazardous situation due to electricity, which if not avoided, may result in death or serious injury.

WARNING!

... indicates a possibly hazardous situation, which if not avoided, may result in death or serious injury.

WARNING!

... indicates a possibly hazardous situation due to electricity, which if not avoided, may result in death or serious injury.

CAUTION!

... indicates a possibly hazardous situation, which if not avoided, may result in moderate or minor injury.

Tips and recommendations:

... refers to useful tips and recommendations as well as information for efficient and trouble-free operation.

ATTENTION!

... indicates actions that will help you prevent material damage.

2.2 Personnel requirements

2.2.1 Qualifications

WARNING!

Inadequately trained persons are at risk of injury!

Improper use can result in serious injury to persons and property.

→ All activities must only be carried out by qualified personnel.

- Only persons who can be expected to perform their work reliably are acceptable personnel. People whose reactions are impaired by drugs, alcohol or medications, for example, are not authorized.
- When selecting personnel, all age- and occupation-specific regulations applicable at the location of use must be observed.
- The following qualifications are specified in the mounting instructions for certain fields of activity.

- **Trained personnel and operators**

  Have been instructed in a training session by the operator with respect to the tasks assigned to them and the potential dangers arising from improper actions.
  The operator of the machine or system must document that the corresponding training has taken place.

- **Specialist personnel**

  Consists of persons capable of performing assigned tasks and independently identifying dangers and avoiding potential hazards based on their specialist training, knowledge and experience as well as their understanding of the applicable standards and regulations

  Are deemed to be technically qualified if they have successfully completed training as a master electrician, apprentice electrician, electrical engineer or electrical technician. Personnel are also considered qualified, who have been employed correspondingly for several years, have been educated in theory and practice during that time and whose knowledge and skills in the trade required have been tested.

  The machine or system operator must document that the appropriate certifications or other proofs of qualification have been or are being provided.

2.3 Unauthorized persons

WARNING!

Danger due to unauthorized persons!

Unauthorized persons who do not meet the requirements described here are not acquainted with the dangers in the work area.

→ Keep unauthorized persons away from the work area.

→ In case of doubt, address the person and direct them away from the work area.

→ Stop working as long as unauthorized persons are in the work area.

2.3.1 Training

Before commissioning the equipment, personnel must be trained by the operator. Log the implementation of the training for better traceability.

Example of instruction log:

Date	Name	Type of Training	Training provided by	Signature
05.11.2009	John Doe	First safety training for personnel	Horst Müller	

2.4 Personal protective equipment

Always wear: **For all tasks:**

Protective headgear
For protection against falling or flying parts and materials.

Protective gloves
For the protection of hands against friction, scrapes, puncture or deeper wounds, as well as against contact with hot surfaces.

Protective clothing
Primarily for protection against ensnarement by moving machine parts. Work clothing must be close fitting with a low resistance to tearing; it must have close-fitting sleeves and no protruding parts.

Protective footwear
For protection against heavy falling parts and slipping on slippery floors.

To be worn for special tasks

Specific protective equipment is required when conducting special tasks. Separate reference to this is made in the individual sections.

Protective eyewear
For eye protection against harmful influences such as strong light, chemicals, dust, splinters or weather effects.

Hearing protection
For protection against loud noises and to prevent acoustic trauma.

Breathing mask (FFP-3 – according to country-specific requirements)
For protection against materials, particles, and organisms. In this case, for protection against the dust produced by the abrasion of sliding contacts and the PVC insulation of the conductor rail.

2.5 Intended use

The equipment is exclusively designed and built for the use described here (its intended use).

Intended use
The ProfiDAT®*compact* Data Transmission System is used for data communication in indoor industrial applications.
In addition to the ability to transfer data, the ProfiDAT®*compact* rail can also be used as a ground conductor rail.

Furthermore, if the positioning option was chosen, a strip or matrix code band can be attached to the ProfiDAT®*compact* rails that can determine the position of a vehicle with the help of a corresponding reader.

WARNING!

The ProfiDAT®*compact* rail must not be used as a phase!

The system includes at least one master and one slave transceiver, as well as a corresponding stationary antenna and a mobile antenna.

Compliance with these technical conditions is mandatory for the installation:

- The permissible maximum travel speed of the collector is 600 m/min.
- The rail may only be installed horizontally with the insertion from the side.

Electrical-technical operating conditions:

- The electrical system must be protected in accordance with local regulations and guidelines.

2.6 Unintended use

Claims of any kind due to damage incurred during use that deviates from the intended use described above ("use other than the intended use") are excluded.
The operator bears sole liability for all damage that results from unintended use.

WARNING!

Danger due to unintended use!

Any application that deviates from or goes beyond the intended use of the equipment can result in hazardous situations.

→ Strictly follow all information in these mounting instructions.

→ Refrain from unintended use of the system.

Unintended use particularly includes the following forms of use:

- Operation outside the specified operating conditions (see Section 3.6).
- Use of the rail for the transmission of power.
- Use where there is a risk of explosion (“Ex” areas).
- Use of the transceiver without a rail.
- Use of the rail without adequate protection.
- Operation in areas that require a higher protection class than IP23.
- Use of the system parallel to a conductor rail system from manufacturers and/or types not approved by Conductix-Wampfler.
- Use of the system with accessories that are not approved and not authorized by the manufacturer.
- Use of the system by untrained personnel.

Environmental conditions

The ProfiDAT®*compact* Data Transmission System may **only** be operated under the environmental conditions described in Section 3.
The ProfiDAT®*compact* Data Transmission System **may not** be operated under the following environmental conditions:

- Ambient temperatures below -20° C and above +55° C.
- Temperature difference may not exceed 40 K.
- Outdoor areas (natural/solar UV radiation, wind, humidity).
- Installation site at elevations higher than 2000 m above sea level.

2.7 Protective measures by the operator /user

The equipment is designed for use in an industrial setting. The operator of the equipment is therefore subject to compliance with the legal obligations concerning workplace safety. In addition to the safety information in this document, all safety, accident protection and environmental regulations valid in the place of operation of the system must also be observed. This particularly applies to the following:

- Work on electrical components of the system **may only be carried out when disconnected from voltage.**
- The operator must inform their self of applicable workplace safety guidelines and identify any additional hazards that may arise under the specific working conditions at the location of use of the equipment. This knowledge must be expressed in the form of operating instructions for the operation of the equipment.
- During the entire time the equipment is in use, the operator must check that these operating instructions still correspond to the current state of regulations and adapt them as necessary.
- The operator must clearly regulate and define responsibilities for installation, operation, troubleshooting and maintenance.
- The operator must ensure that all employees involved with the equipment have read and understood these mounting instructions. In addition, the operator must also train the personnel at regular intervals and inform them of dangers.
- The operator must provide personnel with the necessary protective equipment.
- The operator must keep the keys for the switching cabinets in a safe place. "Safe" means that only explicitly authorized personnel may have access to the keys. The keys may only be issued to technical personnel as described in Section 2.2.1"Qualifications".
- The operator must observe the following standards, regulations and directives when operating the equipment:

EMC Directive 2014/30/EU including	**EMC Directive**
■ EN 6100-6-2	Interference immunity in industrial areas
■ EN 61000-6-4	Interference emissions for industrial areas
■ EN 61000-3-2	Limit values for harmonic currents
■ EN 61000-3-3	Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage power supply networks for systems with a nominal current of 16 A per conductor that are not subject to special connection requirements
■ EN 62311	Assessment of electrical and electronic equipment with respect to limiting exposure of persons to electromagnetic fields (0 Hz – 300 GHz)

Radio Equipment Directive 2014/53/EC, including	**Radio Equipment**
■ EN 301 489-1 V1.8.1	Protection requirements with regard to EMC
■ EN 301 489-17 V2.2.1	
■ EN 300 328 V1.8.1	Use of the radio frequency spectrum
■ EN 301 893 V1.7.1	
■ EN 300 440-1 V1.6.1	Air interface for radio equipment 2.4 – 2.4835 GHz; 5.15 – 6.35 GHz; 5.47 – 5.725 GHz
Low Voltage Directive 2014/35/EU, including:	**Low Voltage Directive**
■ EN 60529	Types of protection provided by housings (IP Code)

The operator is furthermore responsible for ensuring that the equipment is always in perfect working order.

- The operator must ensure that the service intervals described in these mounting instructions are observed.
- The operator must have all safety systems inspected for functionality and completeness on a regular basis (once annually if possible, but at least as often as required by applicable national regulations).
- If the equipment or system has been modified, the safety systems must be inspected again and adapted to the changed conditions so that the equipment or system is safe again.

2.8 Special risks

The following section lists residual risks determined on the basis of a risk assessment.

→ Follow the safety information and warnings in these mounting instructions to reduce health hazards and to avoid dangerous situations.

2.9 5 Safety Rules for working on electrical systems

- Work on electrical systems only when they are disconnected from the power supply. Follow the **5 Safety Rules** before starting work (see DIN VDE 0150-100:2009-10/EN 50110-1:2004-11).
  1. Disconnect the system from the voltage supply at the main switch.
  2. Secure the main switch against being switched back on.
  3. Verify disconnection from power through measurements.
  4. Ground and short-circuit parts of the system on which work will be conducted.
  5. Cover or block off adjacent energized parts.
- Only electricians or personnel trained in electrical work may disconnect power or approve reconnection of power after the work is carried out in the disconnected state!

2.9.1 Electrical hazards and sources of danger in combination with a conductor rail

Risk of death due to electrical shock!

Risk of injury due to falling or being thrown across the room after an electrical shock!

Burns due to arcing resulting from a short circuit!

DANGER!

Contact with energized components can lead to death or severe injury due to electrical shock. There is also a risk of injury from shock reactions, falling or being thrown across the room as a result of an electrical shock.

Work on the following components is dangerous:

- Main power supply
- Live parts: Line feed, cables, connections, conductor rail, connectors, collectors, equipment and connections within switching cabinets, control systems, etc.
- Parts that have become live due to a fault

Before working on the parts listed above:

→ Switch off the power supply of the conductor rail system according to the 5 Safety Rules and secure it against being switched on again. For the 5 Safety Rules, see Section 2.9.

During work:

→ Use insulated tools

Before switching on:

→ Every time before the equipment or system is started, test the insulation resistance according to locally applicable technical standards, directives and legal regulations.

→ Carry out locally required electrical tests.

Maintain electrical safety:

→ Regularly test and maintain electrical equipment.

→ If dangerous deficiencies are identified, take measures to correct the deficiencies without delay. Inform the system operator immediately.

→ If it is not possible to correct the dangerous deficiency, cordon off the area involved or switch the equipment off and secure it against being switched on again. Inform the system operator immediately.

→ Immediately secure loose cables and immediately replace damaged cables.

→ Always replace blown fuses with fuses of the same rating.

Fire hazard due to overload or sparking!

Fire hazards occur due to overloaded cables, electrical arcs, short circuits or sparking. Sparking can occur with poorly serviced, soiled conductor rails or if installation does not comply with the required tolerances.

→ Compliance with permissible current ratings is mandatory.

→ Tolerances must be observed during installation.

→ Install electrical protection as specified.

→ Easily combustible materials may not be stored in close proximity to conductor rails.

→ Check, service and clean conductor rails regularly and as specified. See Sections 8 and 11.

2.9.2 Mechanical hazards and sources of danger in combination with a conductor rail

Risk of injury due to crushing!

Risk of injury due to impacts!

There is a risk of crushing of skin and limbs due to:

- Consumer (spring force) during assembly, disassembly and maintenance.
- Falling parts of the conductor rail system after improper installation or in case of unsuitable operating conditions (for example, in areas containing solvents).
- Moving parts, when the system is in operation.

→ Do not enter the danger zone of the system when in operation. Exception: Maintenance and repair tasks.

→ Allow only trained technicians to carry out the installation.

→ When working on the conductor rail system, wear protective footwear, protective gloves and protective headgear.

→ When changing the collectors or sliding contacts, follow Section 8.2 in these mounting instructions.

→ Only install the conductor rail system where suitable operating conditions prevail. See Section 3.6.

Risk of injury due to cutting and amputation!

The ends of rails and connectors can have sharp edges, particularly if they have been trimmed at the construction site and have not been deburred.

→ Use protective gloves and protective footwear.

→ Deburr the data rail after sawing.

→ Sawed through, dissembled data rails must be handled carefully and properly stored (container or transport box).

→ Be on the lookout for sharp edges near the installation area and avoid contact.

Risk of injury due to falling objects!

The conductor rails, collectors or other components (e.g. antennas), can fall down during operations or during any other works on the system. This can cause severe injuries or fatalities if they fall from great heights.

→ Wear protective headgear.

→ For installation, commissioning, troubleshooting and maintenance: Cordon off the entire danger zone.

→ For decommissioning, disassembly and disposal: Cordon off the entire danger zone. Sawn through, dissembled conductor rails must be handled carefully and properly stored (container or transport box).

Risk of injury due to ensnarement, pulling in and catching!

There is a risk of being ensnared by moving parts when the system is in operation during installation, commissioning or service. For example, moving parts include the machine and the collectors attached to it.

→ Travel at reduced speed!

→ Before working on the conductor rail, disconnect the conductor rail system according to the 5 Safety Rules and secure it against being switched back on. For the 5 Safety Rules, see Section 2.9

→ Wear closely fitting work clothing.

2.9.3 Danger from dust and vapors in combination with a conductor rail

Risk of sensitization, mucous membrane irritation and respiratory disease due to dust!

Abrasion from the sliding contacts, rails and plastic collects in the conductor rails, the data rail and the support structure (substructure). This dust is very fine and is a health hazard. Frequent handling can result in sensitization. Persons who frequently spend longer periods in a heavily used system without protective equipment must reckon with the **following consequences**:

- Irritations of the mucous membranes
- Respiratory diseases
- Cancer

These consequences must also be expected if accumulations of dust are handled without proper care (e.g. blowing out dust with compressed air).

→ In workplaces with long-term exposure and heavily use systems, take effective measures to protect employees from the dust.

→ Wear personal protective equipment during all work on the conductor rail system in which collected dust can be stirred up. In particular, wear personal protective equipment when cleaning the system.

- Protective eyewear
- Dust mask, Class FFP3
- Protective gloves
- Disposable coveralls

→ Before starting work, clean the conductor rail in accordance with requirements. There is a special maintenance instruction for this. See 11.

→ During cleaning operations, protect the surrounding area, e.g. by covering or removing stored materials and cordoning off areas in which dust could fall down on persons.

→ Do not blow out dust with compressed air, but rather vacuum it away. The vacuum must be equipped with a Class H fine filter.

→ Do not eat, drink or smoke during the work!

Poisonous gases during fire!

In the event of fire in the facility, the plastic parts (PVC) of the conductor rail system will emit poisonous gases (HCL).

→ The building must be evacuated immediately.

→ Notify the fire department.

2.9.4 Danger in connection with the operational environment in combination with a conductor rail

Danger as a result of environmental influences!

Due to environmental conditions such as flammable dusts / gases, chemical substances, radiation, temperature and contaminants can damage components and cause breakage and falling off. Flammable dusts can cause fires due to sparking.

DANGER!

→ Check influences depending on temperature, exposure time, concentration and interactions.

→ Use in chemical works, galvanizing plants, electroplating plants, composting plants or in warehouses or installations where chemical substances (e.g. aromatics, benzene) are stored or processed must be checked in advance through Conductix-Wampfler.

→ With an installation height of 3 m or more in areas with pedestrian traffic, secure conductor rails against falling down (safety gear).

→ Install and operate the system according to the ambient conditions that are within the permissible operating conditions.

These characteristics of the conductor rail can create a hazardous situation if the conductor rail is installed in an operational environment with:

- Electrical power
- Sparking
- Dust due to abrasion
- Material composition of the insulating profiles, which release toxic vapors if burned

The **most important measure** to protect against these hazards is to only install the conductor rail system **where the appropriate operating conditions** prevail. See Section 3.6.

The environment of the conductor rail may be exposed to electrical current!

The environment of the conductor rail may be exposed to electrical current under the following circumstances:

- If the conductor rail is severely contaminated or wet.
- If electrically live parts are exposed (insulating profile or the insulation of the connection cable are damaged).
- When the hanger clamps or the insulating profile fail, or if the conductor bar falls down and touches a conductive material.

→ Secure the electrical system according to specifications.

→ Install the conductor rail according to the corresponding documentation (see Section 11), observe environmental conditions, regularly check, properly maintain and clean.

→ Regularly clean the conductor rail and repair if necessary

Risk of sensitization, mucous membrane irritation and respiratory disease due to dust!

Abrasion from the sliding contacts collects in the conductor rails, the data rail and the support structure (substructure). This dust is very fine and is a health hazard. Possible consequences:

- Irritations of the mucous membranes
- Respiratory diseases
- Cancer

→ For protective measures, see Section 2.9.3.

2.9.5 Unexpected start, unexpected overrun in combination with a conductor rail

Control system failure/fault, software error!

The failure of the data transmission system or a software error can lead to uncontrolled movement of the vehicle.

→ A plausibility check of the signals must be carried out through the customer's superordinate control system.

→ Complete the Start-up Checklist, see Section 6.

Restore the energy feed after failure of the power feed!

Failure of the power feed can lead to uncontrolled movements of the system.

→ Initialization of the RAM memory (carried out automatically).

External influences on electrical equipment due to external interference sources!

External interference sources, such as radio or radar, can cause faults in the components and the WLAN network.

→ Only use the manufacturer's data rail (slotted waveguide).

2.9.6 Emergency stop

The ProfiDAT®*compact* Data Transmission System does not have its own emergency stop. Suitable safety components must be incorporated to ensure the emergency stop function.
Conductix-Wampfler recommends the use of a PROFIsafe system.

2.9.7 Danger zones

WARNING!

Risk of injury due to moving components!

When the system is operating, severe injuries can result if persons or objects are within the movement range (danger zone!).

→ Do not operate the machine if persons or objects are within the range of motion (danger zone!).

Exception: Repair and maintenance work. The machine may only be run at a reduced speed and with extreme care.

→ Ensure that the machine cannot move in an uncontrolled manner.

→ Do not reach into moving parts.

→ Cordon off the danger zone around the entire system.

WARNING!

Risk of death due to suspended loads!

Falling or uncontrolled swinging loads can lead to severe injury or even death.

→ Never walk under suspended loads.

→ Only use authorized lifting gear and lashing components with sufficient load capacity.

→ Ensure that lashing components are properly seated.

→ Do not use torn or worn ropes or straps.

→ Do not attach ropes or straps to sharp corners and edges and do not knot or twist them.

→ Only move loads under supervision.

→ Set down the load before leaving the work area.

CAUTION!

Risk of crushing due to stored energy!

When working on the collector, there is the risk of crushing extremities due to uncontrolled movements as a result of the energy stored in the spring.

→ Pay attention to spring force during all work on the collector. Do not reach between the data rail and the collector.

→ With installation, maintenance and repair: Carefully check the spring force.

2.10 Safety systems

The data transmission system has **no** safety systems. The operation of ProfiDAT®*compact* always takes place in connection with the system in which the ProfiDAT®*compact* is installed. Therefore, pay attention to the safety systems of the respective system!

WARNING!

Risk of death due to inoperative safety systems!

Safety is only ensured if the safety systems are intact.

→ Before starting work, check that the safety systems are functional and properly installed.

→ Never disable or deactivate safety systems.

2.11 Conduct in the event of accidents and faults

Measures to be taken in the event of accidents:

- Shut down the system and secure it against unauthorized, unintentional and/or erroneous reactivation.
- Secure the danger zone.
- Remove persons from the danger zone.
- Initiate first aid measures.
- Alert the rescue services.
- Inform responsible parties at the operating site.
- Make access available to rescue vehicles.

Measures in the event of faults:

- Shut down the system and secure it against unauthorized, unintentional, and/or erroneous reactivation.
- Secure the work area against entry.
- Consult qualified personnel when analyzing the fault.
- Consult authorized personnel for maintenance and repair.
- Check for disconnection from power.
- Remove the equipment and replace it with new equipment.
- Determine the cause of fault and repair the equipment.
- Conductix-Wampfler must be informed immediately if personal injury or material damage can occur during breakdowns.

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3 Technical Data

3.1 General information

Specification	Value, Unit
Maximum length of a rail segment	120 m (with line feed)
Rail length	5000 mm
Outer rail dimensions (width x height)	21 mm x 37 mm (21 mm x 52 mm)
Pole spacing	Depending on the respective parallel mounted conductor rail and the space required
Power supply: ProfiDAT®*compact* Transceiver	24 V DC, 4-pole, with screw terminals 48 V DC, PoE (RJ45), (according to IEEE802.3at for Type 1 and IEEE802.3af / typical)
Max. current as a PE rail	400 A (in combination with a conductor rail system with max. 400 A phase current and an ambient temperature of 35 °C)
Maximum data transmission rate	100 Mbps
Maximum travel speed of the mobile antenna / vehicle (straight segment)	600 m/min
Interface	100 Mbps, RJ45
System service life (except wear parts and electrical components)	10 years
Protection class	IP 23 (for collector when inserted)

3.2 Interfaces

3.2.1 Electrical / Electronic

The interfaces to the customer's system are:

- Data interface
- Power supply/control voltage
- Collector
- Grounding (PE)

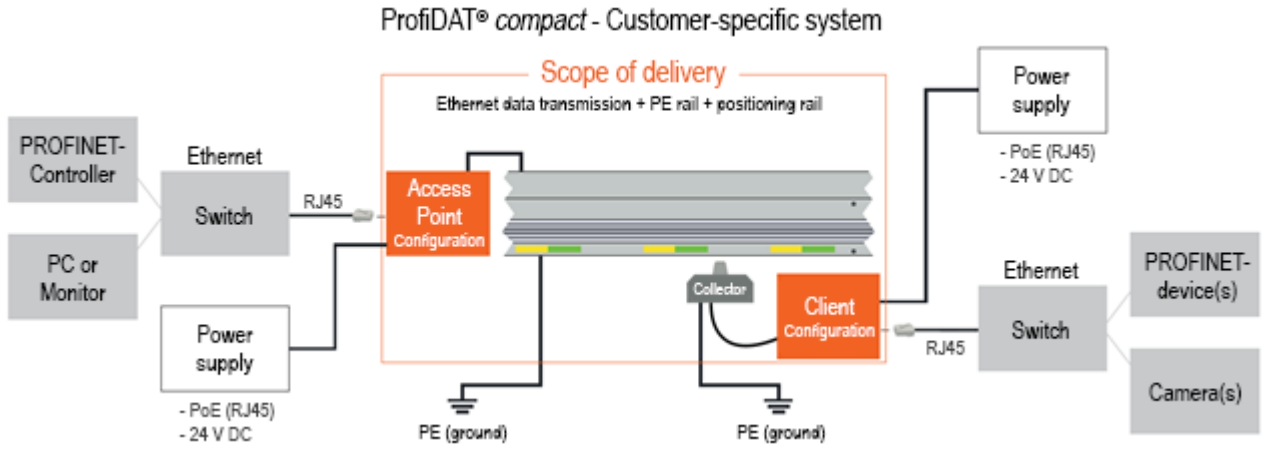


Fig. 1: Overview of interfaces and scope of delivery ProfiDAT®*compact (simplified)*

Data interface: 100 Mbps, RJ45
Data is fed to the rail (slotted waveguide) via the line feed. A data cable (HF cable) is connected to the stationary antenna. The connection is made via plug connectors.
The HF cable is connected to the antenna connector of the transceivers (access point). The access point is connected to the customer network via an RJ45 connector.
Collector (including mobile antenna):
The collector head is connected to the on-board electrical system of the mobile consumer of the machine via two flexible cables (HF cable and PE cable). The data cable (HF cable) between the mobile antenna and the transceiver (client) is included in the scope of delivery. A 600 mm open-ended PE cable is installed in the mobile antenna.
The power cable between the mobile antenna and the consumer must be provided by the customer. The manufacturer/operator of the machine/system must observe the required conductor cross-sections and when applicable, the design of the power cable and ensure that the power cable is installed flexibly and free of directional forces. The connections are made via screw terminals or plug connectors.
PE interface:
The interface for the customer-side PE cable is located on the PE connector (see Section 4.3). The PE cable must be connected according to applicable standards.
Power supply / Control voltage:
The controller for the ProfiDAT®*compact* requires the following power supply:

Name	Voltage / Frequency
DC control voltage	
Transceiver	24 V DC

WARNING!

Risk of injury due to collectors!

Failure to comply with the specified supply voltages for the controller can cause a controller failure and electrical components may be destroyed. As a result, the collector may run jerkily and hit persons or objects.

→ Observe and maintain the specified supply voltages.

→ Keep danger zone clear of persons and objects (see Section 2.9.5).

3.2.2 Control signal cycle times

When commissioning the transceiver devices, it must be taken into account that the PROFINET I/O cycle times of all devices that communicate via the ProfiDAT®*compact* system must be adapted.

The cycle time must be at least 32 ms (may vary depending on the application) and set accordingly in the superordinate control module.

In the following cases, the cycle time must be set to at least 64 ms:

- For line feed with more than one participant (client)
- When using the iPCF protocols (used for applications with more than 3 participants or segment changes or rapid roaming)

A cable-connected PROFIsafe connection requires an F-monitoring time that corresponds to at least 6 times the PROFINET I/O cycle time. A minimum 2s F-monitoring time via WLAN is recommended (for details, see SIEMENS FAQ 109475919).

3.2.3 Data transfer limitations

With the iPCF function (system-specific activated) in connection with the Layer 2 Tunnel, the sum of all data, including the Ethernet header, per transceiver (client) and per iPCF cycle must not exceed 2300 bytes (for details, see SIEMENS FAQ 26562314).

3.2.4 Network integration

ATTENTION!

Instructions regarding the network integration of ProfiDAT®*compact* are described in TI0514-0001!

3.2.5 Mechanical

The interface between the data transmission system and the portable consumer of the machine is:

- Collector

The collector on the ProfiDAT®*compact* rail fulfills a double function. The collector is guided on theProfiDAT®*compact* rail via sliding contacts. The sliding contacts ensure the connection to the ground conductor rail (ProfiDAT®*compact* rail), while the data transmission occurs via the built-in mobile antenna in the collector head. The mobile antenna is inserted into the slot of the ProfiDAT® rail and is electrically isolated from the sliding contacts.

3.3 Transceiver technical data

Fig. 2: Transceiver (example photo)

The transceiver is a PROFINET/PROFIsafe compatible communication device based on the IEEE 802.11n standard. Communication with PROFINET-IO uses a Layer 2 Tunneling Protocol (L2TP).

Specification	**Value, Unit**
Dimensions (width x height x depth)	26 x 156 x 127 mm
Weight	0.52 kg
Installation	S7-300 profile S7-1500 profile 35 mm DIN top hat rail Wall mounting
Protection class	IP30
Data connection	RJ45, 100 Mbps
Grounding	Via profile/top hat rail or paint-free eye

Specification	Value, Unit
Power supply	PoE (RJ45), (according to IEEE802.3at for Type 1 and IEEE802.3af / typical) 4-pole with clamping screws
Operating frequency	5.2 – 5.8 GHz
Operating voltage from terminal strip	19.2 to 28.8 V DC
Operating voltage – via Power over Ethernet	48 V DC
Power consumption: – for 24 V DC (typical) – for Power over Ethernet	 0.25 A 0.125 A
Energy loss: – for 24 V DC (typical) – for Power over Ethernet	 6 W 6 W

3.4 Transceiver housing technical data

Conductix-Wampfler Automation – Housing (part of the transceiver assemblies) (Material number: 3272029)

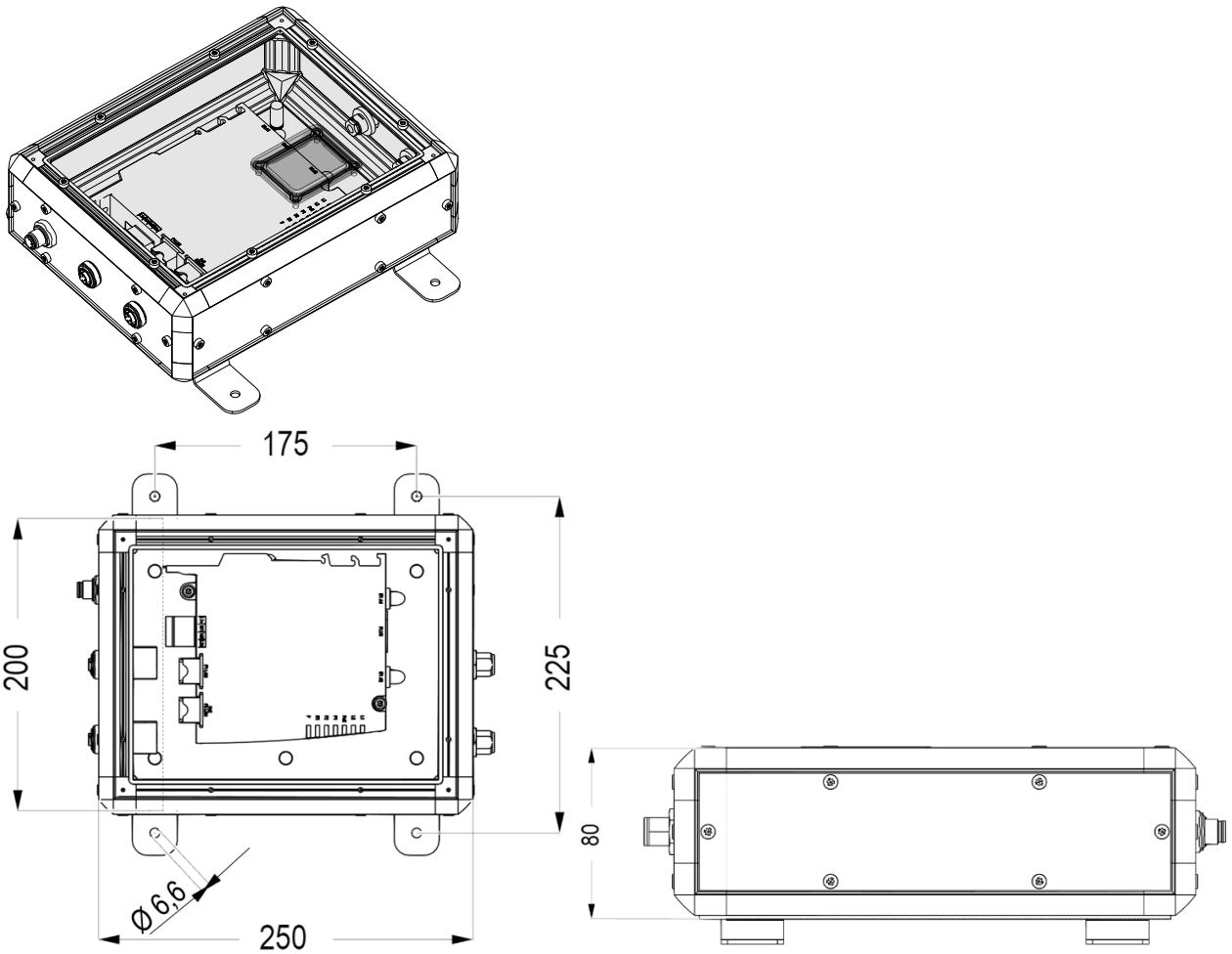


Fig. 3: Transceiver housing dimensions and illustration

- Material: Aluminum and plastic (ABS)
- Fastening: Mounting bracket
- Protection class: IP54
- Transceiver connection (laid outward):
    - 2x M12 4-pole D-coded (Ethernet, -X36 and -X37, of which -X37 with PoE)
    - 2x N-Connect (antennas, -X4 and -X5)
    - 1x M12 A-coded (redundant power supply, -X10)

Scope of delivery:

- Housing with pre-assembled transceiver and terminating resistors (optional)

- Rear side grounding connection via ring terminal
- Plate for equipotential bonding connection with blade receptacle for 1.5-2.5 mm² (only for access point)

Not in scope of delivery:

- Power supply
- Media converter

HF cabling special features:

- Cable (4) in the housing – shorter, deviating material number
- Terminating resistor outside the housing and deviating type

Polycarbonate housing (Material number 051450-11)

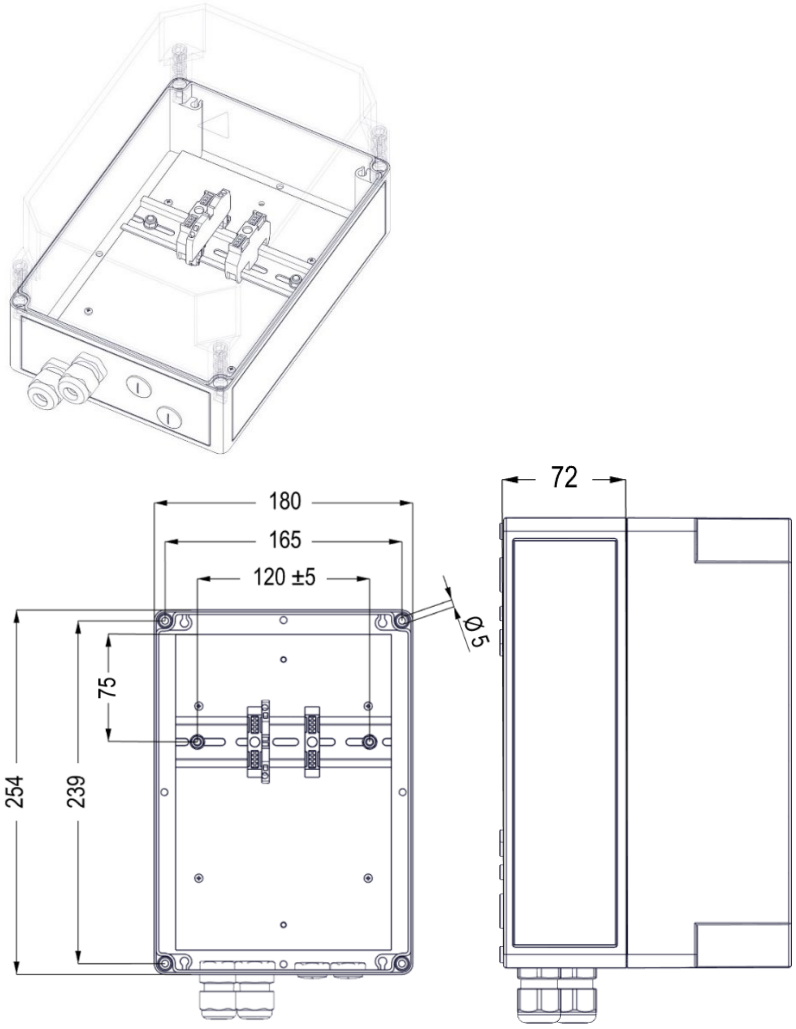


Fig. 4: Polycarbonate housing dimensions and illustration

- Material: Glass fiber reinforced polycarbonate
- Fastening: Sealing and insulation plugs for wall mounting screws

- Protection class: IP66
- Transceiver connection (laid outward):
  - 1…2x N-Connect (antennas), provide unused opening with filler plug
- Prepared connections:
  - Power supply (prepared screw connection M20), connection directly to transceiver
    - Protective conductor terminal 2.5 mm² on top hat rail for PE and equipotential bonding
  - Network connection (prepared screw connection M20), connection directly to transceiver

Scope of delivery:

- Plastic housing with pre-drilled holes (preassembled blind cover and screw connections)
- Mounting plate, top hat rail, end clamps, PE terminal strip (preassembled)
- RJ45 connector for quick installation (Siemens IE FC RJ45 connector 180 2x2)
- Plate for equipotential bonding connection with blade receptacle for 1.5-2.5 mm²

Not in scope of delivery:

- Power supply
- Media converter

3.5 Passive HF components technical data

3.5.1 HF cables

ATTENTION!

The following values for bending radii and tightening torques must not be exceeded. Observing the instructions for the connection of the connectors is mandatory!

Minimum bending radii:
The bending radii must not fall below the values in the table:

Cable type	Diameter [mm]	Color	Minimum bending radius [mm] static	Minimum bending radius [mm] dynamic
SSB Ecoflex 10	10.3	Black	41.2	82.4
SSB Aircell 5	5.5	Black	27.5	55
Huber+Suhner K_02252_D	3	Brown	18	45
Huber+Suhner Enviroflex 316D	3	Black-Blue	5	30

Connector types:

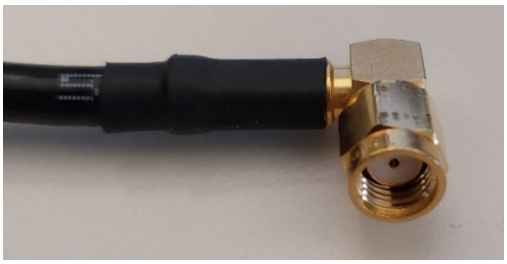


Fig. 5 R-SMA angle connector

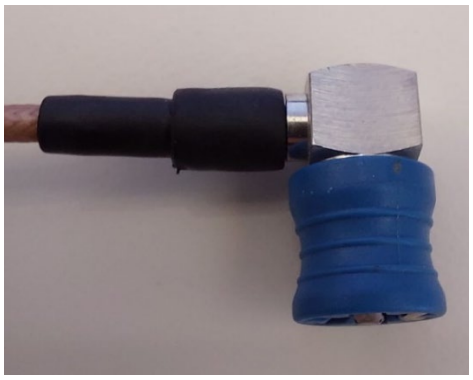


Fig. 6: QLS connector is unlocked

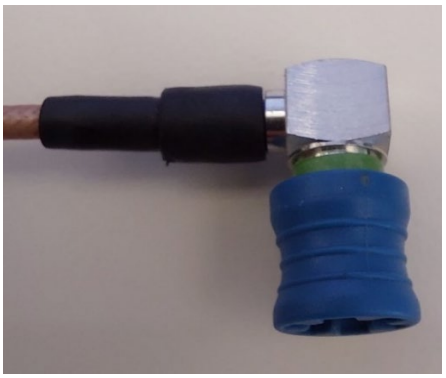


Fig. 7: QLS connector is locked (green ring visible by pushing the blue sleeve forward)

Fig. 8: N-connector

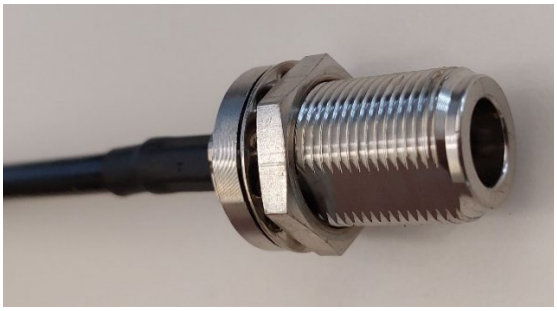


Fig. 9: N-socket as switching cabinet bushing on cable

Tightening torques:

Connector type	Tightening torque
N	4 to 6 Nm
(R)-SMA	0.79 to 1.13 Nm

ATTENTION!

QLS connectors are not screwed, but rather are locked by pushing the blue sleeve forward (green ring becomes visible). To remove the connector, the blue sleeve must be pulled back (unlocked) in the direction of the cable.

ATTENTION!

N-connectors can easily tilt. Ensure that the thread is not destroyed when attaching the connector.

3.5.2 Further passive HF components

Fig. 10: N-socket (on both sides) as switching cabinet bushing

Drill hole diameter: 16mm

Fig. 11: N-attenuator (example 3dB)

Length: 54 mm
Shaft diameter: 18mm

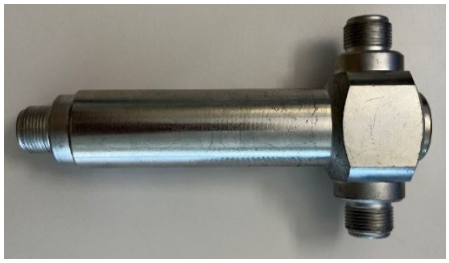


Fig. 12: N-power splitter

Shaft diameter: 34 mm
Outer dimensions: 72 x 132 mm

Fig. 13: R/SMA terminating resistor

Fig. 14: QMA terminating resistor

ATTENTION!

The HF cables must not be crimped (e.g. by pulling too tightly on the cable tie).

→ Observe the bending radii of the HF cables (see Section 3.5.1).

→ Maintain the recommended coupling torques (see Section HF cables 3.5.1).

3.6 Operating conditions

Specification	Value		Notes
Ambient temperature	–20° C up to +55° C	Conditions: At relative humidity [50 % rel. at +40° C]	
Temperature difference	75 K		

ATTENTION!

Faults due to incorrect operating conditions!

Operating conditions outside the specified range can lead to malfunctions due to short circuits, premature aging and damage to electrical and mechanical components.

Important parameters are:

- Dust and deposits
- Humidity/condensation
- Cold/hot temperatures
- Corrosion
- Chemical substances

→ The conductor rail system must be switched off if the operating conditions are no longer within the permissible range described above.

→ The conductor rail system must be switched off if it is wet or soiled. Dry or clean as specified (see Section 11 for special maintenance instructions for conductor rail systems).

→ Take the relevant measures to restore suitable operating conditions.

3.7 Type plate

The transceiver manufacturer's type plate is located on the transceivers.

It contains the following details:

- Type
- Serial number
- MAC address
- Model
- Manufacturer
- Manufacturer address

Additional marking by Conductix-Wampfler GmbH:

- Customer order number
- Access point or client name

Please always include the information on the type plate when inquiring about the product!

4 Product Description and Functional Principle

4.1 Overview

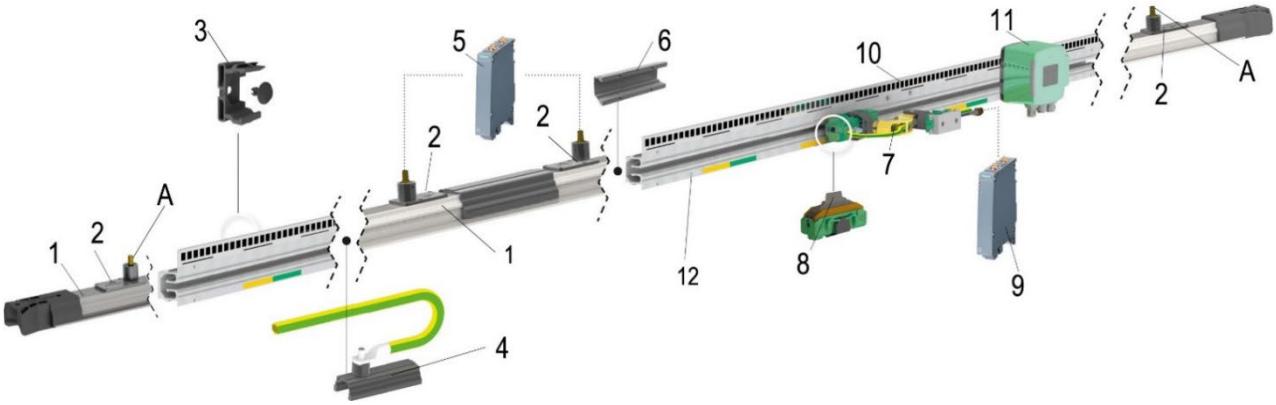


Fig. 15: ProfiDAT®*compact components in detail*

Item	Name	Item	Name
1	Line feed	2	Stationary antenna
3	Universal hanger clamp	4	PE connector/ PE connection
5	Transceiver (access point)	6	Connector
7	Collector	8	Mobile antenna
9	Transceiver (client)	10	Code band for the positioning system (see Section 6.4.12) Not included in scope of delivery
11	Read head for the positioning system (see Section 6.4.12) Not included in scope of delivery	12	Data rail
A	Terminating resistor		

4.2 Brief description

The ProfiDAT®*compact* Data Transmission System is a system that facilitates the communication between a stationary network and one or more mobile consumers. The mobile consumers move along the guideway in a linear, track-guided manner. The collector follows the movement of the mobile consumer and compensates for guideway deviations between the mobile consumer and the data rail (horizontally and vertically).

The data is coupled with the data rail via the stationary antenna, transmitted to the mobile antenna in the collector head and forwarded to the mobile consumer via a connecting cable on the collector. The collector head of the collector is pressed against the data rail with a permanent contact force (approx. 10 N) (for the installation dimension, see Fig. 127).

In addition to the data transfer, the ProfiDAT®*compact* rail can be simultaneously used as a ground conductor rail and as a positioning system. The positioning system consists of bar code or matrix code band, which is glued to the ProfiDAT®*compact* rail with positioning strip and a read head, which is mounted next to the collector with mobile antenna.

The system is variable in length. It consists of at least one stationary and one mobile transceiver, the stationary antenna and the mobile antenna. The ProfiDAT®*compact* rails are fastened to the support structure (substructure) using hanger clamps provided by the customer.

TheProfiDAT®*compact* rails are mechanically connected using connectors that ensure stability and the secure connection of the ProfiDAT®*compact* rails. The data is coupled or decoupled of the ProfiDAT®*compact* rails by means of a stationary antenna. The data can be continuously received and sent via the mobile antenna.

Examples of applications are:

- Electrified monorail systems (EMS)
- Logistics shuttles
- Packaging machines
- Small parts warehouses

4.3 ProfiDAT®*compact* rail components

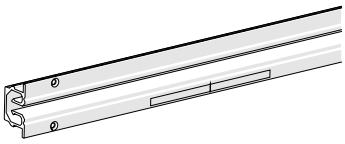


Fig. 16: Rail without positioning strip

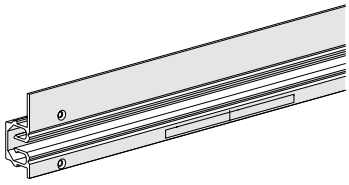


Fig. 17: Rail with positioning strip

- **Data rail (slotted waveguide)**

The data rails are used as a data channel. They are electrically conductive and used as a grounding rail (PE rail).

There are two types of data rails:

- without positioning strip (width: 21 mm, height: 37 mm)
- with positioning strip (width: 21 mm, height: 52 mm)

The standard length of a data rail is 5 m.
The rails can also be purchased as rail bends from Conductix-Wampfler (for more information, see KAT0515-0001).

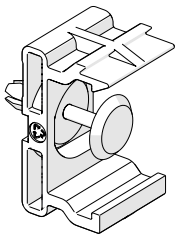


Fig. 18: Universal hanger clamp

- **Hanger clamp**

The universal hanger clamp (see Fig. 18) is fastened to the support structure (substructure) by means of expanding rivets that are provided by the customer.

There are additional fastening variants for the universal hanger clamp. The universal hanger clamp can also be fastened to the support structure (substructure) with screws (see Fig. 19).

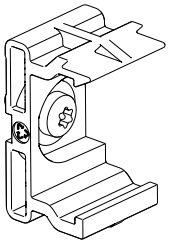


Fig. 19: Hanger clamp with screw fastening

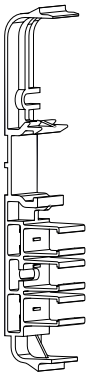


Fig. 20: Exemplary EMS hanger clamp

Project-specific hanger clamps can be developed and produced for the various conductor rail systems in combination with the ProfiDAT®*compact* rail (with and without a positioning strip). (see Fig. 20)

Project-specific hanger clamps, such as for EMS applications, are typically clipped on or screwed into the EMS traverse beam. In this regard, separate documentation, such as technical drawings, can be requested within the scope of a project.

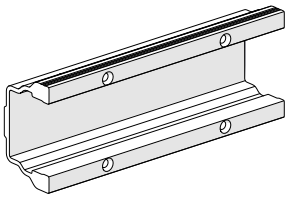


Fig. 21: Connector

- **Connector**

There are two types of connectors:

- Connector
- PE connector, with connection bolts for the PE function

The connector connects two data rails together and is fastened to the data rails using screws.
The PE cable can be connected via the bolt on the PE connector using a cable lug.
An elongated hole in the support structure (substructure) is required for the installation of the PE connector (see Section 6.4.7)

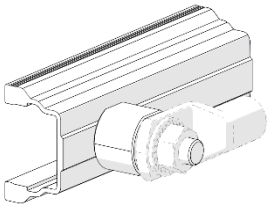


Fig. 22: PE connector

- **PE connection**

The PE connection is screwed to the forward data rail every 25 m for grounding. The flexible drilling jig is used for screwing (see Section 6.4.7). The PE connection is suitable for a cable cross-section up to a maximum of 25 mm².

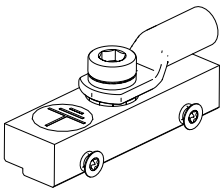


Fig. 23: PE connection

- **Expansion unit incl. anchor point**

The expansion unit connects two data rails together and serves to compensate for changes in length of the data rails due to temperature fluctuations. Rail adapters (with and without positioning strip) in combination with the end feed are required for the mounting (see Section 6.4.4).

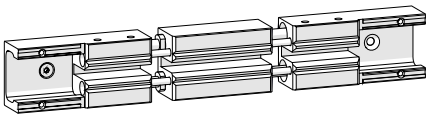


Fig. 24: Expansion unit incl. anchor point

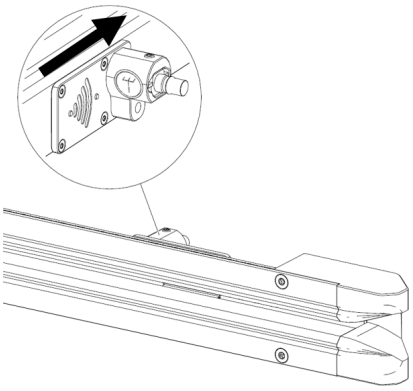


Fig. 25: End feed with stationary antenna

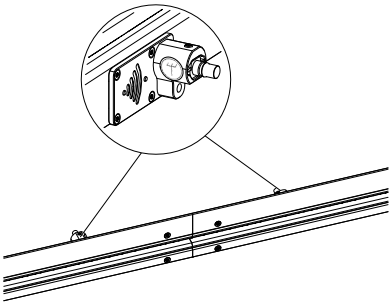


Fig. 26: Line feed with stationary antenna and positioning strip

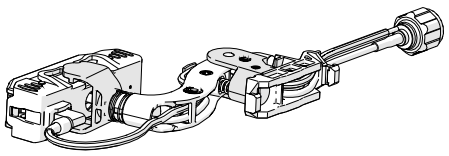


Fig. 27: Collector

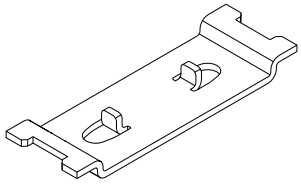


Fig. 28: Towing unit

- **Line feed (with stationary antenna)**

The line feed is mounted on the segment ends or on the rail line. It is used to couple and decouple the data signals.
There are two types of line feeds:

- Line feed with or without positioning strip
- End feed with or without a positioning strip

A WLAN symbol is located on the back of the stationary antenna that indicates the transmission direction of the signal. The transmission direction must not point in the direction of the expansion units or transfer units, but rather must always point in the direction of the segment to be supplied with the signal (see Fig. 25).
At the stationary antenna of a segment end, there is a terminating resistor that attenuates the signal so strongly that no interference radiation is produced for other devices in the vicinity of the data transmission system (e.g. transfers).

- **Collector (with mobile antenna)**

The collector is guided on the ProfiDAT®*compact* rail via two split sliding contacts. The mobile antenna is inserted into the slot of the ProfiDAT®*compact* rail and is electrically isolated from the sliding contacts

- **Towing unit**

The towing unit connects* the ProfiDAT®*compact* collector with the customer's application. The towing unit is screwed onto the support structure (substructure) and the ProfiDAT®*compact* collector is clipped onto the towing unit.

4.4 ProfiDAT®*compact* electrical components (example layout)

Overview of electrical components with HF cables (schematic diagram)

The green area shows the access point components and the client components are shown in the purple area.

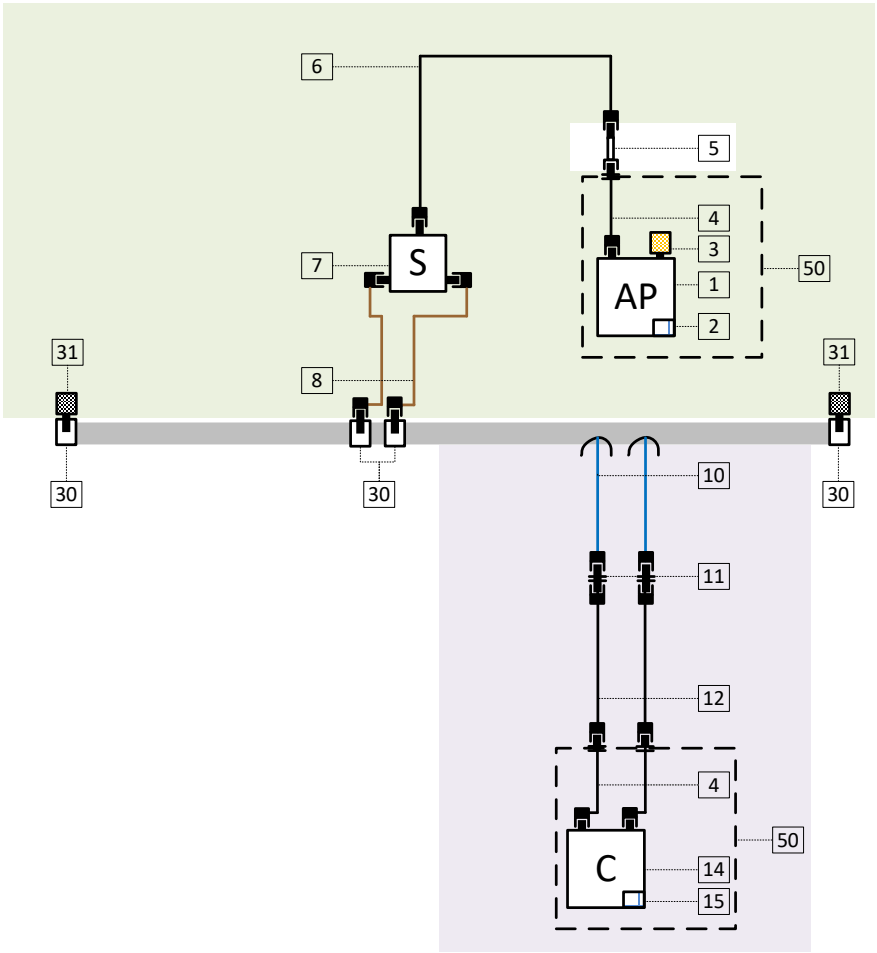


Fig. 29: Overview and arrangement of electrical components. Example: Line feed, client with two antennas, without additional housing, equipotential bonding not shown

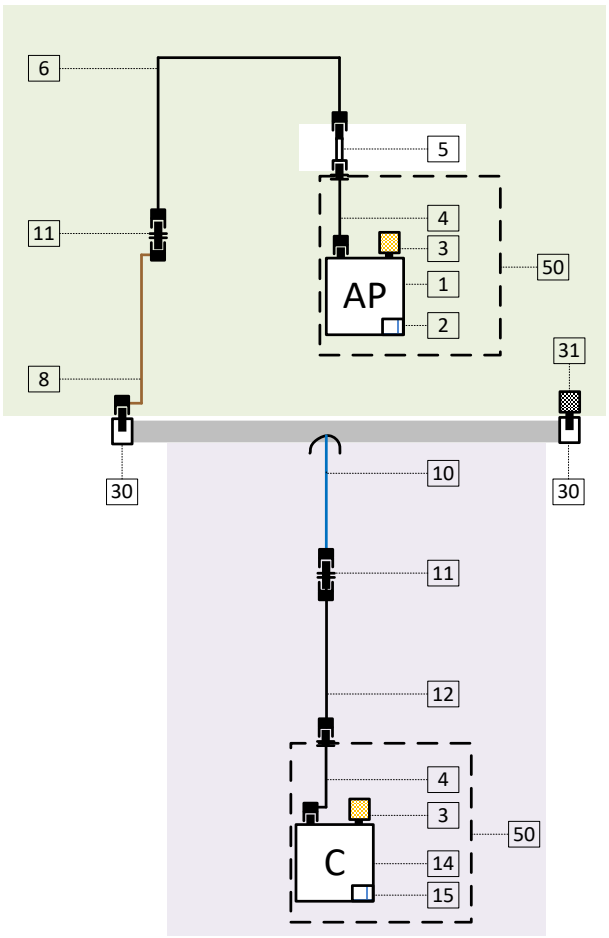


Fig. 30: Overview and arrangement of the electrical components. Example: End feed, client with one antenna, without additional housing, equipotential bonding not shown

#	Name	HF Connection 1			HF Connection 2			Length	Material Number
1	Access point W774	R/SMA	Socket	180°	R/SMA	Socket	180°		3187868
2	Key plug W780								3187889
3	R-SMA terminating resistor	R/SMA	Connector	180°					3170540
4	Aircell 5 cable	SMA	Connector	180°	N	Installation socket	180°	1.0 m	3173091
5	Attenuator 20dB	N	Connector	180°	N	Socket	180°		3275973
5	Attenuator 10dB	N	Connector	180°	N	Socket	180°		3275972
5	Attenuator 6dB	N	Connector	180°	N	Socket	180°		3275971
5	Attenuator 3dB	N	Connector	180°	N	Socket	180°		3275950
6	Ecoflex 10 cable	N	Connector	180°	N	Connector	180°	10.0 m	3173096
7	Power splitter	N	Connector	180°					3187905
8	K_02252_D cable	QLS	Connector	90°	N	Connector	90°	1.0 m	3272896
10	Collector with 316D cable	N	Connector	180°				0.6 m	3247347

#	Name	HF Connection 1			HF Connection 2			Length	Material Number
11	Installation socket	N	Installation socket	180°	N	Installation socket	180°		3187977
12	Ecoflex 10 cable	N	Connector	90°	N	Connector	180°	3.0 m	3259210
14	Client W734	R/SMA	Socket	180°	R/SMA	Socket	180°		3187873
15	Key plug W740								3187890
30	ProfiDAT®*compact* line feed	QMA	Socket	180°	-	-	-	-	-
31	Terminating resistor	QMA	Connector	180°					3248020
50	Housing (optional or customer-supplied)								

ATTENTION!

Depending on the housing, the HF components on and in the housing may differ from those in the example layouts.

ATTENTION!

The equipotential bonding is not shown on the example layout. See Section 6.5.3.

4.5 Modes of operation

The ProfiDAT®*compact* data transmission system is used in "normal operation" mode.

4.5.1 Normal operation

The operator controls the system during normal operation. No person may be present in the work area of the system to monitor the working process during normal operation. Travel commands are exclusively given by the operator.

5 Transport, Packaging and Storage

5.1 Transport

5.1.1 Safety instructions for transport

WARNING!

Risk of death due to suspended loads!

When lifting loads, there is a risk of death due to parts falling or swinging out of control.

→ Never walk under suspended loads.

→ Follow the specifications for the attachment points provided.

→ Do not lash onto protruding machine parts or eyes on installed components. Ensure that lashing components are properly seated.

→ Only use authorized lifting gear and lashing components with sufficient load capacity.

→ Do not use torn or worn ropes or straps.

→ Do not attach ropes or straps to sharp corners and edges and do not knot or twist them.

Damage due to improper transport!

Damage due to improper transport!

Improper transport can result in significant material damage.

→ Unload packaged parts upon delivery and during internal transport with care and observe the symbols and the information on the packaging.

→ Only use the attachment points provided.

→ Only remove packaging shortly before installation.

5.1.2 Transporting packaged parts

Transport packaged parts under the following conditions:

- Dry and dust-free
- Do not expose to aggressive media
- Protect from direct sunlight
- Avoid mechanical vibrations
- Transport temperature: -25° C to + 55° C (without condensation)
- Relative humidity max. 60%

5.1.3 Transport inspection

Immediately check the delivery for completeness and transport damage upon delivery.

In the event of visible damage proceed as follows:

- Do not accept delivery or accept it only with reservations.
- Note the scope of damage on the transport documents or on the transporter's delivery note.
- File a complaint.

ATTENTION!

File a complaint on each defect as soon as it is detected. Damage compensation claims may only be made within the applicable claim periods.

5.2 Packaging

The individual packages are packed appropriately for the expected transportation conditions. We exclusively use environmentally friendly packaging materials.
The packaging has the function of protecting the individual components against transport damage, corrosion and other damage until they are installed. Hence, do not destroy the packaging; remove it only shortly before installation.

Handling packaging materials:
Dispose of packaging material according to applicable legal regulations and local guidelines.

WARNING!

Environmental damage due to improper disposal!

Packaging materials are valuable raw materials and can be reused in many cases or sensibly processed and recycled.

→ Dispose of packaging materials in an environmentally appropriate manner.

→ Comply with locally applicable disposal guidelines; if necessary, engage a specialist to handle the disposal.

5.3 Storage of packaged parts

Store packaged parts under the following conditions:

- Do not store outdoors
- Store in a dry, dust-free area
- Do not expose to aggressive media
- Protect from direct sunlight
- Avoid mechanical vibrations
- Storage temperature: -25° C to + 55° C (without condensation)
- Relative humidity max. 60%
- When storing for more than 3 months, check the general condition of all parts and the packaging at regular intervals. If necessary, refresh or replace the preservative.

ATTENTION!

In some cases, there may be instructions for storage on the packaged parts that go beyond the requirements listed here. Comply with them accordingly.

6 Installation and Commissioning

6.1 Safety

Personnel:

- Installation and commissioning may only be carried out by specially trained technicians!

Wear the following personal protective equipment for all installation and commissioning work:

- Protective clothing
- Protective headgear
- Protective footwear
- Protective gloves

DANGER!

Risk of death due to suspended loads!

Falling loads can cause serious injuries or even death.

→ Never walk under suspended loads.

→ Only move loads under supervision.

→ Set down the load before leaving the work area.

Risk of injury due to improper installation and initial commissioning!

Improper installation and initial commissioning can result in serious personal injury and/or material damage.

→ Before starting work, ensure sufficient space for installation.

→ Use caution when working with open, sharp-edged components.

→ Ensure that the installation area is clean and tidy! Loosely stacked or scattered components and tools are a source of accidents.

→ Install components properly. Comply with the specified tightening torques.

6.2 Preparation

Required tools:

- Cross-cut saw
- Open-end wrench SW7 (M4)
- Open-end wrench SW8 (M5)
- Open-end wrench SW13 (M8)
- Hexagon screwdriver (Allen key) SW 2.5
- Cordless drill driver
- Bit attachment hexagon socket (Torx) TX8
- Bit attachment hexagon socket plus (Torx Plus) TP10
- Round file with ≥ 3 grade of cut
- Flat file with ≥ 3 grade of cut
- Step drill M3 90°
- Drilling jig (Order No.: 05-V015-0005)
- Flexible drilling jig (Order No.: 05-V015-0024)
- Mounting aid (Order No.: 05-V015-0010)
- Torque screwdriver (e.g. Wiha TorqueVario-S 0.1 – 0.6 Nm)
- Blade for torque screwdriver, hexagon socket (Torx) T8
- Torque shut-off screwdriver (e.g. TorqBee from HS-Technik)

Tools required for replacing sliding contacts:

- Torx attachment TX5
- Flat-head screwdriver ≤ 3.0
- Torque screwdriver (e.g. Wiha TorqueVario-S 0.1 – 0.6 Nm)

Required tools for replacing collector heads:

- Torx attachment TX5
- Flat-head screwdriver ≤ 3.0

Required material:

- Cable ties

6.3 Grounding

The system operator must ensure sufficient grounding of the support structures (substructures), particularly the coated components. Safety regulations and country-specific directives for the grounding of electrical equipment (e.g. VDE/UVV/VBG4) must be followed.

The grounding of the support structure (substructure) must be taken into account for different applications:

- Protection against electrical shock
- Lightning protection

DANGER!

Risk of death due to electrical shock!

The support structure (substructure) can be under high voltage if it is **not properly grounded**.

Contact with the support structure (substructure) can lead to death or severe injury. There is also a high risk of injury from over-reaction caused by electrical shock.

Therefore:

→ Read and follow the locally applicable and international guidelines for proper grounding installation and lightning protection.

→ Provide the grounding installation that is appropriate to the architecture of the power grid at the place of installation of the system (TT grid or TN grid).

→ Connect the support structure (substructure) to the grounding installation.

→ Install a conductive connection between all parts of the support structure (substructure). Use toothed washers for screw connections or other suitable components to establish a conductive connection between coated components.

→ Regularly check that the support structure (substructure) is properly grounded.

6.3.1 TN grid

→ In the TN grid, ProfiDAT®*compact* rail (ground conductor rail) is directly connected to the grounded star point of the supply transformer through a cable.

→ To ensure that the protective device of the conductor rail is switched off in the event of a fault, the total resistance of the system between the phase conductor and PE conductor must be checked. The maximum permissible total resistance is calculated using the formula:

$$Z_s \leq \frac{U_0}{I_a} \qquad\qquad Z_s \times I_a \leq U_0$$

Z_s = The impedance of the fault loop including current source of the active conductor up to the fault location and the protective conductor between the fault location and the current source.
I_a = The current that causes the protective device to switch off automatically within the specified time.
U_0= The nominal AC voltage toward the end.

For the measurement, the phase conductor and the PE conductor must be short-circuited at the end of the conductor rail; measurements are taken at the output of the protective device or the following output clamps (connection terminals of the conductor rail supply line).

Example of maximum permissible total resistance for the conductor rail system 0815 with ProfiDAT®*compact*:

Power supply 400 V, short-circuit current circuit breaker 100 A according to Data Sheet 500 A

$$Z_s \leq \frac{U_0}{I_a} = \frac{400V\ /\sqrt{3}}{500\ A} = 0.46\ \Omega$$

6.3.2 Information on the implementation of the conductor rail grounding

→ The ProfiDAT®*compact* rail (ground conductor rail) must be installed at the beginning and at the end as well as at every 5th connection point to the support structure (substructure). The cross-section of the PE cable must be at least 16 mm².

→ Local standards or regulations may require different cross-sections or ground resistance values. The system operator must check the locally applicable standards and regulations and implement the grounding system accordingly. If the standard requirements and the functional aspects such as voltage drop, voltage capacities and ground leakage currents are maintained and verified, other cross-sections can also be used to connect the ProfiDAT®*compact* rail to the support structure (substructure).

→ The ground resistance must be measured during installation and a test report prepared with the following content:

- Condition of the ground connections
- Degree of corrosion and corrosion protection
- Cable and component fastenings
- Measurement of ground resistance
- Documentation of changes and extensions

Work steps:

→ Fasten the PE cable to the PE connector with the cable lug (for screw size M8) according to the applicable standards and regulations (see Fig. 31). **Nut tightening torque(1): min. 10 Nm**

→ Use nickel-plated cable lugs (for corrosion protection).

ATTENTION!

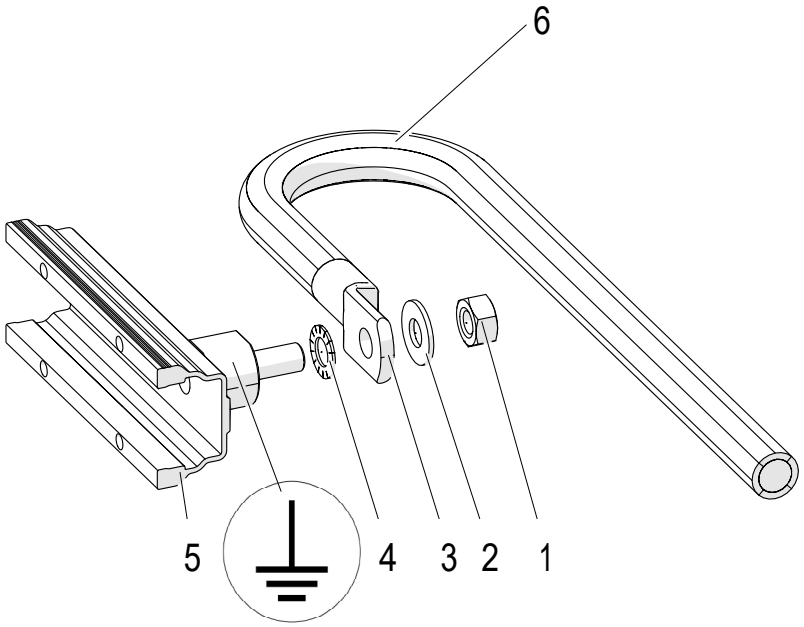
Do not crimp the PE cable!

Comply with the bending radii of the PE cables (see Data Sheet).

ATTENTION!

The PE cable must be suitable for an operating temperature of at least 90° C!

Standard PE connector



Item	Name
1	Hexagon nut, DIN 934
2	Locking edge washer
3	Cable lug up to 95 mm² M8
4	Serrated washer
5	PE connector
6	PE cable

Fig. 31: PE connector

Optional lateral PE connection

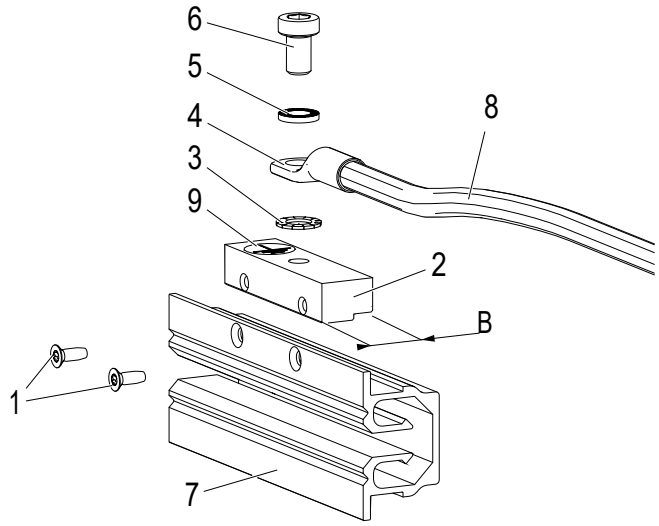


Fig. 32: PE connection

Item	Name
1	Countersunk screw M3 x 8
2	Fastening
3	Serrated washer A6,4 DIN 6798
4	Cable lug up to 25 mm² M6 possible at max. width (w) of < 14 mm
5	Locking edge washer D6.1
6	Cylinder head screw DIN 6912-M6x10
7	Connector
8	PE cable
9	PE symbol

6.4 Mechanical installation

Personnel:

- Installation only by technical personnel
- Min. 2 persons

The following describes the installation of the data transmission system in a step by step manner and one after the other in a practical order. Some steps may be carried out in parallel on site.

6.4.1 Mount universal hanger clamp

The following distances between the hanger clamps must be observed:

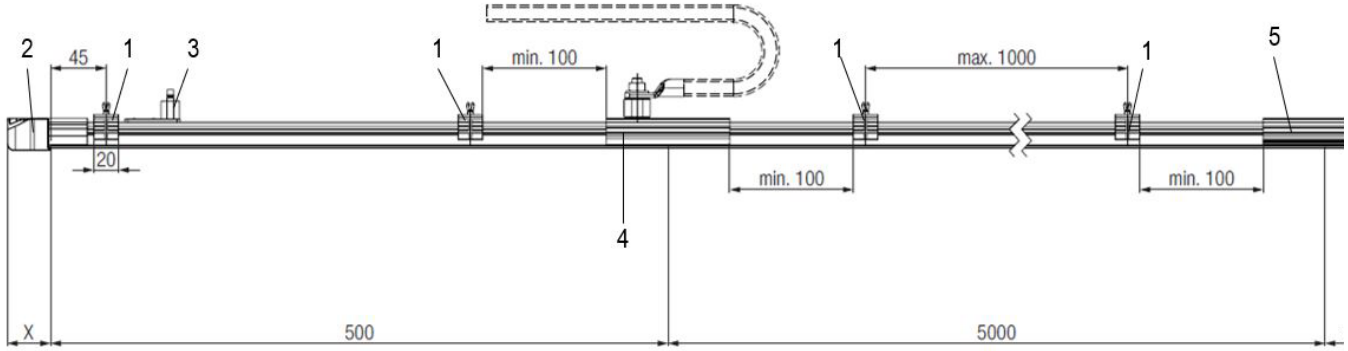


Fig. 33: Minimum and maximum distances between hanger clamps

Item	Name
1	Hanger clamp (universal or combined/project-specific)
2	Transfer guide
3	Stationary antenna
4	PE connector
5	Connector

The distance between the hanger clamps must not exceed 1 m on straight segments or 0.5 m on curves/bends.

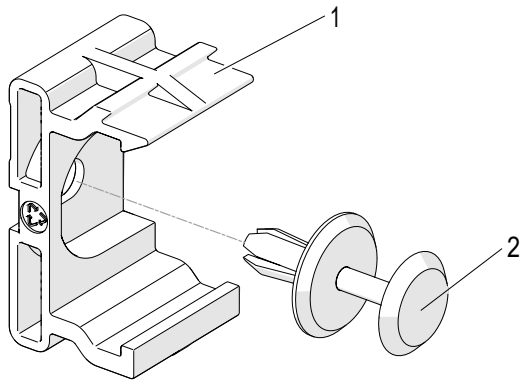


Fig. 34: Mount universal hanger clamp

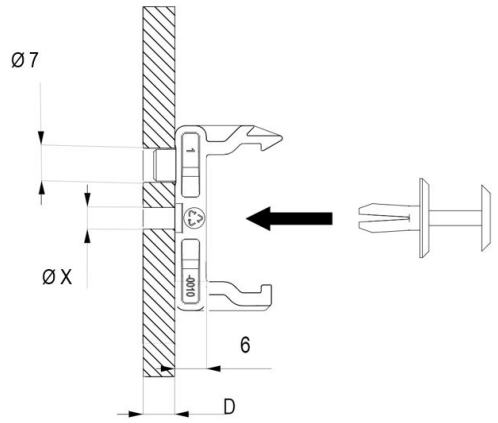


Fig. 35: Universal hanger clamp

Work steps for the universal hanger clamp:

→ Drill the support structure (substructure) for the hanger clamps according to Fig. 36. The diameter "X" depends on the thickness of the support structure (substructure) and can be taken from the table below:

Thickness "D" of support structure (substructure) [mm]	Diameter "X" of the drill holes for the mounting holes [mm]
2	Ø 4.6 ±0,05
3	Ø 4.7 ±0,05
4	Ø 4.8 ±0,05
5	Ø 4.9 ±0,05
6	Ø 5.0 ±0,05
7	Ø 5.1 ±0,05

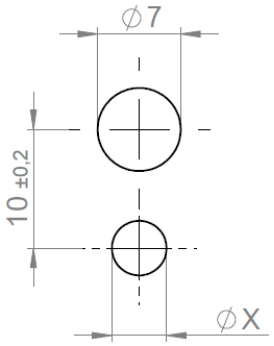


Fig. 36: Distance between drill holes in support structure (substructure) for hanger clamp

→ Mount the hanger clamp (1) on the side of the support structure (substructure).

→ Fix the hanger clamp with an expanding rivet (2). Press the head of the expanding rivet straight into the hole.

If the head of the expanding rivet should break off, the pin of the expanding rivet can still be driven into the hole.

Optional mounting for the universal hanger clamp

The universal hanger clamp can also be mounted with fastenings other than the expanding rivet.

Other fastenings are:

→ Self-tapping screw (DIN 7500 CE)

→ Cylinder screw (DIN 6912)

→ Hex bolt DIN 933

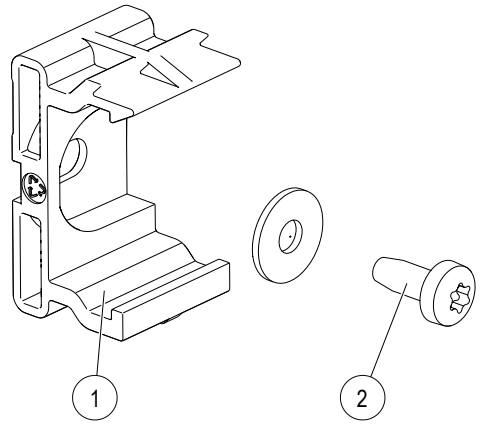


Fig. 37: Hanger clamp with self-tapping screw

Work steps for the universal hanger clamp with other fastenings:

→ Support structure (substructure) for the hanger clamps according to Fig. 39. The diameter "X" depends on the fastening of the universal hanger clamp.

Fastening	Diameter "X" of the drill holes for the mounting holes [mm]
Self-tapping screw	Diameter according to Table 1
Cylinder screw	4.5
Hexagon screw	4.5

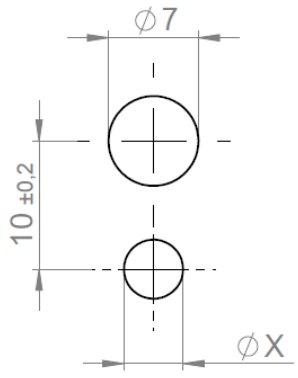


Fig. 38: Distance between drill holes in support structure (substructure) for hanger clamp

Thread reach	Thread M4	
	St	Al
3.5	3.65	-
4	3.65	-
5	3.70	-
6	3.70	-
6.5	3.70	-
7	3.70	-
7.5	3.70	-
8	3.70	3.70
9	-	3.70
10	-	3.70

Table 1: Hole diameter standard values according to DIN 7500-2

→ Mount the hanger clamp (1) on the side of the support structure (substructure).

→ Fix the hanger clamp (1) with the screw (2). Use the tightening torque from Table 2.

Fastening	DIN	Tightening Torque Nm
Self-tapping screw	DIN 7500 CE	1.2
Cylinder screw	DIN 6912	1.5
Hexagon screw	DIN 933	1.5

Table 2: Tightening torques

6.4.2 Combined and project-specific hanger clamps

The mounting of combined hanger clamps can be found in the respective documentation of the conductor rail system or, on request, in the project-specific documentation.
The following distances between the hanger clamps must be observed:

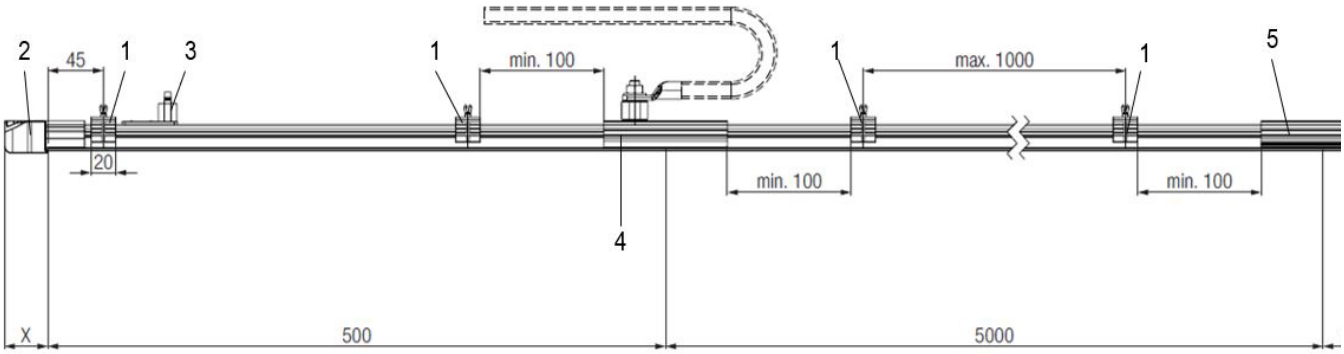


Fig. 39: Minimum and maximum distances between hanger clamps

Item	Name
1	Hanger clamp (universal or combined/project-specific)
2	Transfer guide
3	Stationary antenna
4	PE connector
5	Connector

The distance between the hanger clamps must not exceed 1 m on straight segments or 0.5 m on curves/bends.

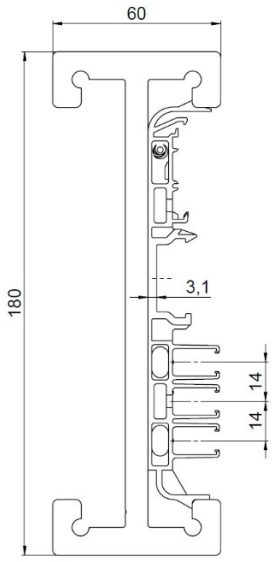


Fig. 40: Hanger clamp 0815 in EMS profile

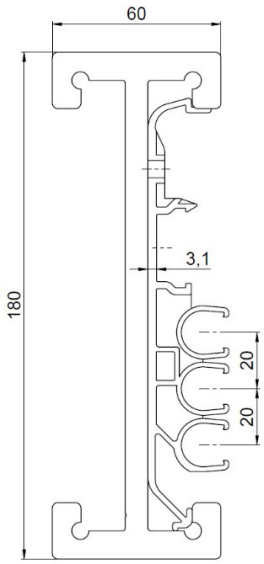


Fig. 41: Hanger clamp 0811 in EMS profile

6.4.3 Mount the line feed

The line feed of the signal in the ProfiDAT®*compact* rail occurs via the stationary antenna (1). The drill hole in the support structure (substructure) for the stationary antenna (1) can be done, for example, with a hole saw (max. Ø 25 mm).
The line feed must be mounted with two hanger clamps.
ATTENTION: The position of the stationary antenna (1) may differ depending on the system. This changes the drilling pattern of the stationary antenna (1). Please note the project-specific documentation and, if necessary, contact Conductix-Wampfler.

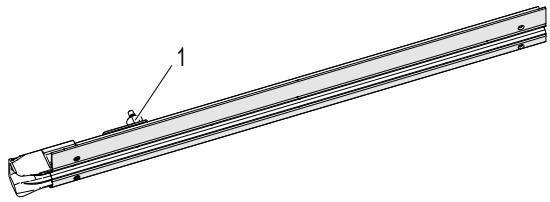


Fig. 42: Stationary antenna (1)

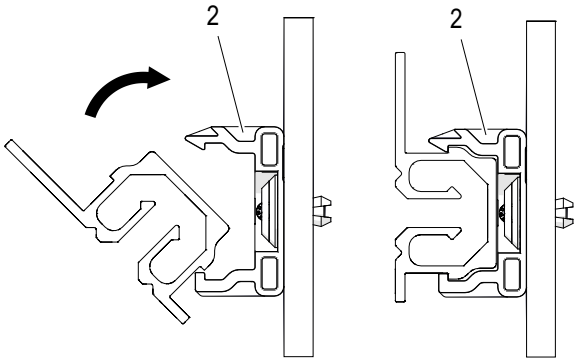


Fig. 43: Mount rail

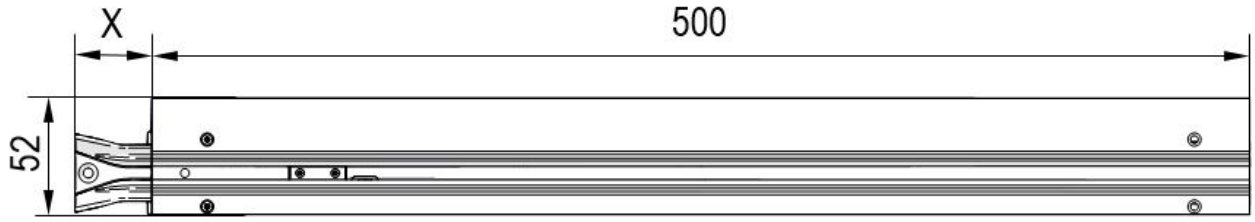


Fig. 44: Distance from rail edge to stationary antenna

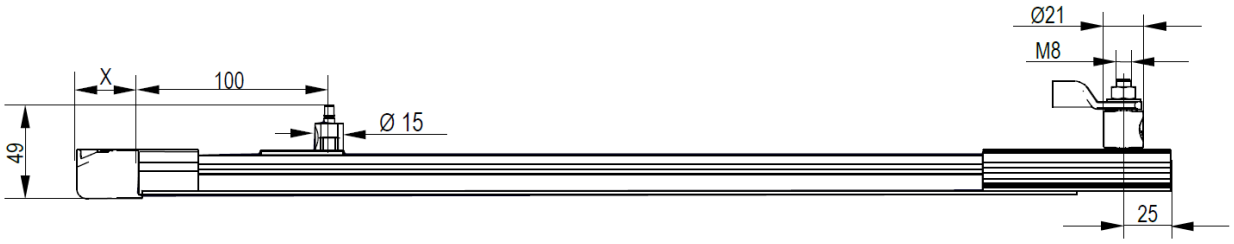


Fig. 45: Distance from rail edge to stationary antenna

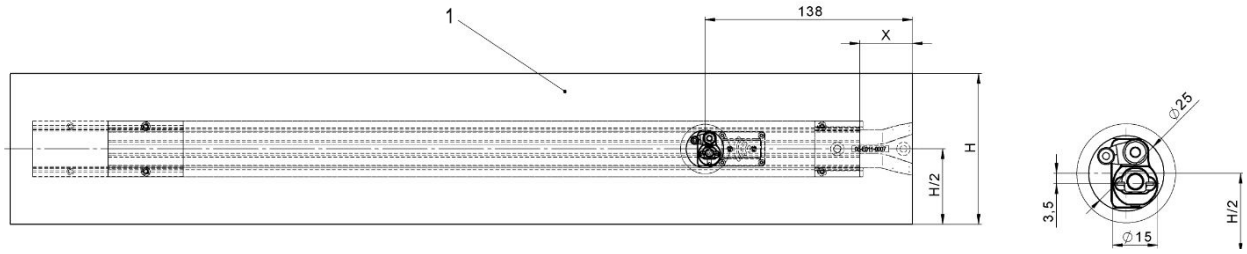


Fig. 46: Support structure (substructure) (1) with line feed (plastic cap, right)

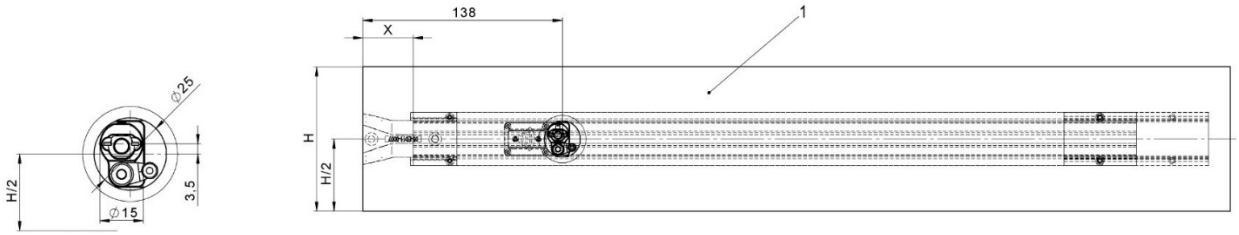


Fig. 47: Support structure (substructure) (1) with line feed (plastic cap, left)

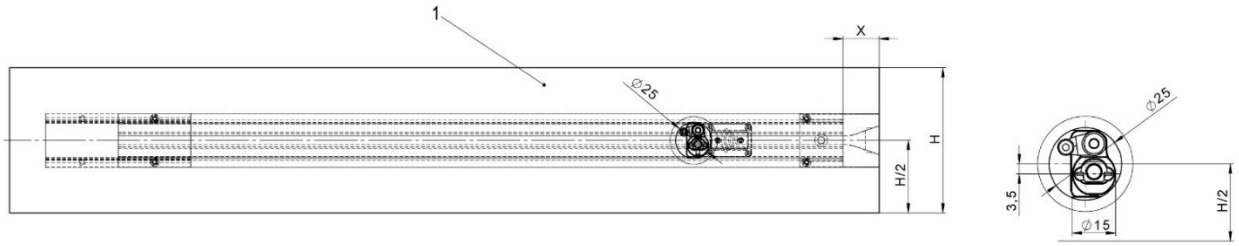


Fig. 48: Support structure (substructure) (1) with line feed (aluminium cap, right)

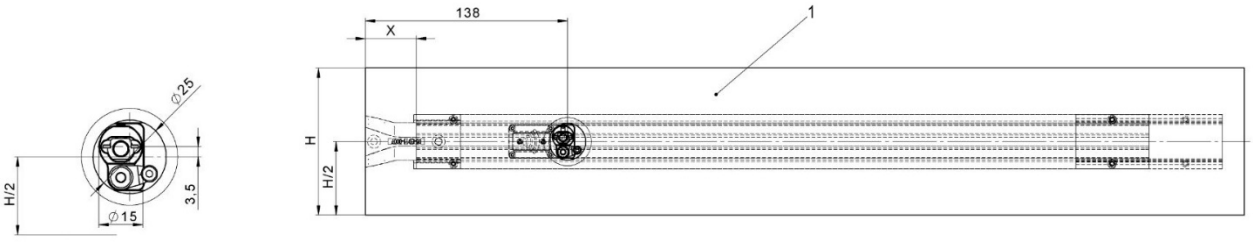


Fig. 49: Support structure (substructure) (1) with line feed (aluminium cap, left)

Work steps:

→ Determine the position of the through hole for the line feed in the support structure (substructure) according to Fig. 44 to Fig. 49 centered on the slot of the data rail. **ATTENTION:** The stationary antenna is located outside (below or above) the center (see Fig. 46 to Fig. 49).

→ With Ø 25 mm , the through hole is correspondingly large enough for the off-center stationary antenna to fit through the center through hole in all versions.

→ Drill a through hole D = 25 mm in the support structure (substructure) with, e.g. a hole saw.

→ Position the line feed. Since there is a PE connector at the end of the end feed rail, the steps in Section 6.4.7 must be followed.

→ Insert the line feed (1) into the hanger clamps (2). Ensure that the hanger clamp grips the rail correctly. The hanger clamps are elastic and thus allow easy insertion/locking of the rail into the hanger clamp. The rails can be moved in the hanger clamps.

→ **Attention:** For applications with built-in expansion units (due to the thermal expansion of the data rail), the through hole must be designed as an elongated hole to compensate for the movement of the stationary antenna relative to the support structure (substructure) (see Section 6.4.4).

6.4.4 Expansion unit

6.4.4.1 Expansion unit layout

Number of expansion units per segment:
The maximum segment length for a line feed (center) is 120 meters. The maximum segment length is linked to the data transmission and not to the ProfiDAT®*compact* rail made of aluminium in particular.

Segment length with 1 stationary access point and 1 mobile participant (client): **max. 120 meters (2 x 60 meters)**
1 mobile participant (client) corresponds to a maximum of 2 mobile antennas.

Segment length with 1 stationary access point and 6 to 20 mobile participants (clients): **Max. 100 meters (2 x 50 meters)**
1 mobile participant (client) corresponds to a maximum of 2 mobile antennas.

Due to the geometry of the line feed and outfeed, an anchor point “AP” is created both in the middle of the route and at the ends of a segment “S”.
This means that the intermediate length corresponds to “a” = “S/2”.

Number of Expansion Units (EU)		1		2		3	
Length		Intermediate Length "a"					
Number of mobile participants (clients)		1 Mobile participant (client)	6 – 20 mobile participants (clients)	1 Mobile participant (client)	6 – 20 mobile participants (clients)	1 Mobile participant (client)	6 – 20 mobile participants (clients)
Temperature difference $\Delta ttot$ [K]	10°	60 m	50 m				
	15°	60 m	50 m				
	20°	50 m	50 m	60 m			
	25°	40 m	40 m	60 m	50 m		
	30°	30 m	30 m	60 m	50 m		
	35°	35 m	35 m	60 m	50 m		
	40°	25 m	25 m	50 m	50 m	60 m	
	45°	20 m	20 m	45 m	45 m	60 m	50 m
	50°	20 m	20 m	40 m	40 m	60 m	50 m

Data rail material: Aluminium with a 0.0000234 1/K linear expansion coefficient

$\Delta t\ tot = \Delta tU + \Delta tSW$
ΔtU = Temperature range of the ambient temperature [° C]
ΔtSW = Temperature increase due to current heat [° C]

Because the ProfiDAT®*compact* may only be used as PE and not as PH rail, the value for ΔtSW always corresponds to 0°.
$\Delta t\ tot = \Delta tU$

With line feed

Example of segment length "S" (intermediate length "a_1" with 1 expansion unit and intermediate length "a_2" with 2 expansion units)

ATTENTION!

Data transfer does not occur in the area of the expansion unit. If there are several expansion units in a row, the distance between the two antennas must be dimensioned accordingly!

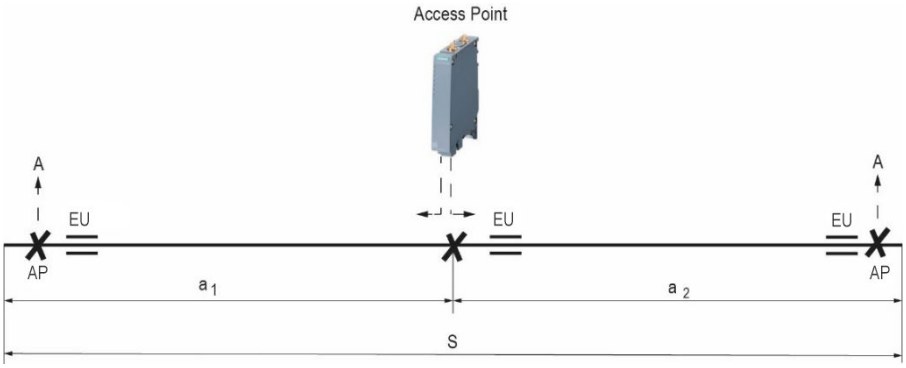


Fig. 50: Expansion unit dimensioning on segment

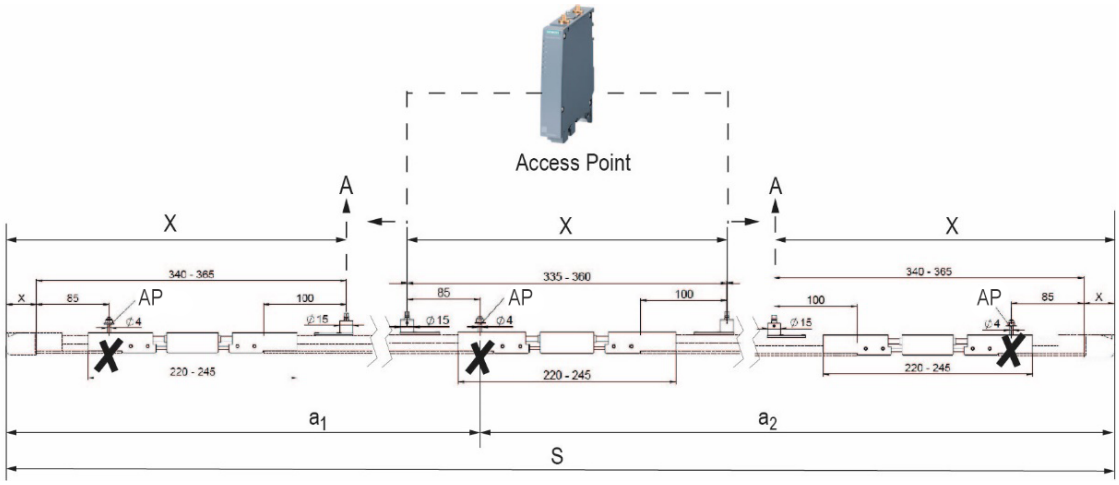


Fig. 51: Expansion unit dimensioning on segment

Item	Name	Item	Name
A	Outfeed	S	Segment length
EU	Expansion unit	a_1	Intermediate length a_1
AP	Anchor point	a_2	Intermediate length a_2
X	Area without data (1 expansion unit)		

With end feed

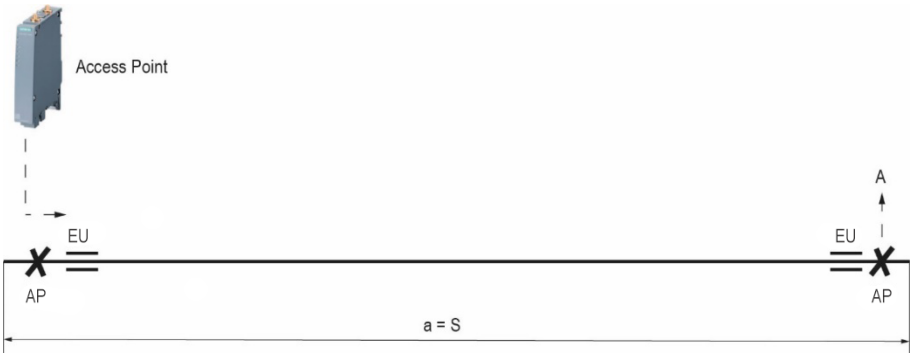


Fig. 52: Expansion unit layout at end

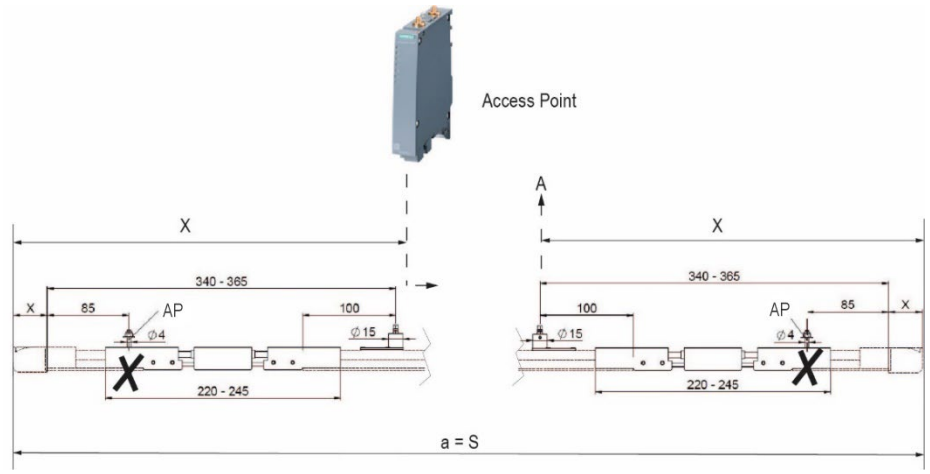


Fig. 53: Expansion unit layout at end

Item	Name	Item	Name
A	Outfeed	S	Segment length
EU	Expansion unit	a_1	Intermediate length a_1
AP	Anchor point	a_2	Intermediate length a_2
X	Area without data (1 expansion unit)		

Transfers and curves are anchor points, this area must therefore be taken into account when designing the system!

6.4.4.2 Setting up the expansion unit

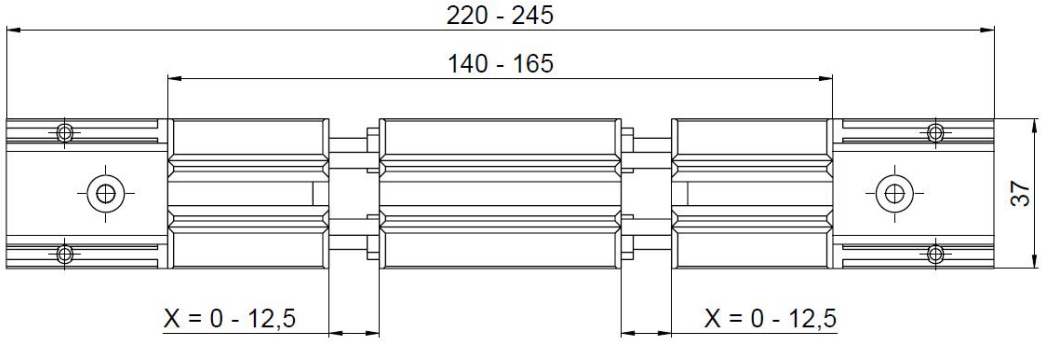


Fig. 54: Air gap in expansion unit

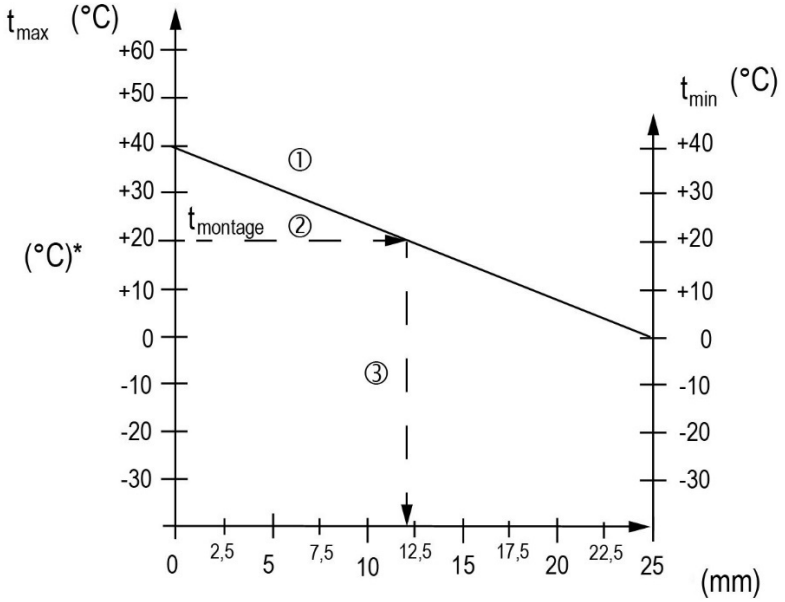


Fig. 55: Determine air gap

t_{min} = the lowest temperature occurring in the given application

t_{max} = highest possible operating temperature in the given application

* = Ambient temperature during installation

Instructions for determining the air gap:

1. Enter the connecting line from t_{min} to t_{max}.
2. Enter the ambient temperature horizontally during installation $t_{installation}$.
3. Draw a line down from the intersection of the two lines and read the air gap to be set.

Example:

Temperature difference: from + 40° C to 0° C

Ambient temperature during installation: + 20° C

Expansion unit setting: Set expansion distance at 12.5 mm per expansion unit and 2 x 6.25 mm air gap

The diagram in Section 11.3 can be used to help determine the air gap at the installation site!

6.4.4.3 Required materials

- 1 x Expansion unit incl. anchor point

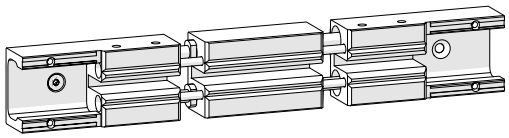


Fig. 56: Expansion unit incl. anchor point

- 1 x Rail adapter (without positioning strip)

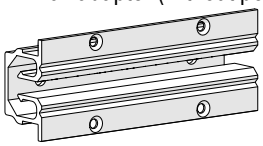


Fig. 57: Rail adapter without positioning strip for code band

- 1 x Rail adapter (with positioning strip)

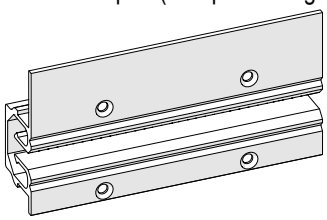


Fig. 58: Rail adapter with positioning strip for code band

- 4 x Self-tapping screw similar to DIN 7500 – M; hexagon socket M3 x 8

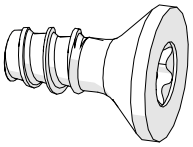


Fig. 59: Self-tapping screw

- Countersunk screw M4 x 20, washer and locking nut for the anchor point

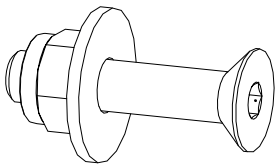


Fig. 60: Anchor point screw

6.4.4.4 Mount the expansion unit at the end of the segment (with and without a positioning strip)

Because a transfer guide (1) is mounted as standard on the end feed, it must first be removed before the expansion unit can be mounted:

→ Loosen the 2 screws M2.5 x 6 (2) and disassemble the transfer guide (1) (see Fig. 61).

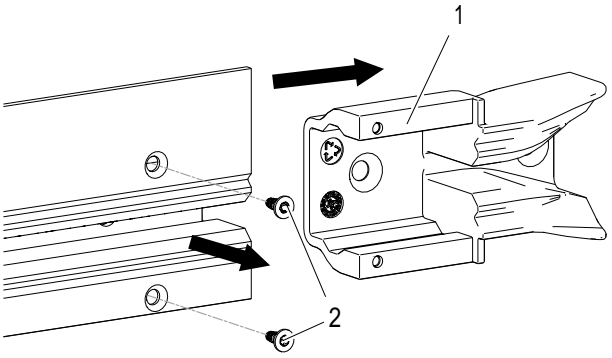


Fig. 61: Disassemble transfer guide

→ Slide the expansion unit (4) onto the rail side with the line feed segment and tighten the 2 self-tapping screws M3 x 8 (3) with a tightening torque of 2.0 Nm and hexagon socket screw type (TorxPlus) TP10 (see Fig. 62 These screws (3) must be tightened (mechanically) using a torque shut-off screwdriver.

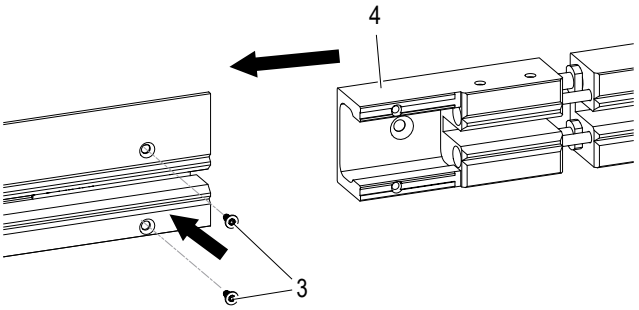


Fig. 62: Mount expansion unit (1)

In certain applications, an anchor point must be set near an expansion unit (4), e.g. before transfers. However, this is not required in all applications. This should be determined by the customer together with Conductix-Wampfler during the design phase.

→ If the anchor point screw M4 x 20 (screw M4 x 20 in Fig. 63 not visible) is to be seated in the expansion unit (4) at position A, then it must be attached before the rail adapter (5) is mounted (see Fig. 63).

→ To fasten the expansion unit (4), a through hole (D = 6 mm) must be drilled through the support structure.

→ The position of the through hole can be derived from Fig. 65 and Fig. 66.

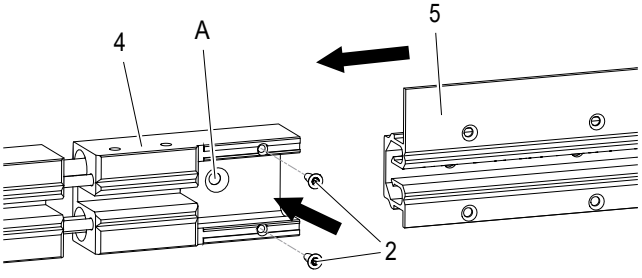


Fig. 63: Mount rail adapter

→ If the anchor point is in the expansion unit (4), then mount the anchor point screw (A) with nut in the expansion unit (4) accordingly with a tightening torque of 3.0 Nm (M4 DIN 7991, hexagon socket SW2.5 – steel 8.8, nut (SW7) (see Fig. 63).

→ Mount the rail adapter (5) with the 2 self-tapping screws M3 x 8 (2). Tighten the screws (2) with a tightening torque of 2.0 Nm, screw type: Hexagon socket (TorxPlus TP10) (see Fig. 63). The self-tapping screws (3) must be tightened (mechanically) using a torque shut-off screwdriver.

→ If the anchor point screw is not to be installed in the expansion unit (4) (see System Layout), it can be mounted using the drill holes in the transfer guide (A) (see Fig. 64).

→ If the anchor point (A) is to be seated in the transfer guide (1) (see system Layout), then install the anchor point screw with nut at the corresponding point in the transfer guide (1) with a tightening torque of 0.15 Nm (M4 DIN 7991, hexagon socket SW2.5 – steel 8.8, nut (SW7)) (see Fig. 64).

→ Slide the transfer guide (1) onto the expansion unit (4) with the rail adapter (5) (see Fig. 64).

→ Tighten the 2 screws (2) (M2,5x6) for the plastic transfer guide (1) with a tightening torque of 0.3 Nm (screw type: Hexagon socket (Torx) T8) (see Fig. 64).

→ If an aluminium transfer guide (1) is used, then 2 self-tapping screws M3 x 8 are to be used. Tighten these with a tightening torque of 2.0 Nm, screw type: Hexagon socket (TorxPlus TP10).

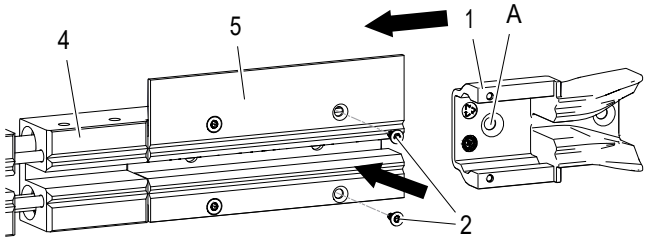


Fig. 64: Mount transfer guide

System without positioning strip

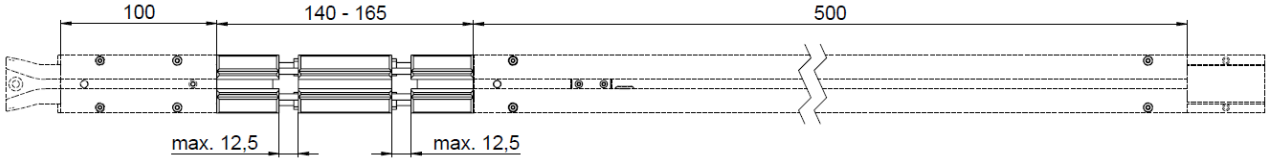


Fig. 65: Expansion unit – end feed (mounted on left)

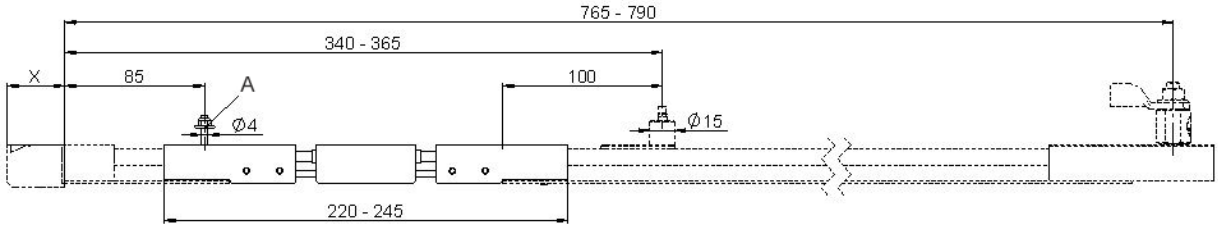


Fig. 66: Expansion unit – end feed (mounted on left), A = Anchor point

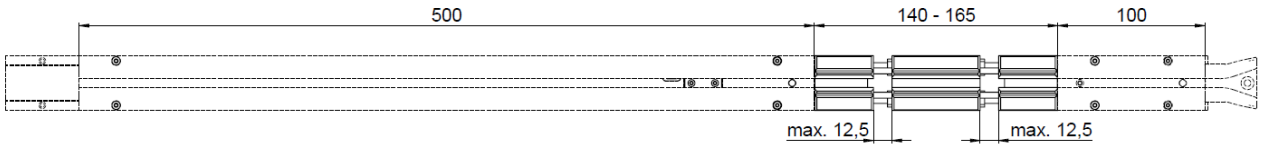


Fig. 67: Expansion unit – end feed (mounted on right)

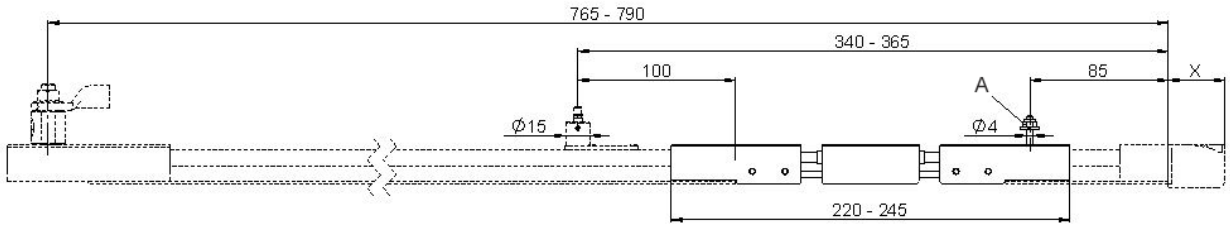


Fig. 68: Expansion unit – end feed (mounted on right), A = Anchor point

System with positioning strip (take dimensions from Fig. 65 to Fig. 68)

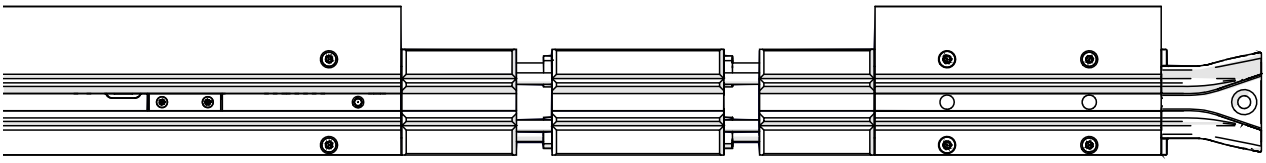


Fig. 69: Expansion unit – end feed (mounted on right)

6.4.4.5 Mount expansion unit for line feed

→ Loosen the 4 self-tapping screws M3 x 8 (3) to disassemble the connector (center) (2) (screw type: Hexagon socket (TorxPlus) TP 10) (see Fig. 70).

→ Slide rails (1) off the connector (center) (2) (see Fig. 70).

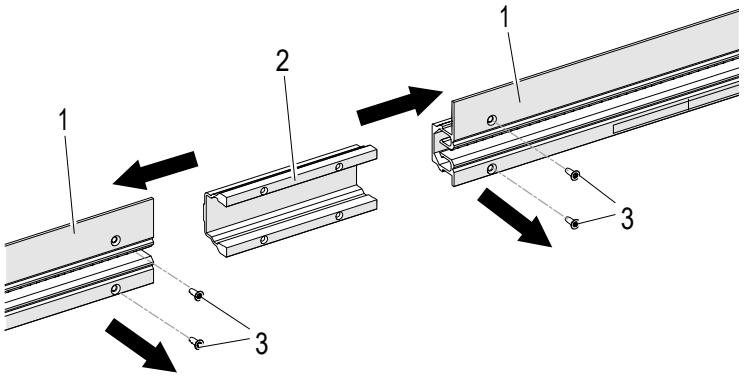


Fig. 70: Disassemble connector

In certain applications, an anchor point must be set near an expansion unit, e.g. before transfers. However, this is not required in all applications. This should be determined by the customer together with Conductix-Wampfler during the design phase.

→ The position in the expansion unit where the anchor point screws are to be placed must be determined (A or B) (see Fig. 71) (see System Layout)

→ To fasten the expansion unit (4) using the anchor point screws, a through hole (D = 6 mm) must be drilled through the support structure.

→ The position of the through hole can be derived from Fig. 73 and Fig. 54.

→ Mount the anchor point screw (A or B) (screw type: M4 DIN 7991, hexagon socket SW 2.5 – steel 8.8, nut M4 (SW 7)) on the right or left of the expansion unit (4) with a tightening torque of 3.0 Nm (see Fig. 71).

→ Slide the rail ends (2) with the line feed segment (1) (right and left) onto the expansion unit (4) (see Fig. 71).

→ Tighten the 4 self-tapping screws M3 x 8 (tightening torque: 2.0 Nm, screw type: Hexagon socket (TorxPlus) TP10) (3) (see Fig. 71). These screws must be tightened (mechanically) using a torque shut-off screwdriver.

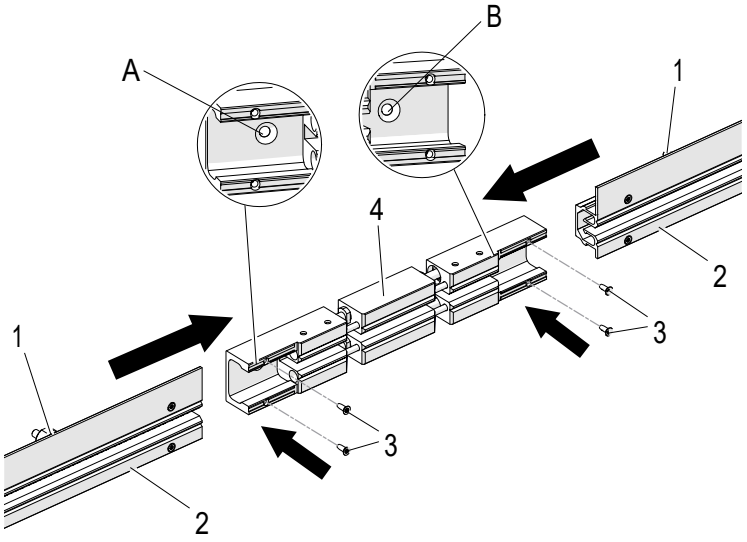


Fig. 71: Mount expansion unit (1)

System without positioning strip

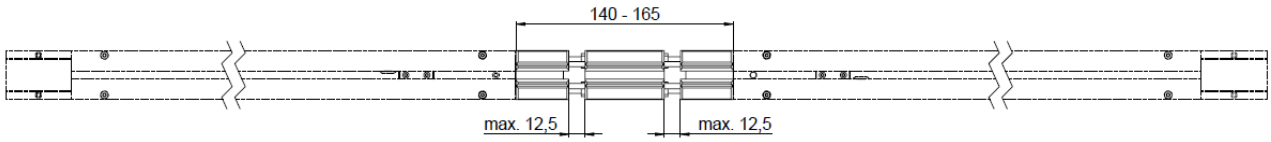


Fig. 72: Line feed without positioning strip

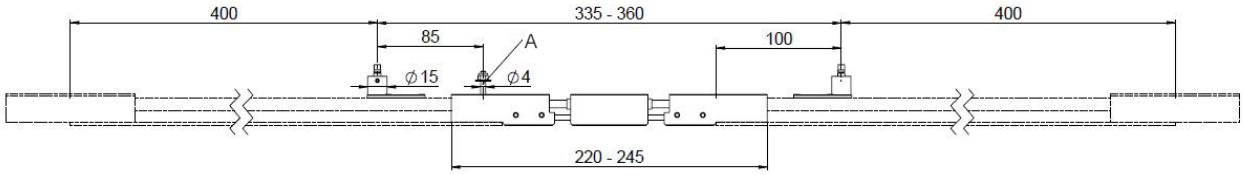


Fig. 73: Line feed without positioning strip; A = anchor point

System with positioning strip (take dimensions from Fig. 72 to Fig. 73)

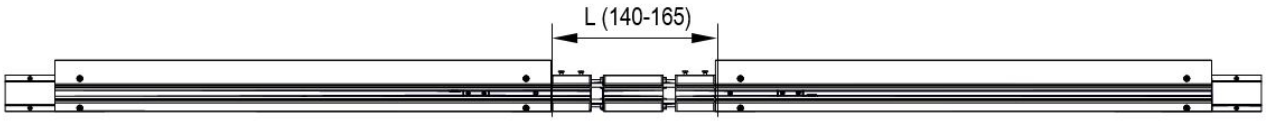


Fig. 74: Line feed with positioning strip

6.4.5 Mount the ProfiDAT®*compact* rail

The first ProfiDAT®*compact* rail is to be mounted at the beginning of the line feed. The system must also be completed with a line feed (stationary antenna) at the end.

Work steps:

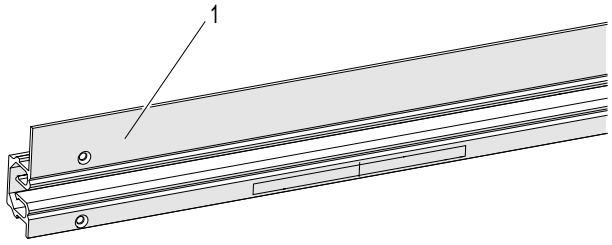


Fig. 75: ProfiDAT®*compact rail*

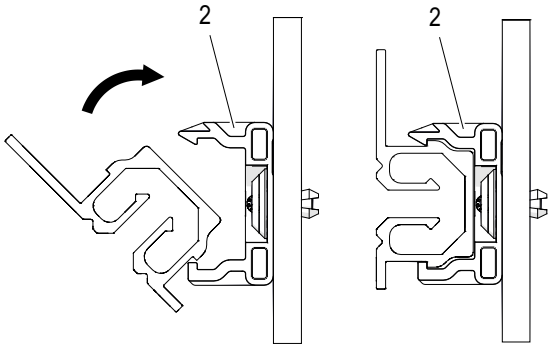


Fig. 76: Mount rail (from front)

→ Mount the ProfiDAT®*compact* rail (1) into the hanger clamp (2). Ensure that the hanger clamp grips the rail correctly. The hanger clamps are elastic and thus allow easy insertion/locking of the rail into the hanger clamp. The rails can be moved in the hanger clamps.

→ Mount all other rails into the hanger clamps in the same way.

6.4.6 Mount connectors

The individual rails are connected to one another via connectors.
PE connectors are used to connect the PE cable. These are mounted according to the Layout Plan at the beginning or end of the system and at every 5th connection point.

Work steps:

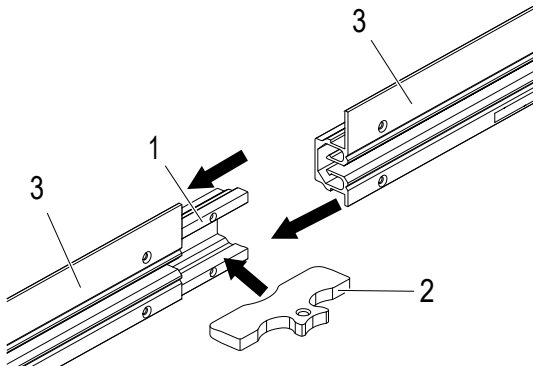


Fig. 77: Mount connector onto ProfiDAT®*compact rail*

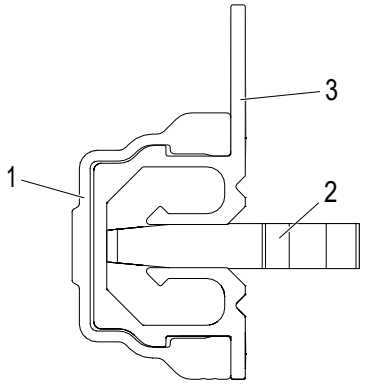


Fig. 78: Mounting aid at connection point

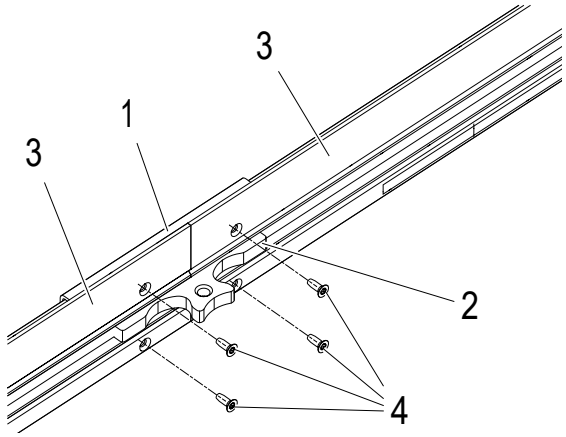


Fig. 79: Tighten 4 self-tapping screws (2 Nm)

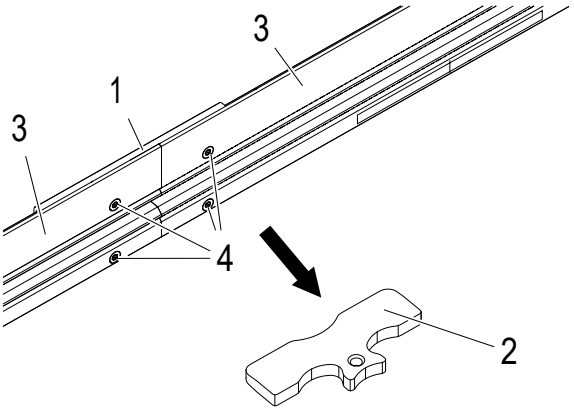


Fig. 80: Remove mounting aid

→ Slide the connector (1) onto ProfiDAT®*compact* Rail (3) up to the center. Then slide the second ProfiDAT®*compact* rail (3) into the connector (1).

→ To avoid an offset in at the connection point (see Fig. 82: Maximum offset of connection point in X-direction and Fig. 83), insert the mounting aid (2) into the connector point (see Fig. 77). Insert the mounting aid (2) into the ProfiDAT®*compact* rail in such a way that it lies flat against the inner surface of the rail (see Fig. 78).

→ Tighten all 4 self-tapping screws (W5154-K30X8-ES) (4) with a torque shut-off screwdriver (e.g. TorqBee) to 2 Nm (see Fig. 79).

→ Remove the mounting aid (2) from the connection point (see Fig. 80) and connect and mount all ProfiDAT®*compact* rails in the same way.

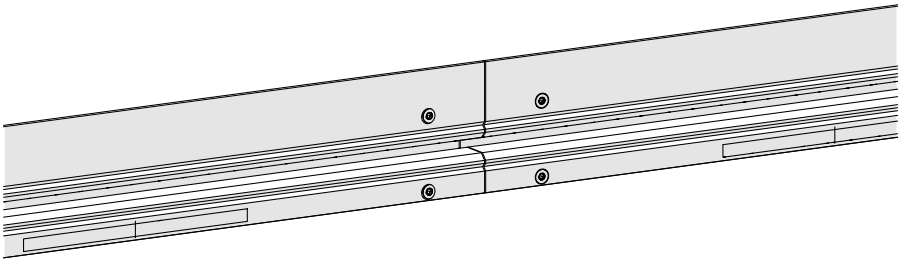


Fig. 81: Fully mounted connection point of rails without offset

ATTENTION!

The two profiles must directly abut each other! The gap between the rails may not be more than 0.5 mm in the X-direction (travel direction) (see Fig. 82: Maximum offset of connection point in X-direction)!

The sliding surfaces for the sliding contacts must be level with each other and deburred.

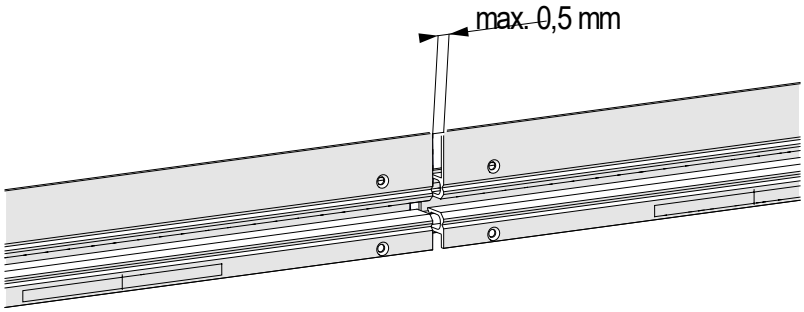


Fig. 82: Maximum offset of connection point in X-direction (direction of travel)

ATTENTION!

If both rails have an offset of more than 0.5 mm in the Y-direction, then at least one rail must be replaced!

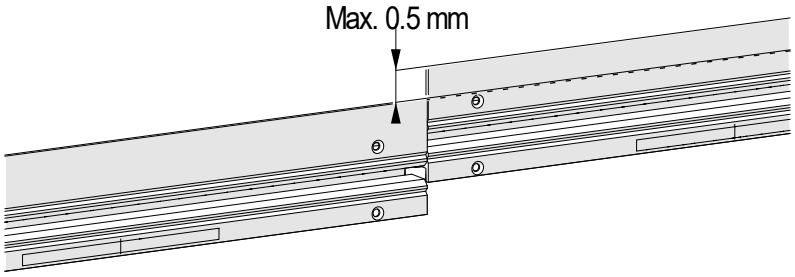


Fig. 83: Maximum offset of connection point in Y-direction

6.4.7 Mount PE connectors

Note the following for the PE connector:

- The PE connector must not act as an anchor point.
- Avoid needing too many cuts on the data rail for a connection point.
- Install a PE connector every 25 m to ground the support structure (substructure).

There are three variants for mounting onto the support structure (substructure):

1.) Mount the PE connector at the connection point

→ Drill an elongated hole (Ø 21 mm) for the PE bolt into the support structure (substructure), through which the spacer can be guided (see Fig. 98 and Fig. 99). The dimensions of the elongated hole depend on the air gap set in the expansion unit (see Section 6.4.4.2). In addition, the spacer must be able to move freely in the elongated hole.

→ Mount the PE connector in the same way as a normal connector (see Section 6.4)

→ Connect each PE connector to a terminal box. If the PE cable is at the rear of the support structure (substructure), it must be led back through (e.g. through a hole in the support structure) in such a way that it is possible to connect it to the terminal box.

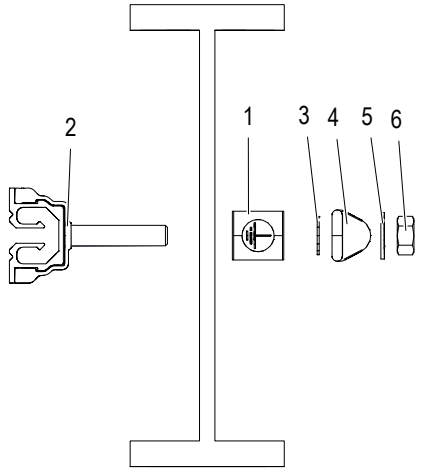


Fig. 84: Mount PE connector onto support structure (substructure)

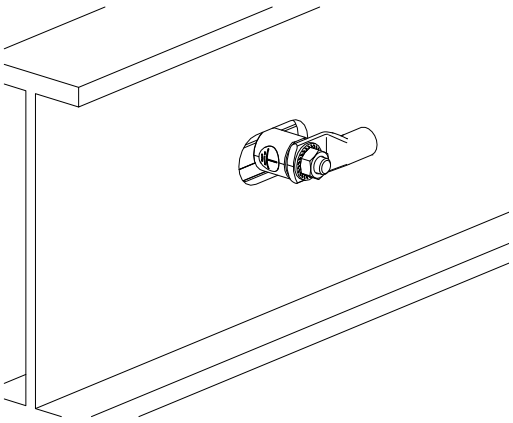


Fig. 85: PE connector seated in elongated hole

Item	Name
1	Spacer Ø 21 mm
2	PE connector
3	Serrated washer DIN 6798
4	Cable lug
5	Locking edge washer
6	Hexagon washer

2.) Mount PE connector on segment (without connector point)

→ Drill an elongated hole (Ø 21 mm) for the PE bolt into the support structure (substructure), through which the spacer can be guided (see Fig. 98 and Fig. 99). The dimensions of the elongated hole depend on the air gap set in the expansion unit (see Section 6.4.4.2). In addition, the spacer must be able to move freely in the elongated hole.

→ If there is no connection point after 25 m, mount the connector into the data rail segment using a drilling jig.

→ Align the drilling jig (2) with the data rail (1). (see Fig. 100 and Fig. 101)

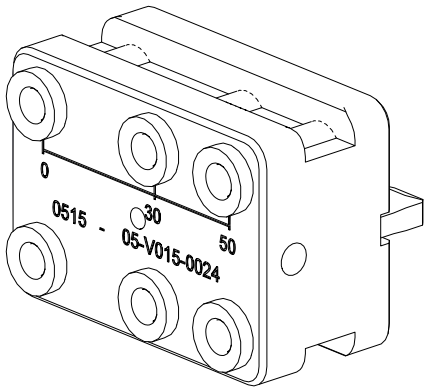


Fig. 86: Flexible drilling jig

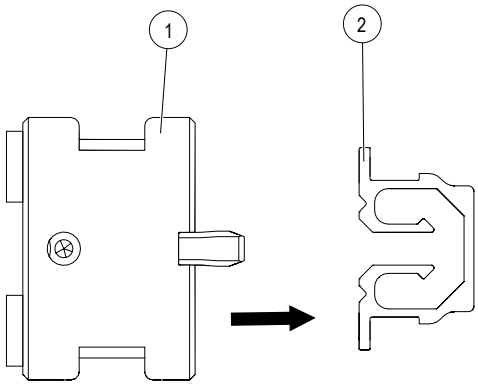


Fig. 87: Slide the drilling jig (1) into the data rail (2)

→ To adjust the drilling depth, insert the step drill M3 90° (3) into the lateral drill hole on the drilling jig up to the mechanical stop (see Fig. 88).

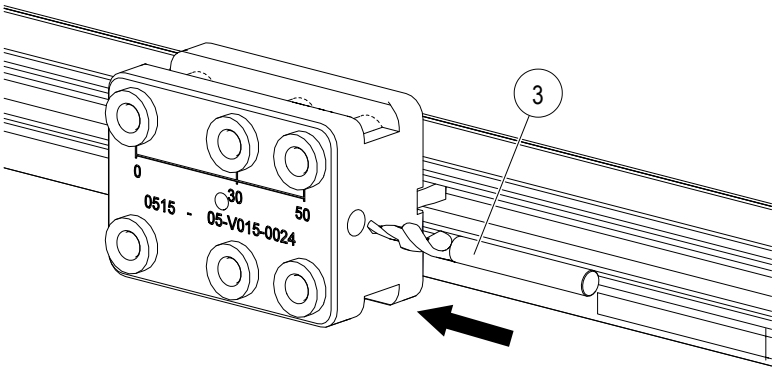


Fig. 88: Step drill M3 90° into lateral drill hole

→ Slide the stop ring (4) over the step drill M3 90° (see Fig. 89).

→ Align the stop ring correctly and fasten it accordingly (see Fig. 90).

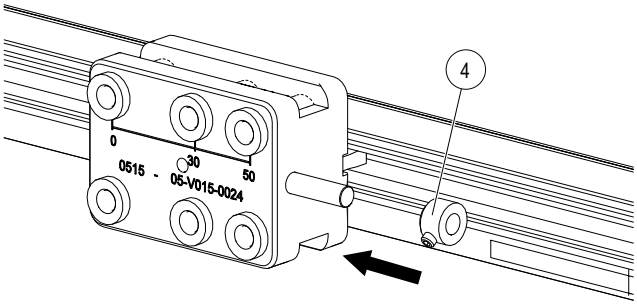


Fig. 89: Slide stop ring (4) over step drill M3 90°

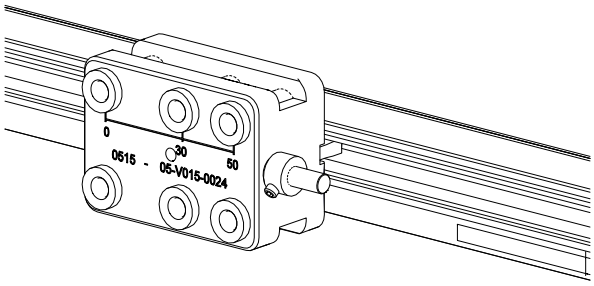


Fig. 90: Align stop ring correctly

→ Drill the 4 holes (5) into the data rail. The drill holes are deburred during the drilling process (see Fig. 105).

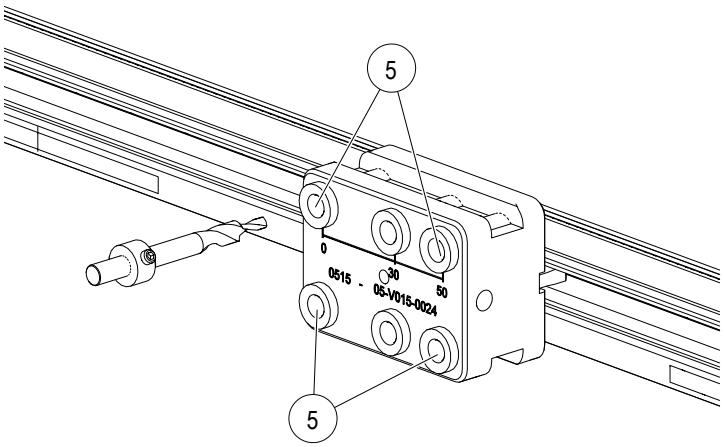


Fig. 91: Drill 4 holes for PE connector

→ Tighten all 4 self-tapping screws (W5154-K30X8-ES) (6) with a torque shut-off screwdriver (e.g. TorqBee) to 2 Nm (see Fig. 106).

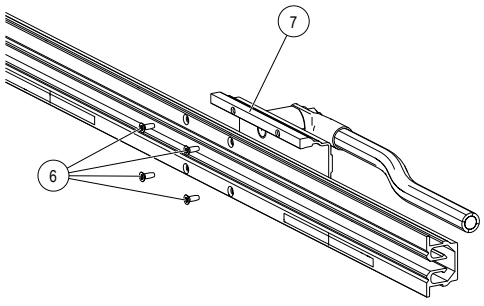


Fig. 92: Tighten all 4 self-tapping screws

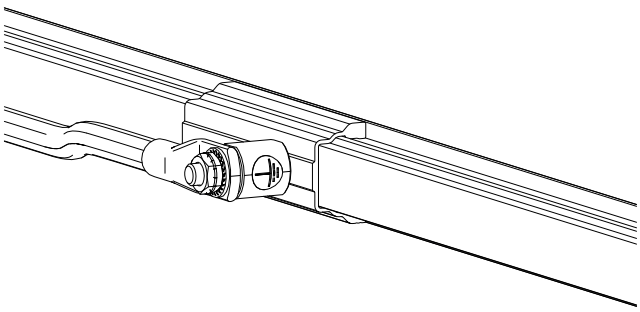


Fig. 93: PE connector is mounted

3.) Mount the PE connection on the data rail

→ The PE connection is mounted on the data rail. The flexible drilling jig is used for the drill holes in the data rail (see Fig. 86 and Fig. 87).

→ Attach the stop ring to the step drill M3 90° (see Fig. 102 to Fig. 104).

→ Drill the 2 holes (8) into the data rail (see Fig. 108). The drill holes are deburred during the drilling process.

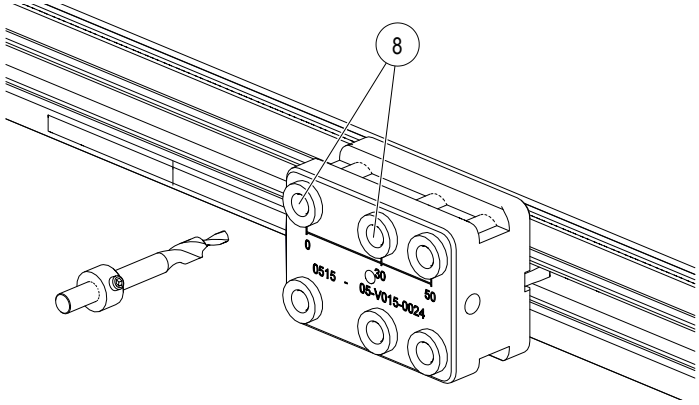


Fig. 94: Drill 2 holes for PE connection

→ Tighten the 2 self-tapping screws (W5154-K30X8-ES) (10) with a torque shut-off screwdriver (e.g. TorqBee, tightening torque: 2 Nm (see Fig. 95).

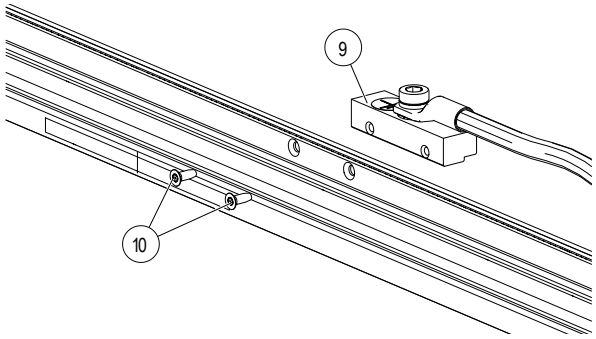


Fig. 95: Tighten the 2 self-tapping screws

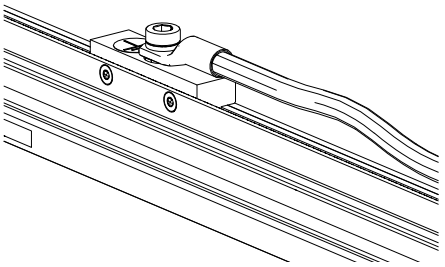


Fig. 96: PE connection is mounted

6.4.8 Adjust the length of the ProfiDAT®*compact* rail

The ProfiDAT®*compact* rails have a standard length of 5 m. Shorter lengths are available, but are usually produced at the installation site.

The connection points between the ProfiDAT®*compact profiles have a great impact on the attenuation of the system. In order for the attenuation to be as low as possible, the rails must be precisely machined and connected at the connection points. We therefore recommend that the installation only be carried out by Conductix-Wampfler personnel.*

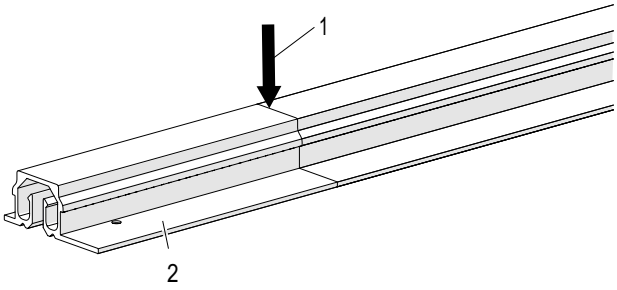


Fig. 97: Shorten ProfiDAT®*compact rail (with positioning strip)*

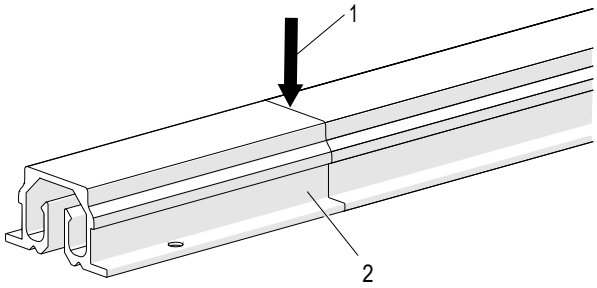


Fig. 98: Shorten ProfiDAT®*compact rail (without positioning strip)*

Work steps:

→ Determine the required length of the data rail.

→ The cutting direction (1) must be from the closed rail side.

→ Saw the rails at right angles with the cross-cut saw.

→ Drill holes and countersinks with the step drill M3 90° for connectors using the drilling jig.

→ Deburr all edges in Area A and Area B according to DIN ISO 13715 (Fig. 99).

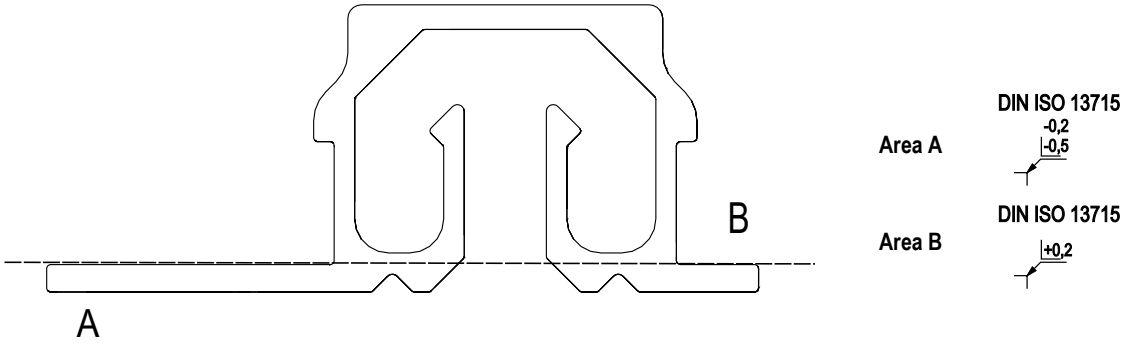


Fig. 99: Deburr ProfiDAT®compact rail

ATTENTION!

Sharp edges and/or burrs lead to increased wear of the sliding contacts in a very short period of time!

Poorly made saw cuts can cause the connection points to be affected by a gap or offset, which can have an adverse effect on the data transmission quality. Follow the instructions for this in Section 6.4.6.

The drill holes for the connector in the data rail must be redrilled if the data rail length must be adjusted. A special drilling jig is available for this (Order No.: 05-V015-0005).

Work steps:

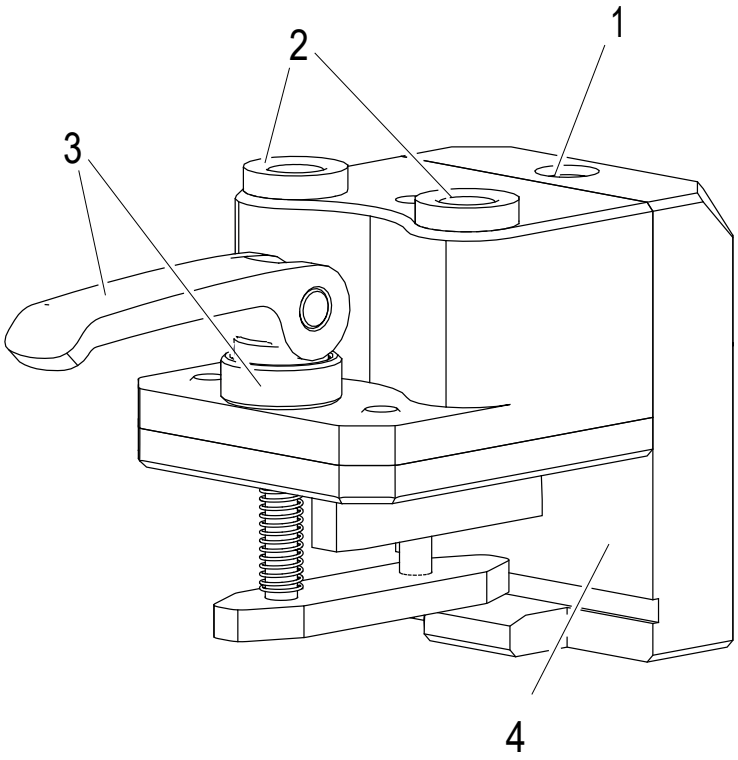


Fig. 100: Drilling jig 0515 overview

Item	Name
1	Drilling hole (to set/adjust the adjusting ring)
2	Drill guide
3	Eccentric tappet with adjustment nut
4	Rail stop

→ To set the adjusting ring to the correct dimension, the step drill M3 90° (5) is first inserted into the drilling hole (1) up to the mechanical stop.

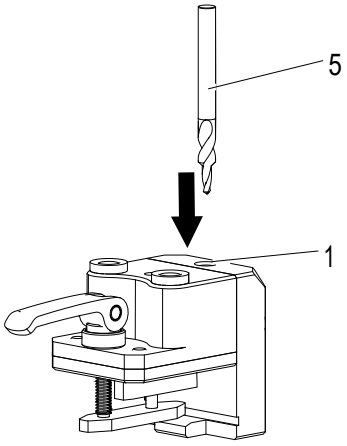


Fig. 101: Step drill M3 90°

→ Place the adjusting ring (7) with the threaded pin (6) over the step drill (5).

→ Tighten the threaded pin (6) (see Fig. 102 and Fig. 103).

→ Remove the step drill (5) from the drill hole (1) with the adjusting ring (7) and threaded pin (6) tightened (see Fig. 104).

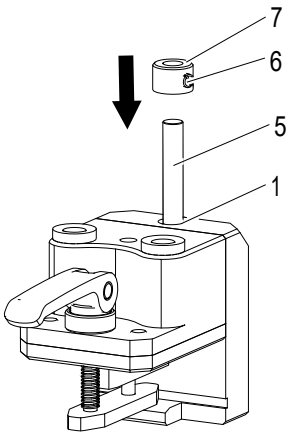


Fig. 102: Fix the step drill using the adjusting ring

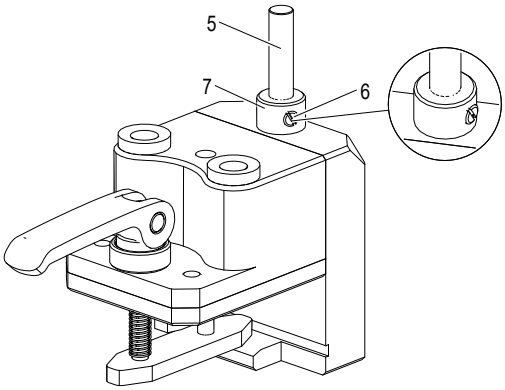


Fig. 103: Tighten threaded pin (6)

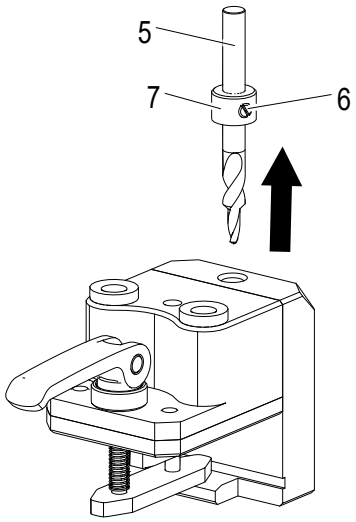


Fig. 104: Remove step drill (5) with tightened adjusting ring (7) from drilling hole.

→ Position the data rail (8) at the drilling jig.

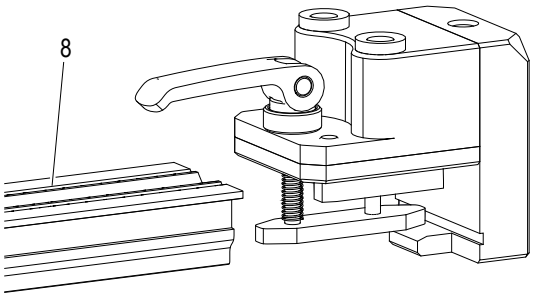


Fig. 105: Position data rail (8)

→ To release the drilling device, open the eccentric tappet (9) (A) and loosen the adjustment nut (10) (B).

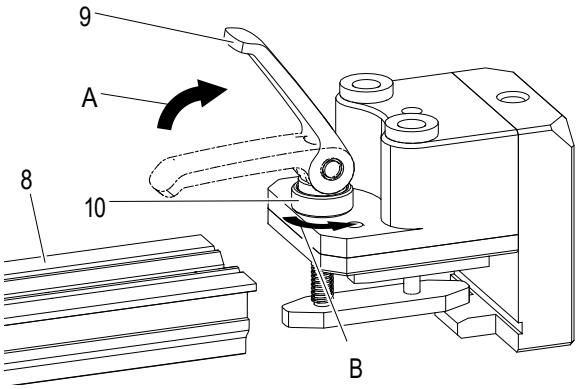


Fig. 106: Open/loosen eccentric tappet (9) and adjustment nut (10)

→ Slide the data rail (8) up to the rail stop (C) (see Fig. 108).

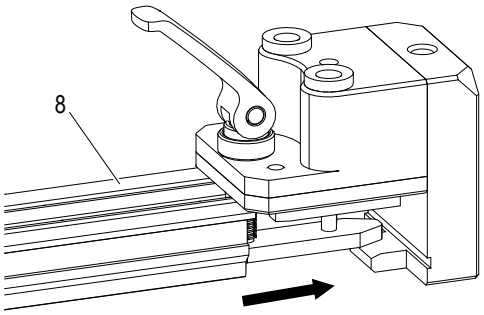


Fig. 107: Slide data rail (8) up to rail stop

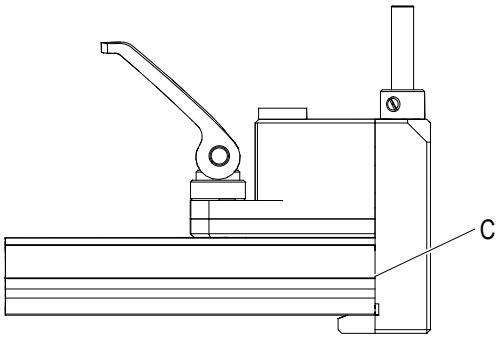


Fig. 108: Data rail (8) lays against rail stop (C)

→ In order to fix the data rail (8) in the drilling jig, close the eccentric tappet (9) (A) and tighten the adjustment nut (10) (B).

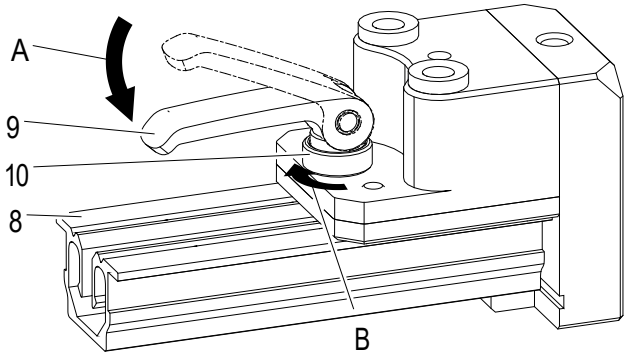


Fig. 109: Fix data rail in drilling jig

→ Drill with a cordless screwdriver (incl. countersink) until the adjusting ring comes into contact with the drill bushing (2) (see Fig. 111).

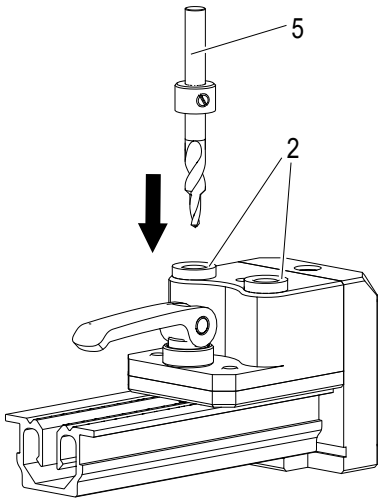


Fig. 110: Data rail

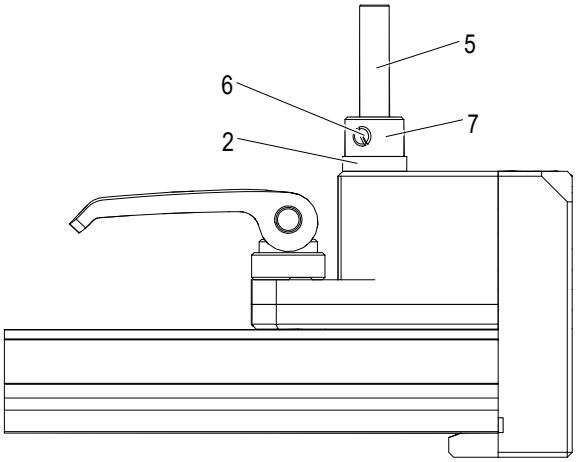


Fig. 111: Step drill (5) lays against drilling hole (10)

→ Open/loosen the eccentric tappet (9) and the adjustment nut (10), to remove the data rail.

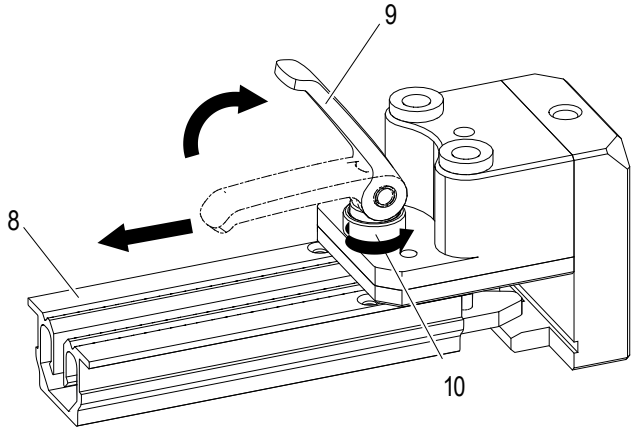


Fig. 112: Remove data rail

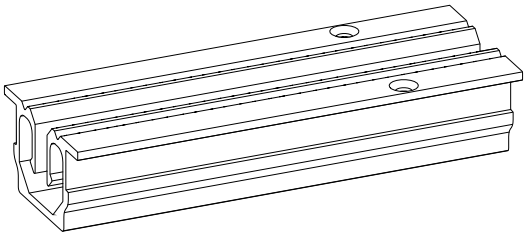


Fig. 113: Rail is drilled

→ Check the distance dimensions (see Fig. 114).

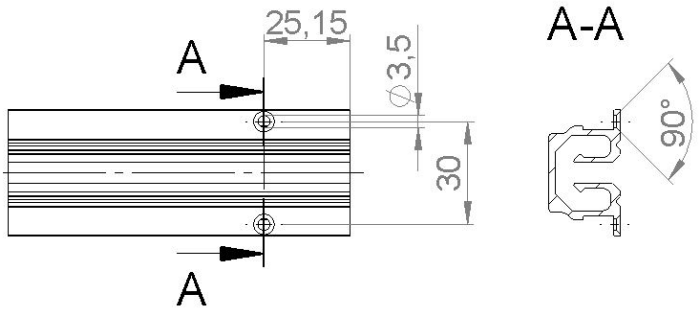


Fig. 114: Check distance dimensions

6.4.9 Transfers

In order to ensure a trouble-free transfer of the collector at transfer points, the following additional conditions must be observed:

- Distance of the opposing transfer guides is max. 10 mm in X-axis (travel direction) (see Fig. 115)
- Height offset (Y axis) max. 3 mm (Fig. 116) and side offset (Z-axis) max. 5 mm (Fig. 115)

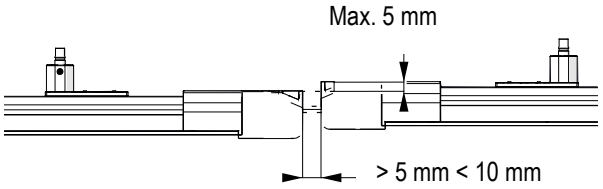


Fig. 115: Distance horizontal (view from above)

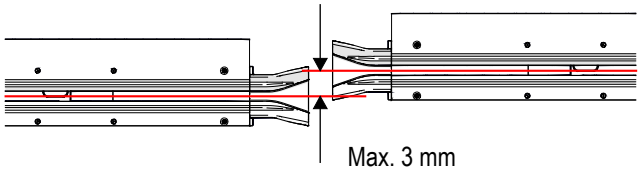


Fig. 116: Distance vertical (view from side)

There are two different types of transfer guides:

- Transfer guide 0515 plastic (standard) (Mat. No.: 3256996)

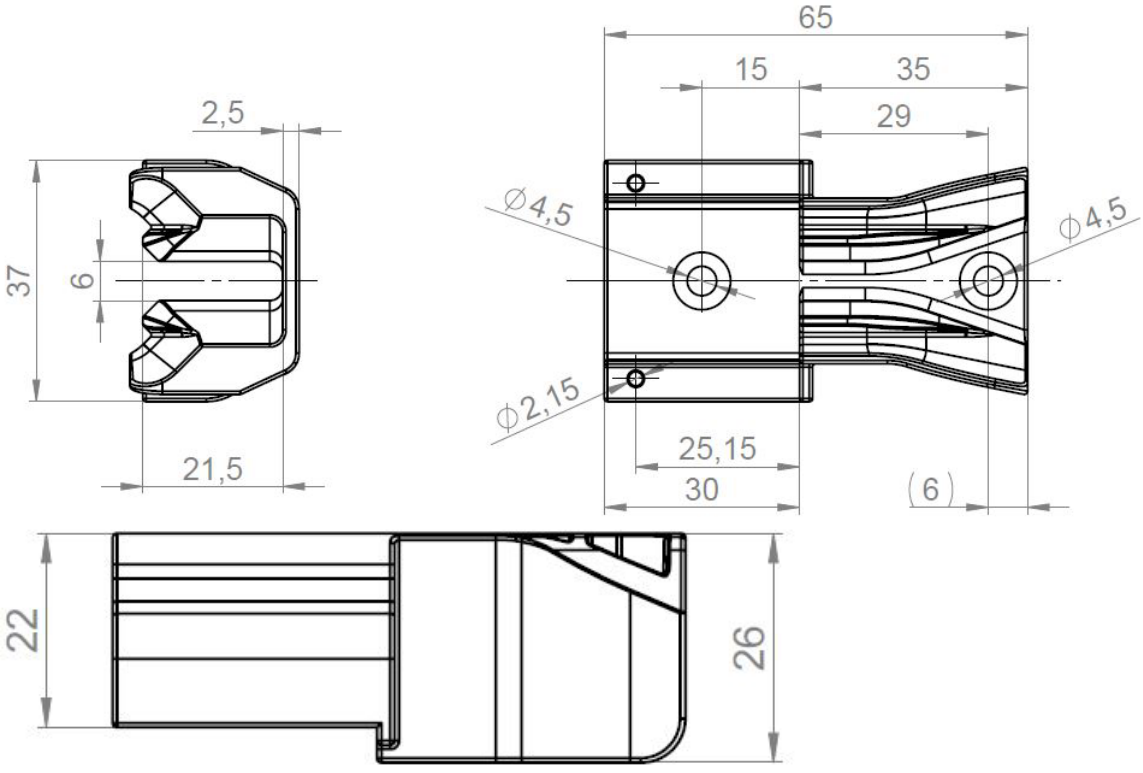


Fig. 117: Plastic transfer guide

- Transfer guide 0515 aluminium (generally used for EMS applications) (Mat. No.: 3260960)

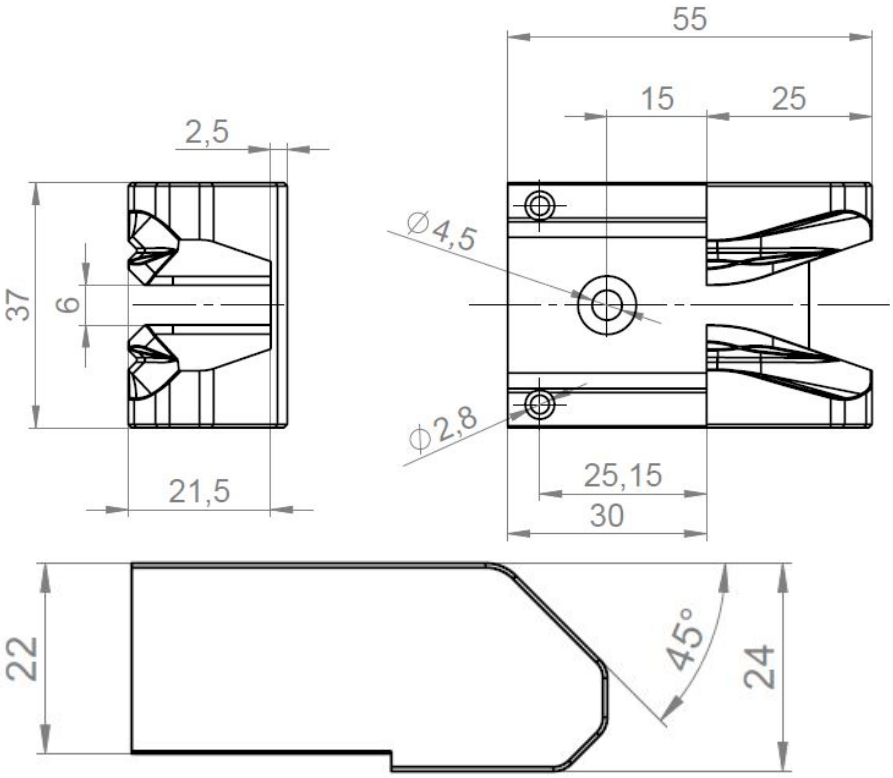


Fig. 118: Aluminium transfer guide

6.4.10 Drilling patterns for support structure (substructure)

If the support structure (substructure) is located directly on the back of the data rail, through holes for the stationary antennas, PE connectors and anchor points must be drilled in the support structure (substructure). This is described in the respective sections within this document.
Common drilling patterns are shown below. However, there may be deviations from this within the scope of projects, which is why this should be discussed with Conductix-Wampfler in the design phase.
Project-specific drawings can be requested from Conductix-Wampfler during the design phase.

Drilling pattern for line feed with an expansion unit

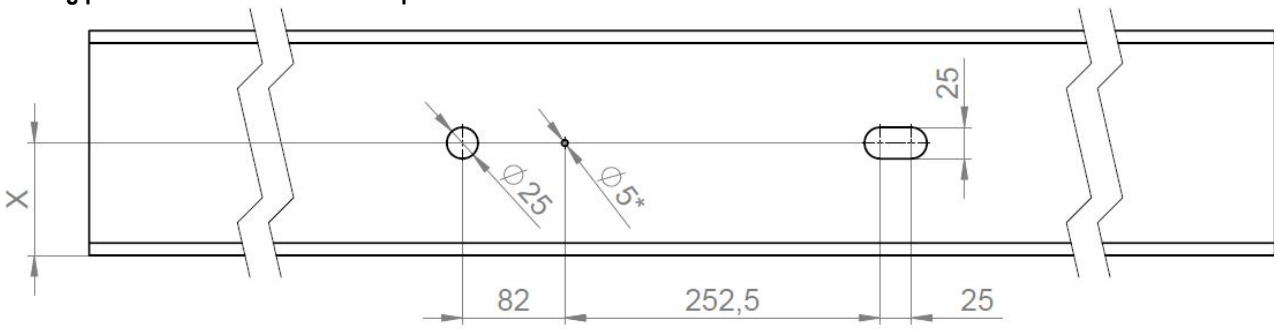


Fig. 119: Drill hole positions for line feeds with expansion unit and without overrun cap

*Drill hole in anchor point screw

Drilling pattern for end feed with an expansion unit and an aluminium overrun cap

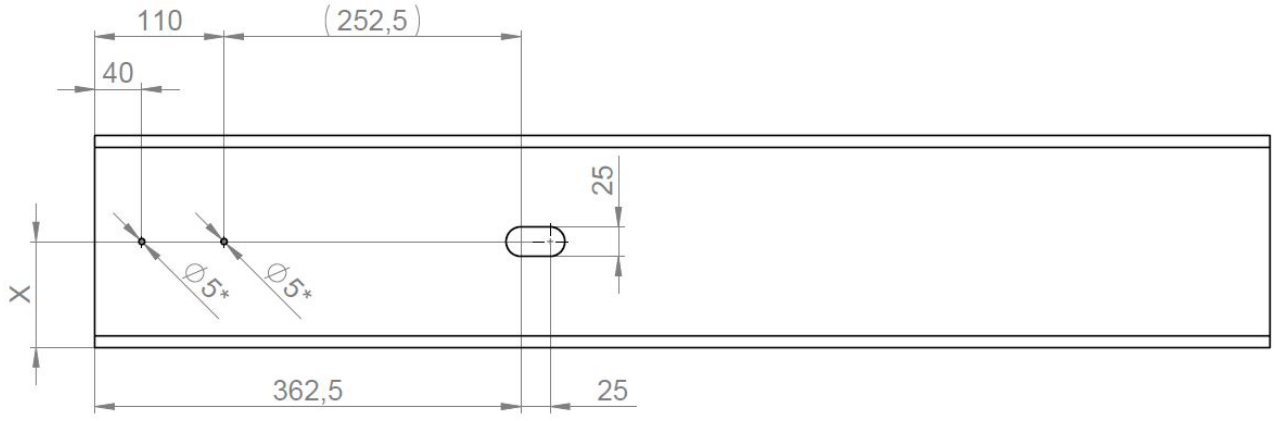


Fig. 120: Drill hole positions for end feed with expansion unit and aluminium overrun cap

* Options for anchor point screw

Drilling pattern for end feed with an expansion unit and plastic overrun cap

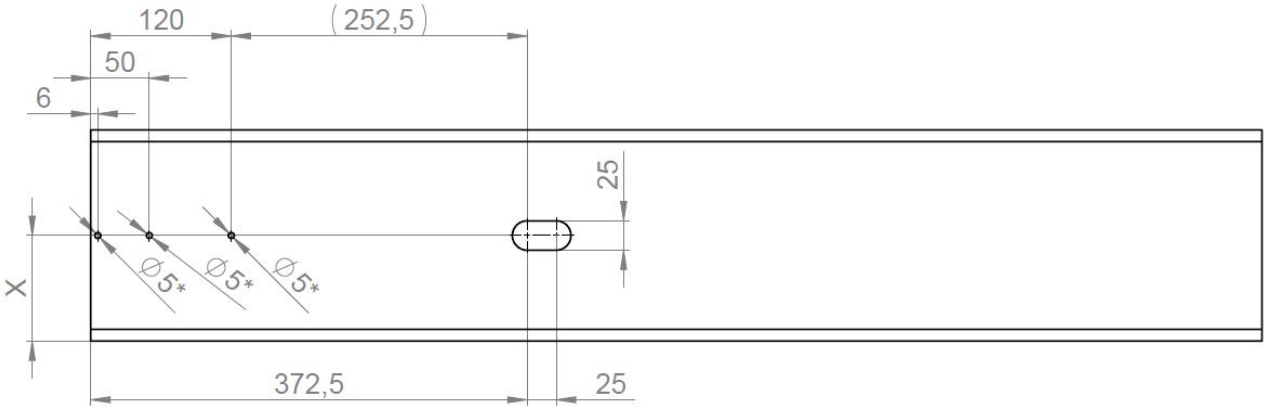


Fig. 121: Drill hole positions for end feed with expansion unit and plastic overrun cap

ATTENTION: Not suitable for substructures (support structure) with angled cuts!

* Options for anchor point screw

Drilling pattern for end feed with an expansion unit and aluminium overrun cap (45° cut on short side)

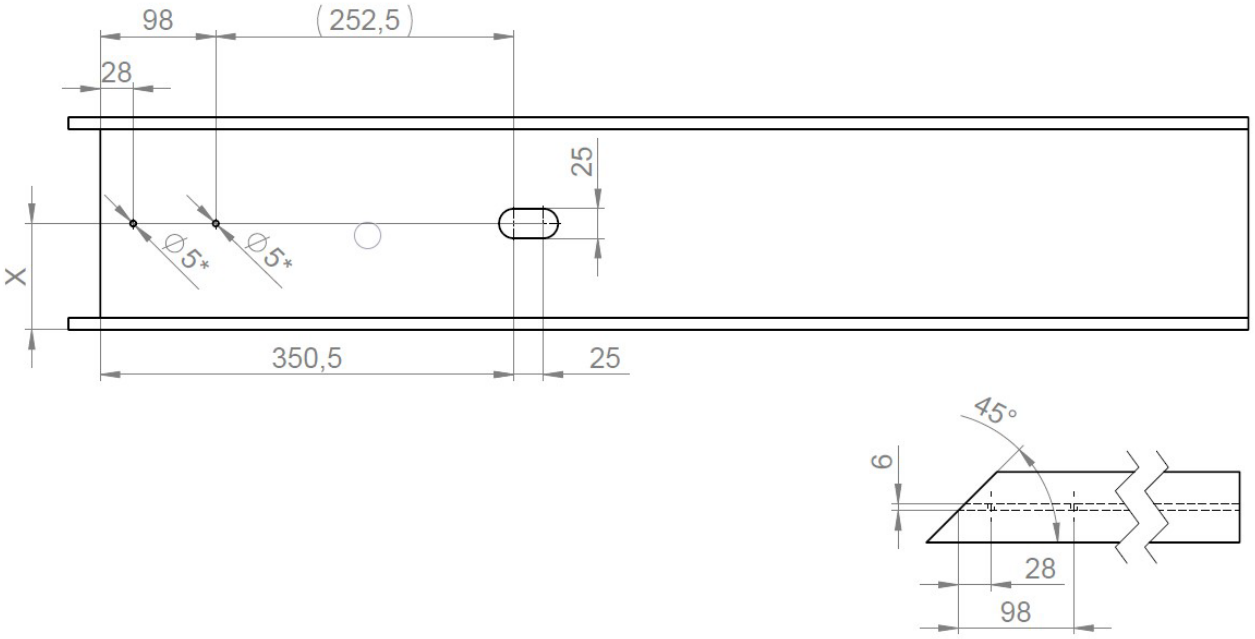


Fig. 122: Drill hole positions for end feed with single expansion unit with aluminium overrun cap (45° cut on short side of substructure (support structure))

* Options for anchor point screw

Drilling pattern for end feed with an expansion unit and aluminium overrun cap (45° cut on long side)

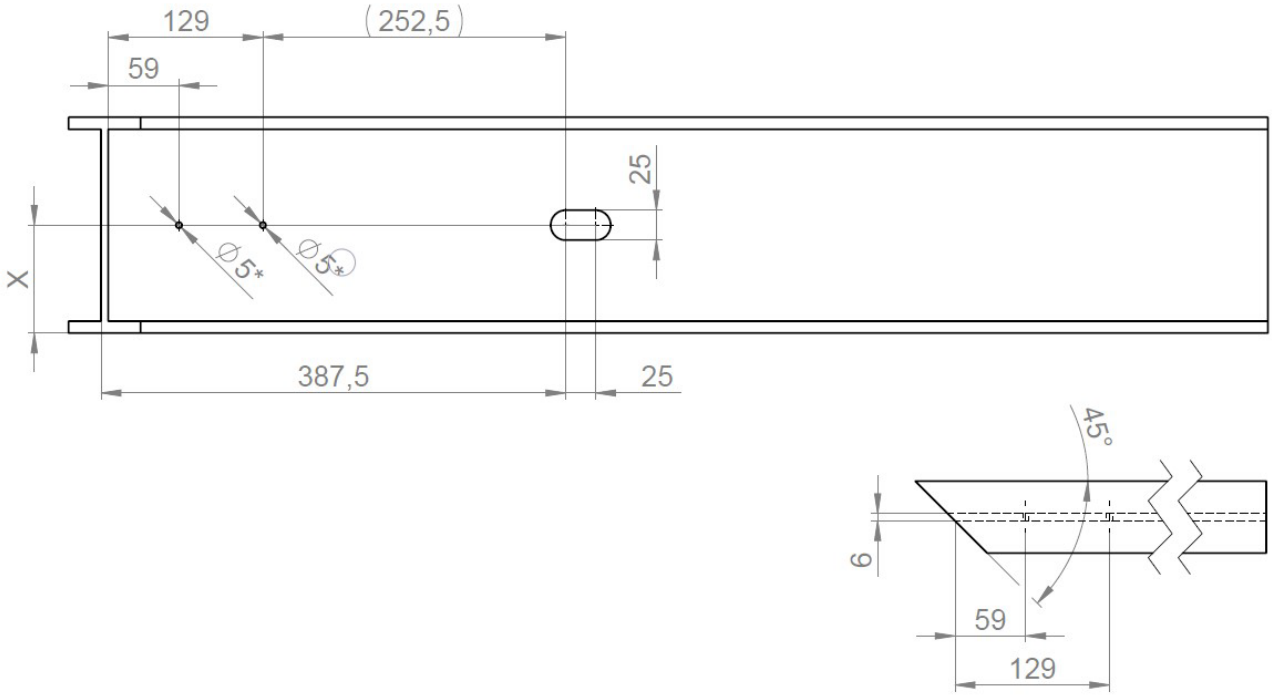


Fig. 123: Drill hole positions for end feed with single expansion unit with aluminium overrun cap (45° cut on long side of substructure (support structure))

* Options for anchor point screw

6.4.11 Mount the collector

The collector is mounted on the vehicle or on a separate, customer-specific mobile consumer.

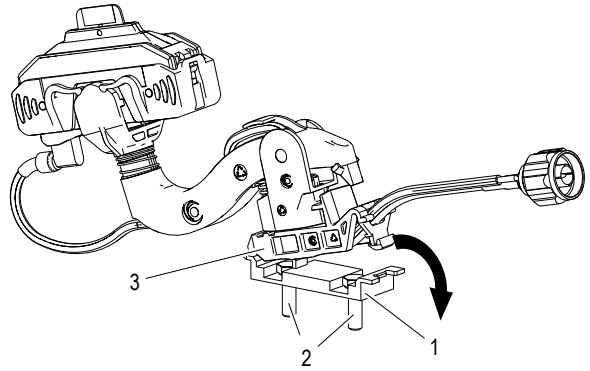


Fig. 124: Mount collector on towing unit

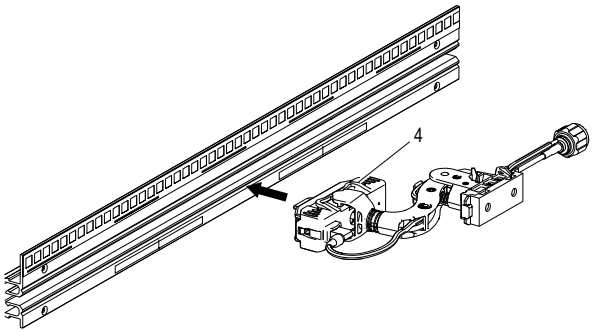


Fig. 125: Slide collector into rail

Work steps:

→ Drill holes in the support structure (substructure) at a distance of 30 mm (see Fig. 142).

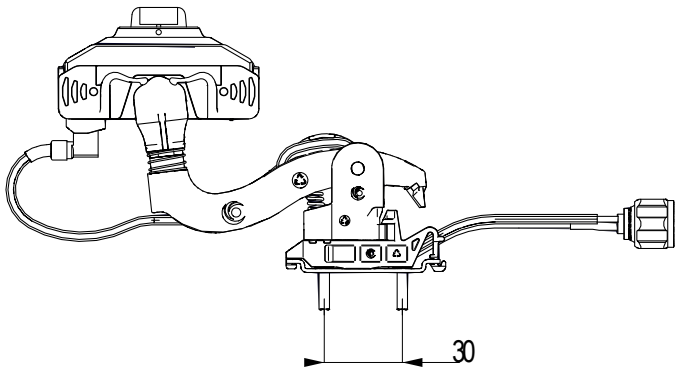


Fig. 126: Screw distances in towing unit

→ Mount the towing unit (1) using M5 x 2 hexagon screws (DIN EN 4017 (DIN 933) – steel 8.8) (2) to the support structure (substructure) with a tightening torque of 6 Nm (see Fig. 141).

→ Mount/snap the collector/collector bearing (3) onto the towing device (1).

→ Slide the collector head (4) with the mobile antenna into the data rail from the side.

→ Align the towing unit (1) including the collector with the data rail (see Fig. 127).

ATTENTION!

It must be ensured that the central axis of the data rail (A) is mounted exactly on the central axis of the collector (B) and that the specified mounting distance between the towing unit and rail is maintained (see Layout Plan and Fig. 127).

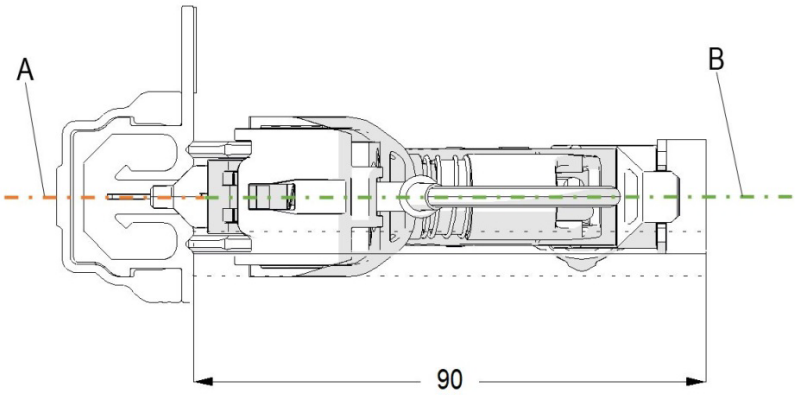


Fig. 127: Collector mounting dimension from towing unit to bottom edge of rail

6.4.12 Mount the positioning system

The positioning system consists of the code band (2), which is attached to the data rail with the positioning strip, and the read head (1), which is located on the vehicle.

The read head is mounted according to the manufacturer's operating instructions.

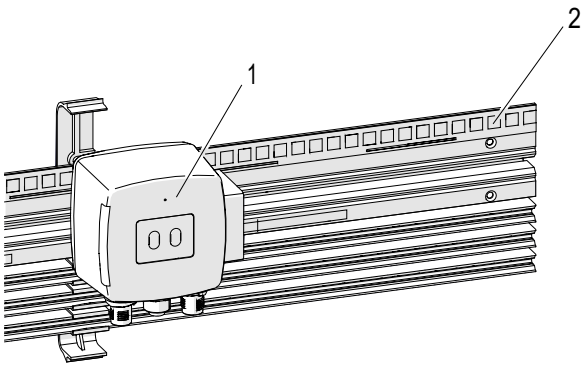


Fig. 128: Positioning system in detail

The code band is glued directly onto the ProfiDAT®*compact* rail (only possible when using the rail with an additional positioning strip). The height of the code band may not exceed 20 mm. Please observe the manufacturer's operating instructions.

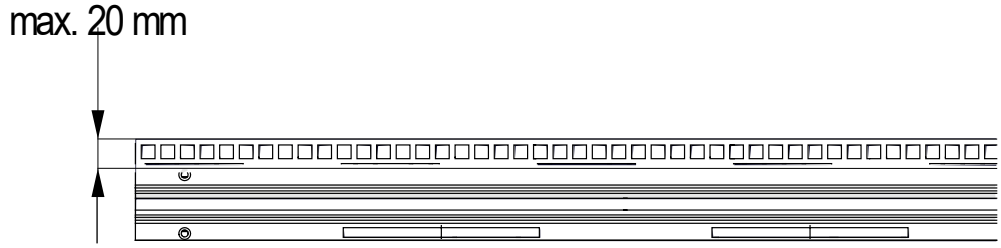


Fig. 129: Maximum height of code band

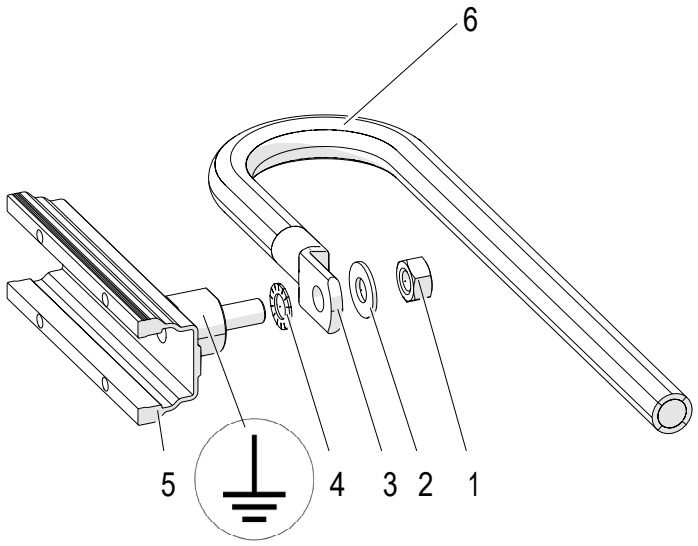
6.4.13 Connect PE cable to the PE connector

The ProfiDAT®*compact* rail must be connected to the customer's PE cable at the line feed points! If the route is interrupted by one or more transfers, each segment must be connected to the customer's system with a PE cable.
The cable cross-section of the PE cable can be determined by the customer, but must be designed to correspond to at least half the phase current. In addition, the PE cable must be suitable for an operating temperature of at least 90° C.
The PE connectors are used to connect the PE cable to the ProfiDAT®*compact* rails. In this case, a PE connector is used rather than a simple connector.
Work steps:

→ Fasten the PE cable to the PE connector with the cable lug (for screw size M8) according to the applicable standards and regulations (see Fig. 130). **Tightening torque of the nut (1): Min. 10 Nm**

→ Use nickel-plated cable lugs (for corrosion protection).

Standard PE connector



Item	Name
1	Hexagon nut, DIN 934
2	Locking edge washer
3	Cable lug up to 95 mm² M8
4	Serrated washer
5	PE connector
6	PE cable

Fig. 130: PE connector with PE cable

Optional lateral PE connection

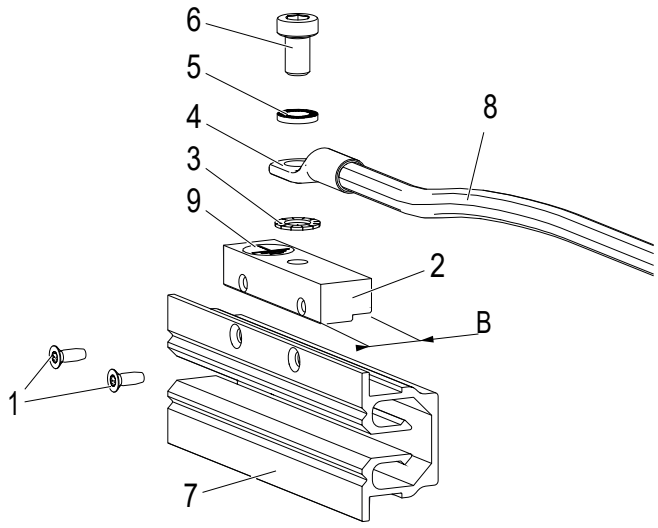


Fig. 131: PE connection

Item	Name
1	Countersunk screw M3 x 8
2	Fastening
3	Serrated washer A6,4 DIN 6798
4	Cable lug up to 25 mm² M6 possible at max. width (w) of < 14 mm
5	Locking edge washer D6.1
6	Cylinder head screw DIN 6912-M6x10
7	Data rail
8	PE cable
9	PE symbol

ATTENTION!

Do not crimp the PE cable!

Comply with the bending radii of the PE cables (see Data Sheet).

ATTENTION!

The PE cable must be suitable for an operating temperature of at least 90° C!

6.4.14 Use of the data rail without PE function

If the data rail is used without the PE function, it must nevertheless be connected to the grounded support structure (substructure). Carry out the following steps if the PE function is not used:

→ Connect both segment ends to the customer's grounded support structure (substructure) using the PE connector.

→ Connect the green-yellow PE cable (minimum cross-section 25^{mm2}) (see Fig. 130).

→ In addition, the general instructions for designing the data rail as a ground conductor rail must be observed (see Section 6.3.2).

6.4.15 Check the installation through attenuation measurement

In order to check the quality of the mechanical installation, the attenuation of the rail can be measured with suitable measuring means. This measurement can be carried out by the “International Service” of Conductix-Wampfler GmbH.

The expected values for this measurement for each ProfiDAT®*compact* segment are part of the project-specific documentation. Exceeding the expected values indicates a defective mechanical mounting of ProfiDAT®*compact* and must be corrected.

6.5 Electrical installation

DANGER!

Risk of death due to electrical shock!

Contact with energized components can lead to death or severe injury due to electrical shock. There is also a risk of injury from shock reactions, falling or being thrown across the room as a result of an electrical shock.

→ Disconnect the system from the voltage supply at the main switch. Here!

→ If there is no main switch, disconnect the power source from the system according to the system manufacturer's instructions.

→ Secure the system against being switched back on again.

→ Confirm that the power has been disconnected.

→ Ground and then short-circuit parts of the system that have been disconnected from the power supply.

→ Cover or block off adjacent energized parts.

→ Before each start-up, test the insulation resistance according to locally applicable technical standards, directives and laws.

6.5.1 Mount the transceiver

Work steps:

→ Mount the ProfiDAT®*compact* transceiver on a top hat rail (35 mm, DIN), S7 profile rail or on a surface. Installation of transceivers in a metal housing is recommended.

→ Ensure equipotential bonding (see Section 6.5.3).

→ Connect the data cable (HF cable) (see Sections 6.5.4 and 3.5.1).

→ Connect the network cable (see Section 6.5.6).

→ Connect power supply (see Section 6.5.7)

Observe the information and safety instructions in the manufacturer's documentation!

6.5.2 Lay the data cable (HF cable) – General

Care must be taken when laying the HF cable. The following instructions must be observed:

- Never bend the cable below the bending radius (see the "Minimum bending radii" table in Section 3.5.1).
- Observe the tightening torques of the connector (see "Tightening torques" table in Section 3.5.1).
- Do not expose the cable and connector to tensile stress.
- Do not twist the cable.
- Do not crimp or constrict the cable.
    - Only tighten cable ties carefully, if necessary use large cable ties (e.g. those made with Velcro)
- Avoid proximity to energy-carrying cables, apply general EMC basics such as:
    - Separate cables from energy cables using separators
    - Cross energy-carrying cables at right angles

ATTENTION!

The HF cable must never be unwound spirally (e.g. pulled out of the center). Always unwind the HF cable correctly.

If the HF cable is too long, it must be laid in loops as described below to reduce the effective length:

ATTENTION!

The HF cable must never be shortened with a cutting tool (pliers, scissors or similar).

→ Lay the equipotential bonding cable (1, if present) and the HF cable (2) in parallel. Lay a maximum of two loops and fix the cables with cable ties (3) at a suitable distance (see Fig. 132 and Fig. 133).

ATTENTION!

If the minimum bending radius of one of the cables is larger than the other, the smaller minimum bending radius must be followed so that the cable with the smaller minimum bending radius is not damaged.

The depicted quantity of two loops must not be exceeded (see Fig. 132 and Fig. 133).

Spiral winding, as with conventional cables, is prohibited with these cables.

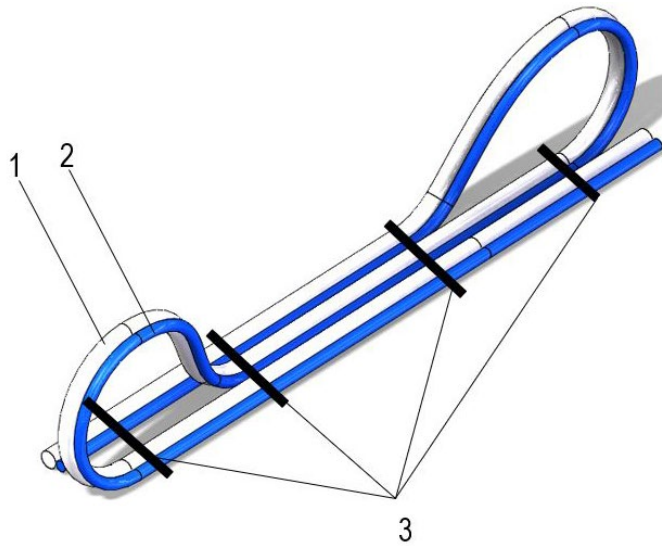


Fig. 132: Laid cables with cable ties

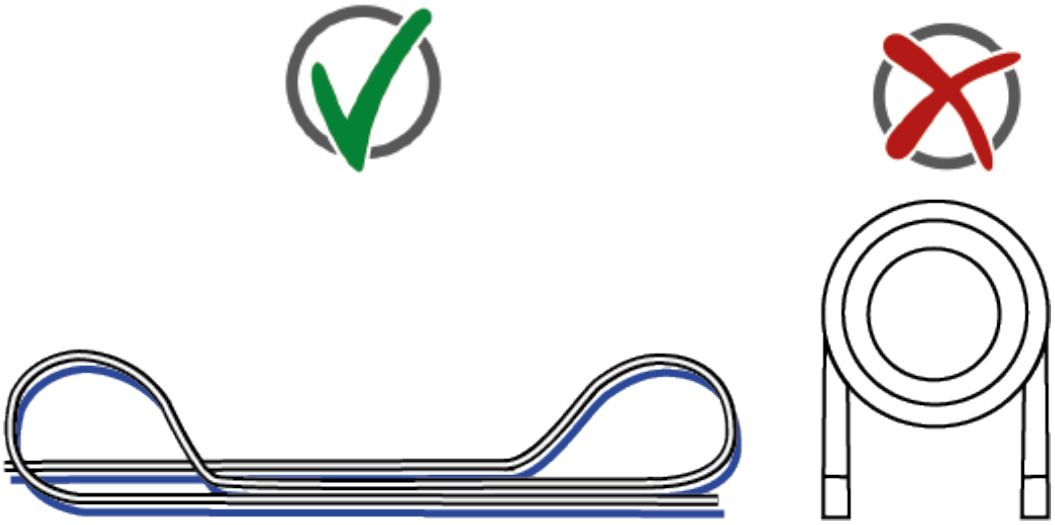


Fig. 133: Loop formation is allowed; coil winding prohibited

6.5.3 Protection against electromagnetic interference and damage from potential differences

To avoid damage to the HF components, the following components must be connected to the same protective ground potential:

- The Ethernet cable shielding and the Ethernet devices connected to it
- Transceiver (via top hat rail, profile rail or paint-free eye)
- Transceiver housing

In addition to grounding, the following requirements for equipotential bonding of the HF components must be observed to avoid interference through electromagnetic disturbances:

Mobile components

No other HF components may also be connected to the equipotential bonding in addition to the components connected to the protective ground potential described above. For example, these include additional switching cabinet HF cable bushings used as connectors. These must be mounted in an insulated manner.

Stationary components

The following stationary HF components are to be included in the equipotential bonding:

- Switching cabinet bushing for the HF cable that is connected to the transceiver
- Additional control switching cabinet bushings for the HF cables
- Data rail line feed segments

Mount the equipotential bonding cable on the line feed segment

→ Crimp the equipotential bonding cable (1) and the crimping cable lug (2) together using a crimping tool (see Fig. 134).

→ The line feed segment of the data rail has an equipotential bonding connector (6). Using a hexagon screw driver 3mm, screw the crimped equipotential bonding cable to this connector using screw connections consisting of a cylinder screw M4 (4), locking edge washer (5) and serrated washer (see Fig. 135).

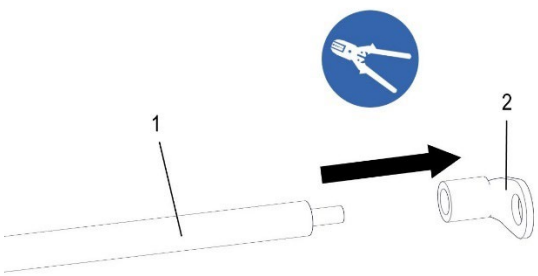


Fig. 134: Crimp equipotential bonding cable with crimping cable lug

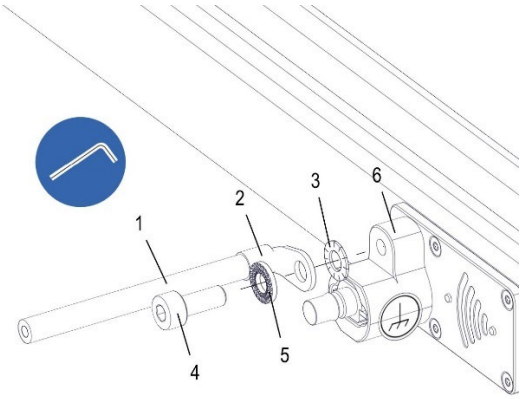


Fig. 135: Mount equipotential bonding cable on data rail line feed segment

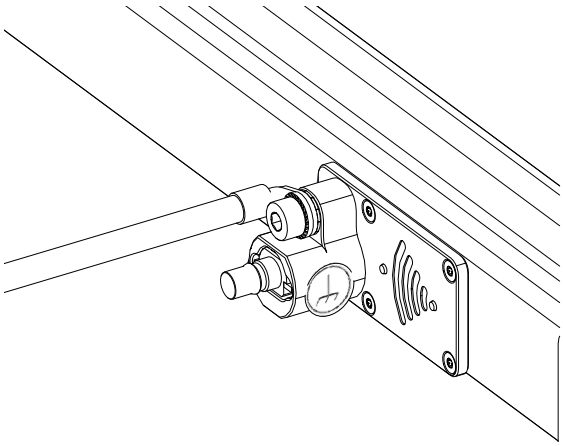


Fig. 136: Fully mounted equipotential bonding cable

Implementation of the equipotential bonding
The equipotential bonding must be implemented using an equipotential bonding cable with the following characteristics:

Laying the equipotential bonding cable
The equipotential bonding cable must be laid parallel, directly and over the entire length, next to each HF cable that connects the points specified above. The equipotential bonding cable must be connected to the potential of the HF cable shield directly at the beginning and end of the respective HF cable segment.

Connection of multiple equipotential bonding cables
When using a power splitter, 3 equipotential bonding cables meet at this power splitter (node). There, the equipotential bonding cables must be connected to one another in a conductive manner, e.g. via a fixed bolt and using ring terminals. If this node is grounded, then the power splitter must also be grounded (see Fig. 137)!

Recommended conductor* characteristics
Sheath color: white
Cross-section: 4…6 mm²
Conductor* class: 5 or 6

ATTENTION!

The equipotential bonding cables must not have a green-yellow sheath color (DIN EN 60204-1/32).

NOTE!

Refer to Section 6.5.2 for laying with an HF cable.

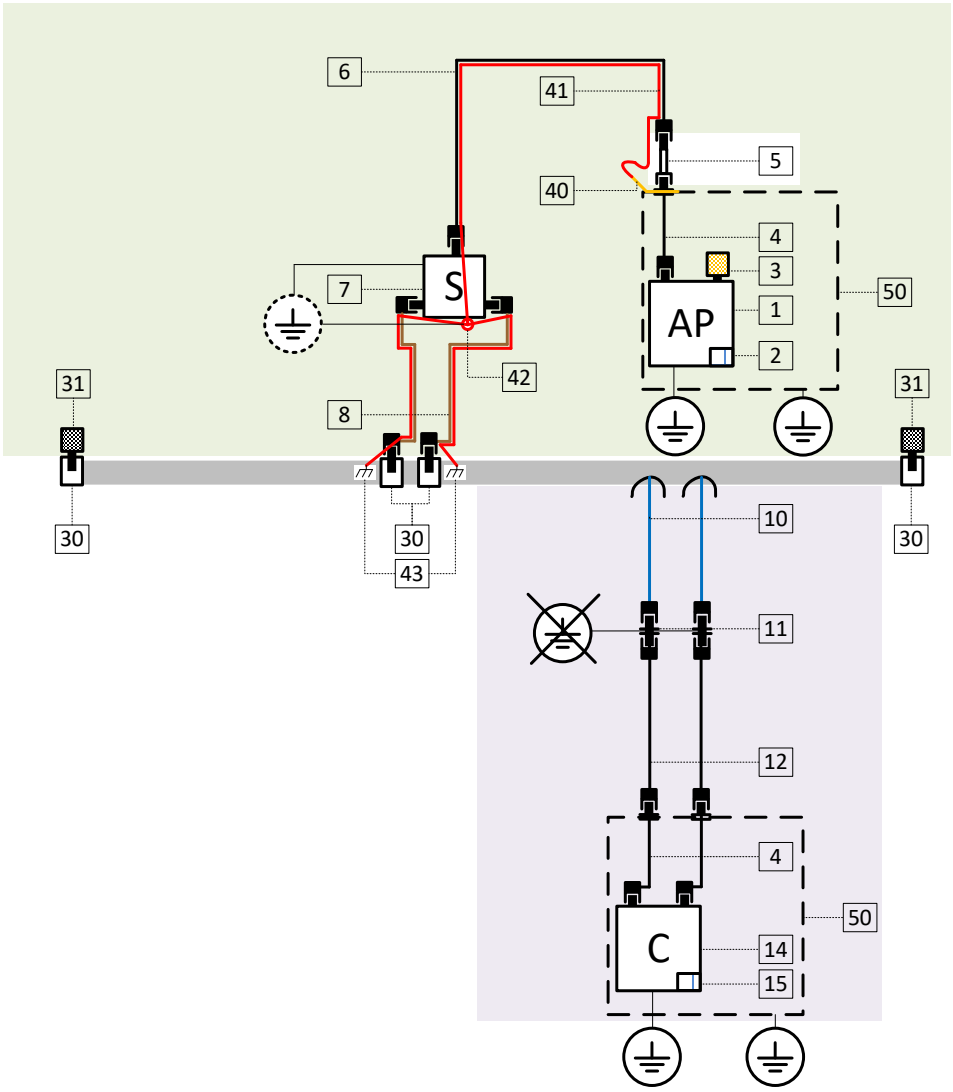


Fig. 138: Principle diagram of equipotential bonding (red) and grounding (symbol)

Item	Name
40	Grounding plate diameter M16 with connection for flat cable lug
41	Equipotential bonding cable
42	Equipotential bonding conductor node on splitter
43	Connection for equipotential bonding cable to line feed segment

6.5.4 Connect the transceiver (access point) to the stationary antenna

The connecting cable for the line feed to the ProfiDAT®*compact* rail is mounted between the transceiver (access point) and the connection to the line feed (stationary antenna).

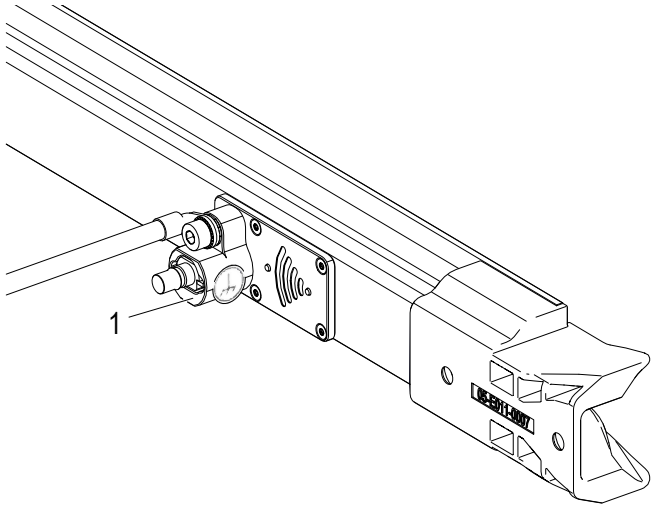


Fig. 139: Line feed to stationary antenna

The line feed can occur either as a segment line feed or as an end feed.

Connection with segment line feed

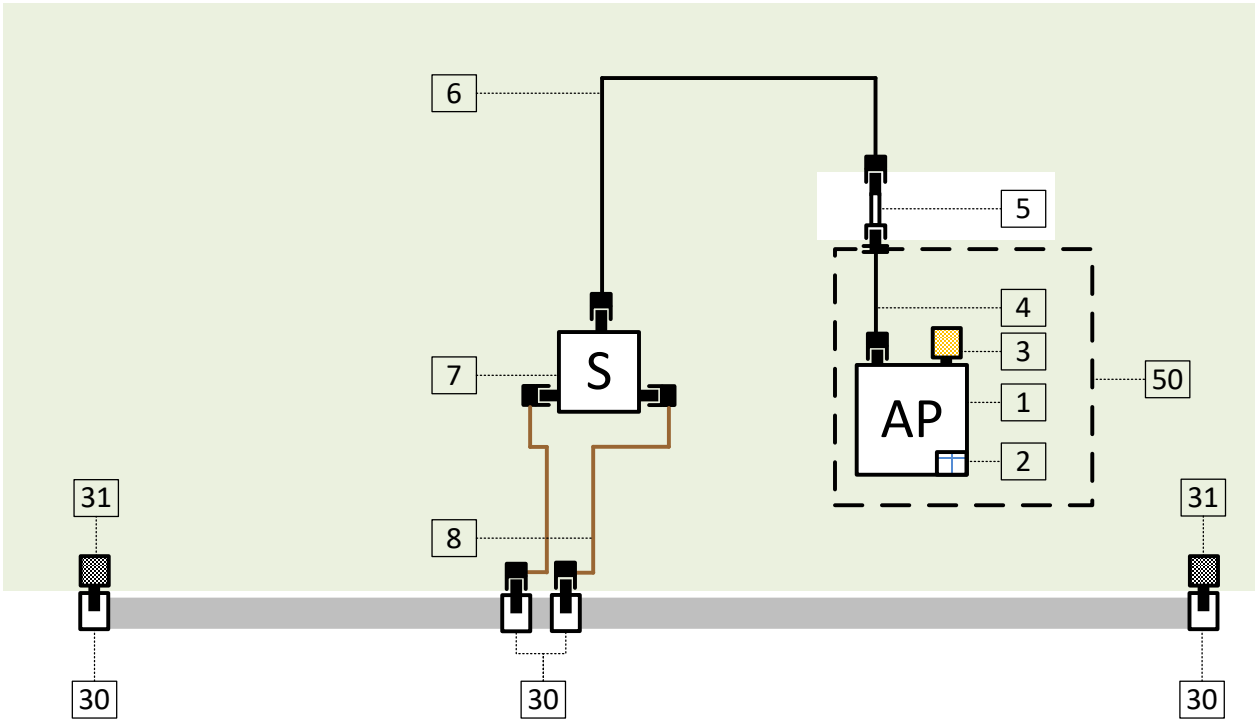


Fig. 140: Segment line feed

#	Name	HF Connection 1			HF Connection 2			Length	Material Number
1	Access point W774	R/SMA	Socket	180°	R/SMA	Socket	180°		3187868
2	Key plug W780								3187889
3	R-SMA terminating resistor	R/SMA	Connector	180°					3170540
4	Aircell 5 cable	SMA	Connector	180°	N	Installation socket	180°	1.0 m	3173091
5	Attenuator 20dB	N	Connector	180°	N	Socket	180°		3275973
5	Attenuator 10dB	N	Connector	180°	N	Socket	180°		3275972
5	Attenuator 6dB	N	Connector	180°	N	Socket	180°		3275971
5	Attenuator 3dB	N	Connector	180°	N	Socket	180°		3275950
6	Ecoflex 10 cable	N	Connector	180°	N	Connector	180°	10.0 m	3173096
7	Power splitter	N	Connector	180°					3187905
8	K_02252_D cable	QLS	Connector	90°	N	Connector	90°	1.0 m	3272896
30	ProfiDAT®*compact* line feed	QMA	Socket	180°	-	-	-	-	-
31	Terminating resistor	QMA	Connector	180°					3248020
50	Housing (optional or customer-supplied)								

Work steps:

→ Connect the R-SMA connector of the cable (4) to the R-SMA connector of the transceiver. The N-socket on the other end of the cable (4) must be installed as a switching cabinet bushing and electrically conductively connected to the housing (grounded). The grounding plate (Section 6.5.3, Fig. 101, Pos. 40) with the switching cabinet bushing.

→ If available for a specific project, connect the attenuator (5) to the N-socket of the cable (4). Project-specific attenuators can also be located on the power splitter (7).

→ Connect the N-connector of the cable (6) to the N-socket of the attenuator (5) or the switching cabinet bushing N-socket of the cable (4).

→ Mount the power splitter (7) and connect the N-connector of the cable (6) to the N-socket of the power splitter (7). Ensure equipotential bonding, see Section 6.5.3.

→ Connect the N-connector of the cables (8) to the N-socket of the power splitter and lead the QLS connector of the cable (8) to the line feed (30).

→ Connect the QLS connector of the cable (8) to the QMA socket of the line feed (30).

→ Fix the cable routing with cable ties or similar to the support structure (substructure); stow excess cables properly.

→ Connect the QMA terminating resistors (31) to both segment ends (30)

Connection at the end feed

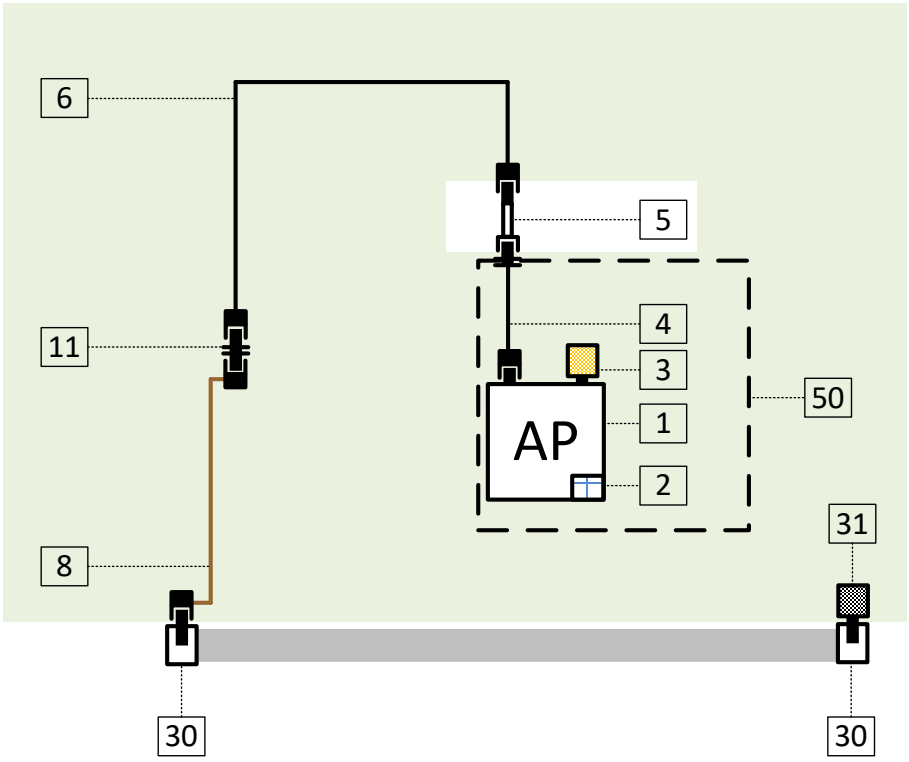


Fig. 141: Connection at end feed

#	Name	HF Connection 1			HF Connection 2			Length	Material Number
1	Access point W774	R/SMA	Socket	180°	R/SMA	Socket	180°		3187868
2	Key plug W780								3187889
3	R-SMA terminating resistor	R/SMA	Connector	180°					3170540
4	Aircell 5 cable	SMA	Connector	180°	N	Installation socket	180°	1.0 m	3173091
5	Attenuator 20dB	N	Connector	180°	N	Socket	180°		3275973
5	Attenuator 10dB	N	Connector	180°	N	Socket	180°		3275972
5	Attenuator 6dB	N	Connector	180°	N	Socket	180°		3275971
5	Attenuator 3dB	N	Connector	180°	N	Socket	180°		3275950
6	Ecoflex 10 cable	N	Connector	180°	N	Connector	180°	10.0 m	3173096
7	Power splitter	N	Connector	180°					3187905
8	K_02252_D cable	QLS	Connector	90°	N	Connector	90°	1.0 m	3272896
30	ProfiDAT®*compact* line feed	QMA	Socket	180°	-	-	-	-	-
31	Terminating resistor	QMA	Connector	180°					3248020
50	Housing (optional or customer-supplied)								

Work steps:

→ Connect the R-SMA connector of the cable (4) to the R-SMA connector of the transceiver. The N-socket on the other end of the cable (4) must be installed as a switching cabinet bushing and electrically conductively connected to the housing (grounded). The grounding plate (Section 6.5.3, Fig. 101, Pos. 40) with the switching cabinet bushing.

→ If available for a specific project, connect the attenuator (5) to the N-socket of the cable (4). Project-specific attenuators can also be located on the power splitter (7).

→ Connect the N-connector of the cable (6) to the N-socket of the attenuator (5) or the switching cabinet bushing N-socket of the cable (4).

→ Connect the N-connector of the cable (6) to the cable (8) using the N-connector (11). Fasten the N-connector and follow the instructions for equipotential bonding, see Section 6.5.3.

→ Lead the QLS connector of the cable (8) to the line feed (30).

→ Connect the QLS connector of the cable (8) to the QMA socket of the line feed (30).

→ Fix the cable routing with cable ties or similar to the support structure (substructure); stow excess cables properly.

→ Connect the QMA terminating resistor (31) to the segment end (30).

6.5.5 Connect the transceiver (client) to the mobile antenna

The mobile antenna connection cables of the collector are connected to the transceiver (client) on the vehicle.

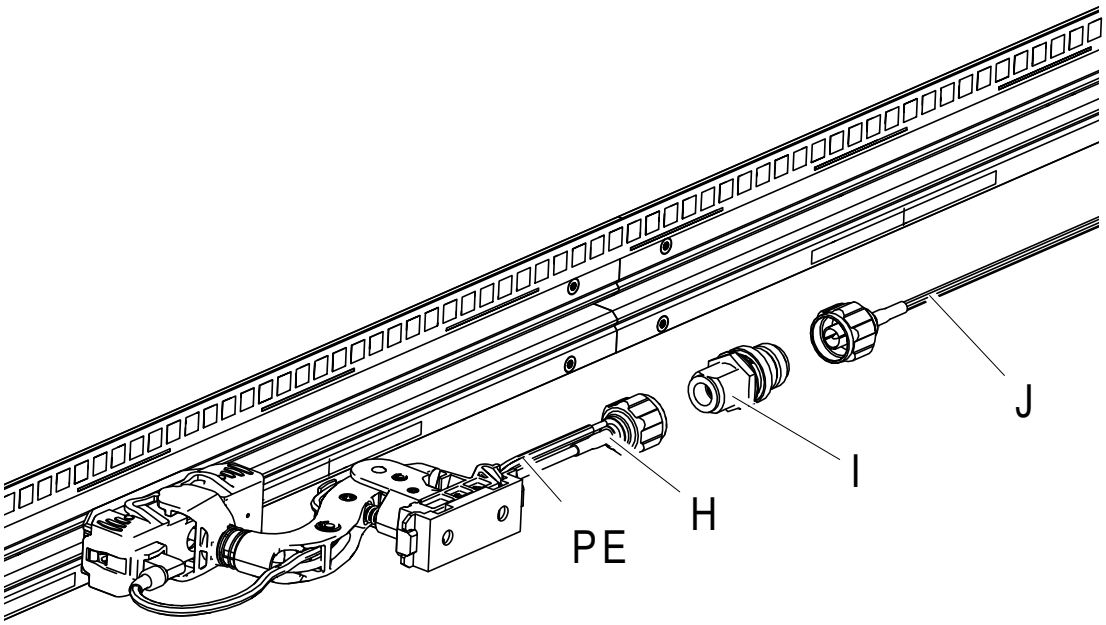


Fig. 142: Connection to mobile antenna

Connection of client with two antennas

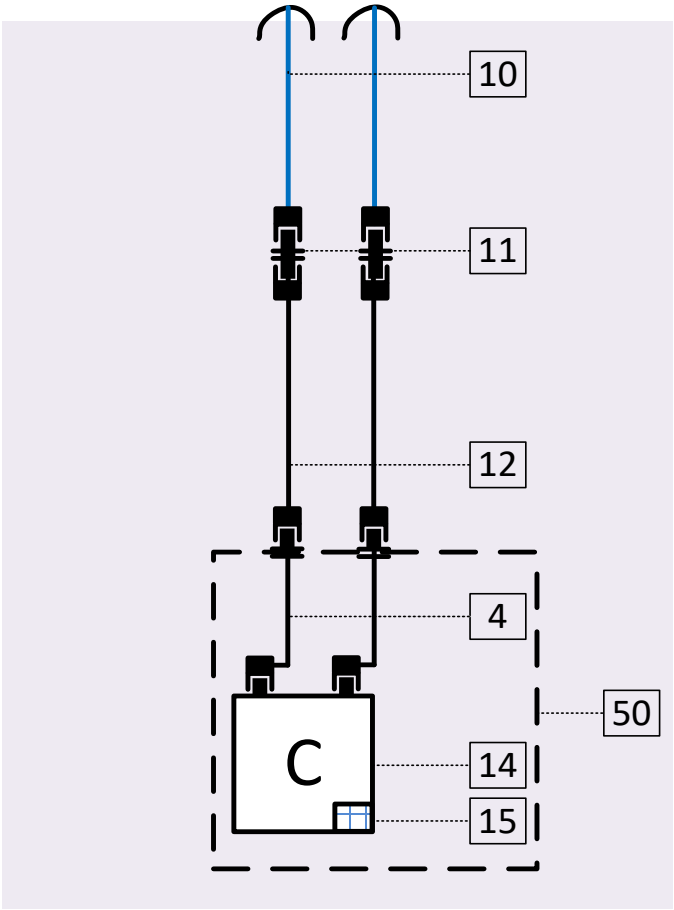


Fig. 143: Client with two antennas

#	Name	HF Connection 1			HF Connection 2			Length	Material Number
4	Aircell 5 cable	SMA	Connector	180°	N	Installation socket	180°	1.0 m	3173091
10	Collector with 316D cable	N	Connector	180°				0.6 m	3247347
11	Installation socket	N	Installation socket	180°	N	Installation socket	180°		3187977
12	Ecoflex 10 cable	N	Connector	90°	N	Connector	180°	3.0 m	3259210
14	Client W734	R/SMA	Socket	180°	R/SMA	Socket	180°		3187873
15	Key plug W740								3187890
30	ProfiDAT®*compact* line feed	QMA	Socket	180°	-	-	-	-	-
31	Terminating resistor	QMA	Connector	180°					3248020
50	Housing (optional or customer-supplied)								

Work steps:

→ Connect the R-SMA connector of the cable (4) to the R-SMA connector of the transceiver. The N-socket on the other end of the cable (4) must be installed as a switching cabinet bushing and electrically conductively connected to the housing (grounded).

→ Connect the N-connector of the cable (12) to the cable (11) using the N-connector (10). Connect the N-connector (11), observe instructions for equipotential bonding, see Section 6.5.3: This N-connector (11) must be installed in an insulated manner. The N-connector (11) can simultaneously serve as a strain relief for fastening to a tab/strain relief plate.

→ Lead the cable (12) from the collector to the cable (4). Connect the N-connector of the cable (12) to the switching cabinet bushing N-socket of the cable (4).

→ Connect the connection cable of the second collector in the same manner.

→ Fix the cable routing with cable ties or similar to the support structure (substructure); stow excess cables properly.

Connection of client with one antenna

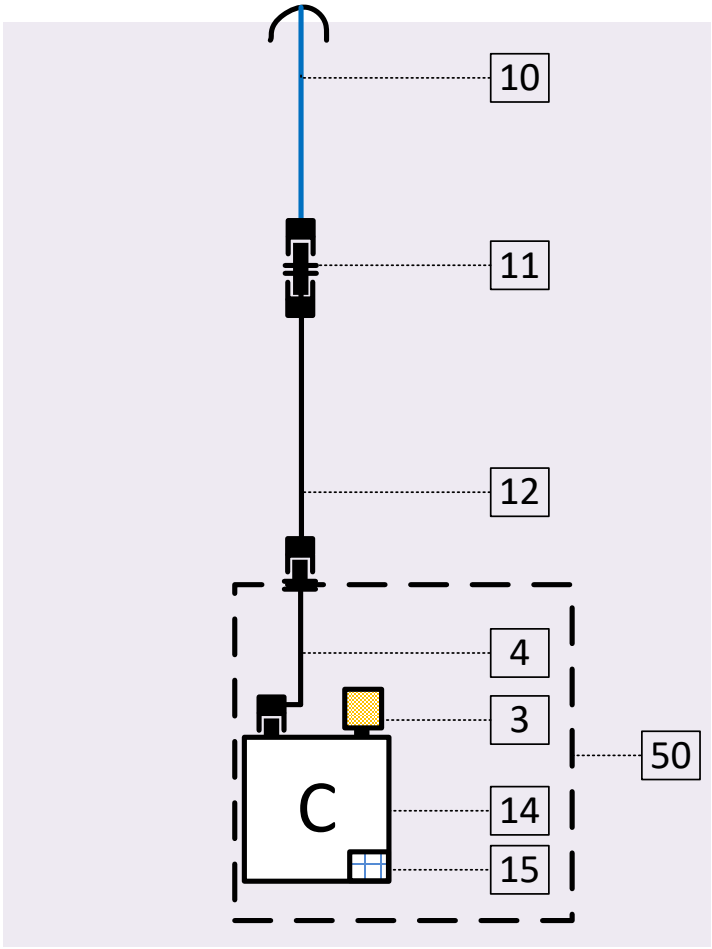


Fig. 144: Client with one antenna

#	Name	HF Connection 1			HF Connection 2			Length	Material Number
4	Aircell 5 cable	SMA	Connector	180°	N	Installation socket	180°	1.0 m	3173091
10	Collector with 316D cable	N	Connector	180°				0.6 m	3247347
11	Installation socket	N	Installation socket	180°	N	Installation socket	180°		3187977
12	Ecoflex 10 cable	N	Connector	90°	N	Connector	180°	3.0 m	3259210
14	Client W734	R/SMA	Socket	180°	R/SMA	Socket	180°		3187873
15	Key plug W740								3187890
30	ProfiDAT®*compact* line feed	QMA	Socket	180°	-	-	-	-	-
31	Terminating resistor	QMA	Connector	180°					3248020
50	Housing (optional or customer-supplied)								

Work steps:

→ Connect the R-SMA connector of the cable (4) to the R-SMA connector of the transceiver. The N-socket on the other end of the cable (4) must be installed as a switching cabinet bushing and electrically conductively connected to the housing (grounded).

→ Connect the N-connector of the cable (12) to the cable (11) using the N-connector (10). Connect the N-connector (11), observe instructions for equipotential bonding, see Section 6.5.3: This N-connector (11) must be installed in an insulated manner. The N-connector (11) can simultaneously serve as a strain relief for fastening to a tab/strain relief plate.

→ Lead the cable (12) from the collector to the cable (4). Connect the N-connector of the cable (12) to the switching cabinet bushing N-socket of the cable (4).

→ Fix the cable routing with cable ties or similar to the support structure (substructure); stow excess cables properly.

6.5.6 Connect transceivers to the network

→ Insert the Ethernet connector (RJ45) into the socket P1 (option 1) on the transceiver. Observe the information and safety instructions in the manufacturer's documentation.

ATTENTION!

Instructions regarding the network integration of ProfiDAT(R)*compact* are described in TI0514-0001!

ATTENTION!

See manufacturer's documentation for differences between the two Ethernet ports of the transceiver.

6.5.7 Supply power to the transceiver

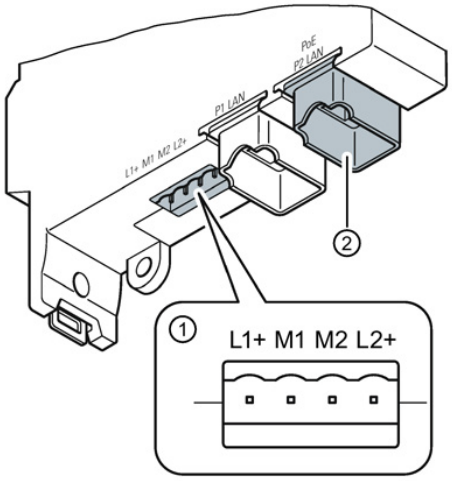


Fig. 145: Transceiver connection for Ethernet

For power supply via 4-pole socket (Option 1):

- Direct supply via the 4-pole socket: Connection assignment:

  L1 +: DC 24V
  M1: Ground
  M2: Ground
  L2 +: DC 24V

ATTENTION! **Do not reverse the polarity of the connections!**

For power supply via Power over Ethernet (Option 2):

→ Insert the Ethernet connector (RJ45) into the P2 socket

6.6 Checklist and initial Commissioning

WARNING!	**This checklist serves as a guideline to ensure the safe operation of the ProfiDAT®*compact* system!** This checklist is intended for qualified professionals who install and commission data transmission systems and are familiar with the regulations on safety at work and accident prevention. **The report on the following pages must be filled out during the initial commissioning.**

End customer		**Customer No.**	
		Order No.	

Location of Commissioning	
Address	
Country	

Business Premises No.		**Crane No.**	
Serial Number ProfiDAT®*compact* transceiver			
Start of Commissioning		**Commissioner**	
End of Commissioning		**Name**	
		Date	
		Signature	

No.	Description	Comment: OK/NOK
1.	**Installation**	
1.1.	Distance of the hanger clamps (suspension distance) is correct according to Section 6.4.1.	
1.2.	Care has been taken to ensure that there are as few connection points as possible at the conductor rail joints 0515.	
1.3.	The collector is correctly aligned with the ProfiDAT®*compact* rail. Installation dimensions of 90 mm have been complied with see Fig. 127.	
1.4.	No blocking objects are in the movement area of the collector.	
1.5.	The ProfiDAT®*compact* connectors are mounted correctly. The maximum gap between the rails is 0.5 mm in the X-direction (direction of travel) and Y-direction (see Fig. 82: Maximum offset of connection point in X-direction and Fig. 83).	
1.6.	The line feed components are correctly mounted.	
1.7.	The PE cable is correctly mounted on the PE connectors. The PE symbol is glued to the PE connector.	
1.8.	The PE cable is correctly mounted on the PE connection. The PE symbol is glued to the PE connection.	
1.9.	The sliding contacts are free of grease.	
1.10.	All screws are tightened with their respective tightening torque.	
1.11.	The ProfiDAT®*compact* transceivers were mounted correctly (see Section 6.5.1).	
1.12.	All electrical connections are correctly completed by specialist personnel.	
1.13.	The attenuation values of all ProfiDAT®*compact* segments are in the expected range (see Section 6.4.15)	
1.14.	All data cables (HF cables) are correctly laid and connected.	
1.15.	All passive HF components (splitters, attenuators, terminating resistors, …) are correctly mounted.	
1.16.	All equipotential bonding cables have been correctly laid and connected.	
1.17.	The operating personnel are trained.	

The transceivers are preconfigured to customer specifications. The IP addresses are listed in the project-specific documentation.

2.	**The ProfiDAT®*compact* connection has been confirmed via device LEDs**	
2.1.	**The stationary ProfiDAT®*compact* transceiver is turned on and the LAN is connected.** Switch on the 24 V power supply to the ProfiDAT®*compact* transceiver and allow the ProfiDAT®*compact* transceiver at least 1 minute to start. Requirement: LED “L1” or “L2” or “PoE” lights up green. LED "R1" lights up green or flashes green to orange. LED "P1" and/or "P2" light up green or flash green to orange. LED "F" is off.	
2.2.	**The ProfiDAT®*compact* transceiver on the vehicle is turned on and the LAN is connected.** Switch on the 24 V power supply to the ProfiDAT®*compact* transceiver and allow the ProfiDAT®*compact* transceiver at least 1 minute to start. Requirement: LED “L1” or “L2” or “PoE” lights up green. LED "R1" lights up green or flashes green to orange. LED "P1" and/or "P2" light up green or flash green to orange. LED "F" is off.	
2.3.	**The ProfiDAT®*compact* connection is established** Requirement: LED "R1" lights up green or flashes green to orange.	

*The initial commissioning of the transceiver must occur **simultaneously** with the commissioning of the system into which the data transmission system is integrated. The connection establishment and the data transmission can only take place when the system is turned on and a connection is established between the antenna on the collector and the stationary antenna on the line feed via the* ProfiDAT®*compact rail.*

3.	**Initial commissioning of data transmission**	
3.1.	All access points are accessible from a central point via the network.	
3.2.	All clients are connected to the respective access point (see Section 9.3.8).	
3.3.	When using two mobile collectors per client: Both mobile collector of a vehicle receive a similar* signal strength (see Section 9.3.10)	
3.4.	All vehicles receive the same signal strength at a reference position (e.g. line feed)	
3.5.	A signal scan with one vehicle throughout the entire route was carried out and is trouble-free and without deviation at a normal operating speed (see Section 9.3.11)	

If the configuration of the transceiver has been changed:

- *These changes are also to be undertaken for all the same/ similar devices of the system.*
- *These are to be documented and additionally backed up by a ConfigPack – Backup.*

4.	Commissioning	
4.1.	**Collector test – low speed** Test: Travel the entire guideway at 10% of the maximum speed. Observe the activity of the collector on the data rail, particularly at the rail joints, switches, lifters, joints and other transfers. Required result: The connections and transfers along the entire length of the data rail are smooth and the activity of the collector is trouble-free at all times.	
4.2.	**Collector test – increased speed** Test: Increase the speed to 30 %, 50 %, 80 %, and finally 100 % of the full speed. Successful result: The collector activity is trouble-free at all times.	
4.3.	**Additional functional tests** Required result: All other functions are carried out according to the collector's requirements.	

7 Operation

7.1 WLAN channel usage

When using the "iPCF" function, it is imperative to ensure that the WLAN channels used for the ProfiDAT®*compact* are exclusively available for ProfiDAT®*compact* and are not used by any other device in the local area.
Even minor disturbances due to the "iPCF" functionality can lead to a negative influence on the communication.

The WLAN channels used for ProfiDAT®*compact* can be found in the project-specific documentation.

7.2 Safety

Risk of injury due to improper operation!	**Improper operations can result in serious personal injury and material damage.** → Conduct all operating steps according to the specifications of these mounting instructions. → Before starting work, ensure that all covers and safety systems are installed and working properly. → Never disable the safety systems during operation. → Maintain order and cleanliness in the work area! Loosely stacked or scattered components and tools are a source of accidents.
Unauthorized personnel are at risk!	**Unauthorized persons who do not meet the requirements described here are not acquainted with the dangers in the work area!** → Keep unauthorized persons away from the work area. → In case of doubt, address the person and direct them away from the work area. → Stop working as long as unauthorized persons are in the work area.

Electrical
Do not exceed the nominal voltage specified in Section 3! The data transmission system can be overloaded due to excessive current or voltage. Risk of fire and/or destruction of the data transmission system!

Personnel:

- The system may only be operated by trained personnel!

Personal protective equipment (these items must be worn during all work):

- Protective clothing
- Protective footwear

8 Maintenance and Service

8.1 Safety

Risk of injury due to improperly conducted maintenance works!

Improper maintenance can cause serious injuries to persons or material damage.

WARNING!

→ Before starting work, ensure sufficient space for installation.

→ Ensure that the installation area is clean and tidy! Loosely stacked or scattered components and tools are a source of accidents.

→ If components have been removed, be careful to reinstall them properly, replace all fastenings, and comply with screw tightening torques.

→ Switch off the main power supply line and secure it against unauthorized reactivation.

→ Use the climbing aids and working platforms provided when installation tasks are carried out above eye level.

→ Do not use machine components as climbing aids.

→ Ensure the safe and environmentally friendly drainage, collection and disposal of operating and auxiliary materials.

→ Safety systems that have been removed for installation, service or repair work must be reinstalled and inspected immediately after the work is complete.

→ Observe the intervals for inspection and maintenance work specified in the maintenance instructions.

→ Ensure that sufficient space for maintenance work is available.

→ Ensure that powered components are not inadvertently activated during maintenance work.

→ Secure detached parts against falling.

→ Screw joints that were loosened during maintenance work must be retightened and secured according to instructions.

→ fastenings and seals that cannot be reused are to be replaced (such as self-locking nuts, disks, splints, O-rings, glued or micro-encapsulated screws).

→ Lubrication or greasing points that are cleaned or wiped during maintenance and repair work must be re-lubricated as instructed.

→ After finishing work, collect all tools and materials and check that all are present.

→ Disassembled parts and components that were exchanged are to be collected, stored in a safe place, recycled or returned.

→ Before entering systems, they must be disconnected from power using the main switch and secured against unauthorized, unintentional, and/or erroneous switching on.

8.2 Maintenance schedule

The following sections describe the maintenance work required for optimal, trouble-free operation. The work carried out according to the maintenance plan must be logged.
If signs of heavier wear are revealed during regular inspections, reduce the maintenance intervals according to the actual signs of wear.
Contact the manufacturer in case of any questions regarding maintenance tasks and intervals. See the service address on the last page.

Interval	Maintenance work	Conducted by
Every 14 Days: 3 and 4 shift operation **Every 30 Days: 2 shift operation; after 300 hours at the latest**	Visual inspection of the components of the ProfiDAT®*compact* system ■ Proper condition ■ Proper function ■ Firm seating of screws and nuts ■ Deformation ■ Wear ■ Damage ■ Level of soiling ■ Corrosion	Users
Every 4 weeks	Visual and functional inspection ■ Wear of the sliding contacts	Specialist technician
Every 6 months	Visual and functional inspection ■ Check for ease of movement ■ All electrical connections and cables Visual inspection of the ProfiDAT®*compact* system components for: ■ Proper condition ■ Proper function ■ Deformation ■ Wear ■ Damage ■ Level of soiling ■ Corrosion	Specialist technician
	Check the screw connections ■ Check the tightness of the screws ■ If necessary, tighten with tightening torque (see Section 6).	Specialist technician
Every 6 months	Check the collector ■ Installation dimensions ■ Contact force of the sliding contacts ■ Connecting cables ■ Oil joints and/or bolts	

8.2.1 Documentation

→ The results of inspections and the measures taken are to be documented in written reports.

→ Conductix-Wampfler must be immediately informed of any defects or malfunctions that occur during the test phase and within the warranty period.

8.2.2 Maximum wear of the sliding contacts

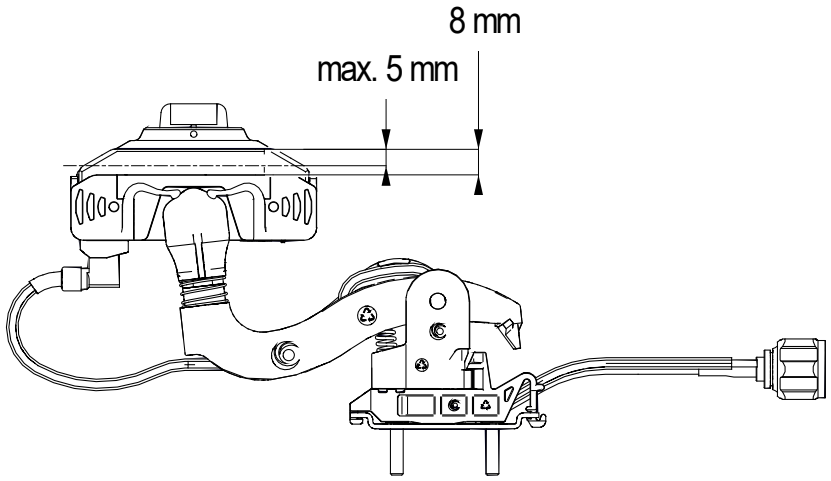


Fig. 146: Wear limit of sliding contacts on ProfiDAT®*compact collector*

8.2.3 Replacement of the sliding contacts

Work steps:

→ Pull off the angled blade receptacle (1) of the PE cable (see Fig. 147).

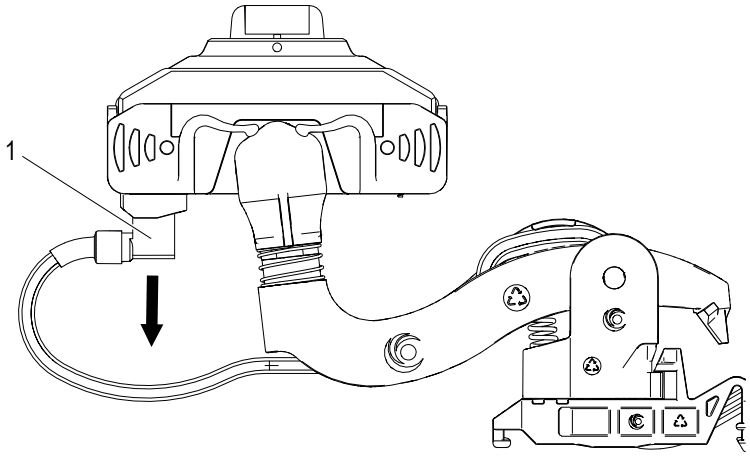


Fig. 147: Pull off angled blade receptacle

→ Pull the data cable so that the collector head can be better loosened from the joint (see Fig. 148 and Fig. 149).

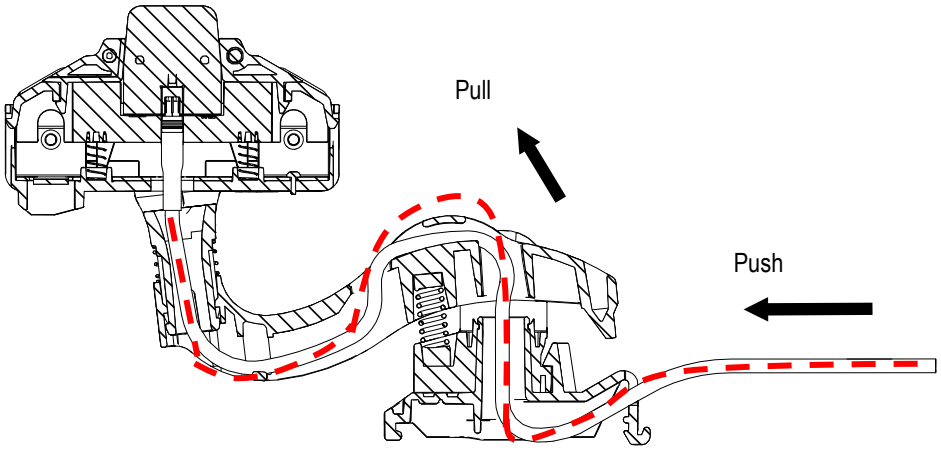


Fig. 148: Pull data cable (HF cable) (loop from above)

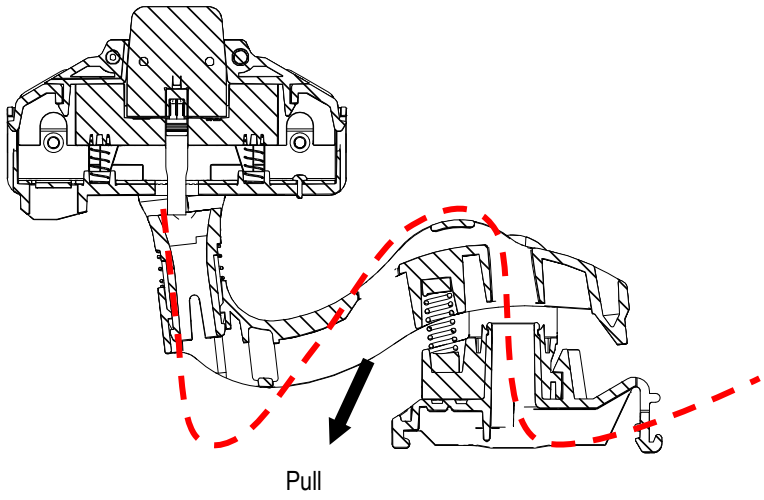


Fig. 149: Pull data cable (HF cable) (loop from below)

→ Using a flat-head screwdriver ≤ 3.0, carefully push a nose of the collector housing inward to disassemble the circuit board housing (see Fig. 150).

→ Disconnect the collector head (1) from the connector (2) of the data cable (HF cable) (3). The data cable (HF cable) must protrude approx. 30 mm from the joint (see Fig. 154).

ATTENTION!

Springs can jump out!

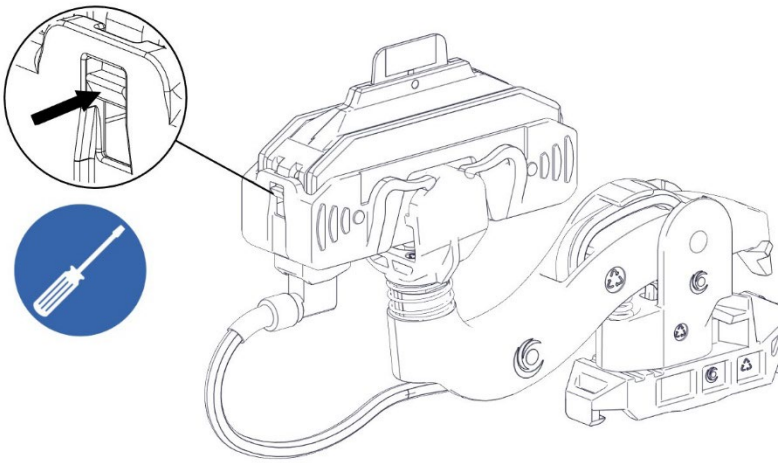


Fig. 150: Carefully press nose in collector housing inward with flat-head screwdriver

→ Disconnect the collector head (1) from the connector (2) of the data cable (HF cable) (3). The data cable (HF cable) must protrude approx. 80 mm from the joint (see Fig. 151).

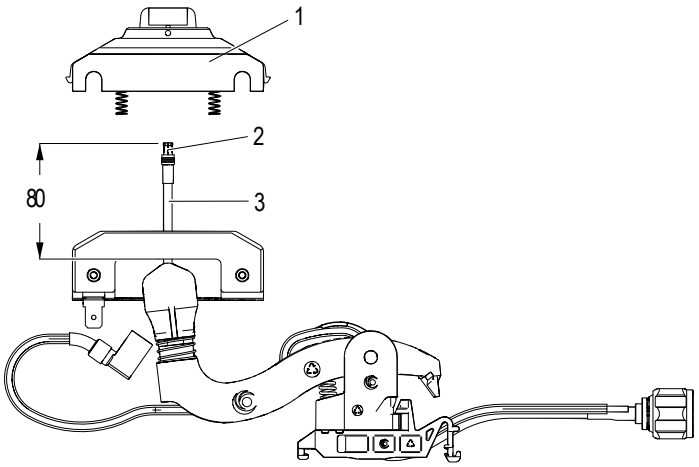


Fig. 151: Pull collector housing (1) from data cable (HF cable) (3)

→ Disassemble the balance incl. sliding contact (1) from the joint (2) (see Fig. 152 and Fig. 153). If necessary, use a flat-head screwdriver > 3.0.

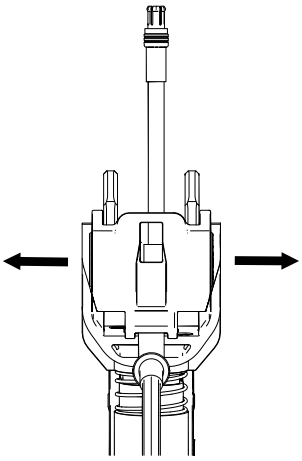


Fig. 152: Disassemble balance incl. sliding contact from joint

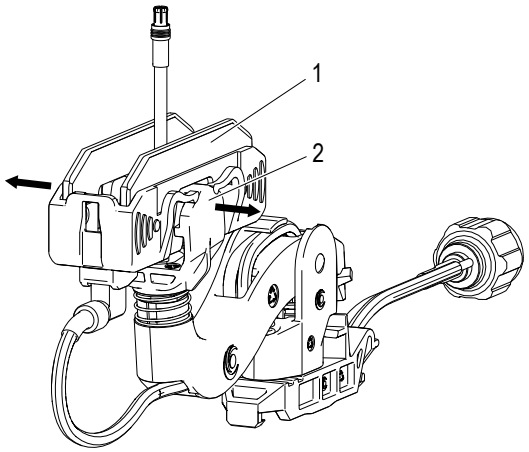


Fig. 153: Balance incl. sliding contact (1) and joint (2)

→ When removing the cover, check the sliding components for wear (see Fig. 154). With heavy wear (> 1.5 mm), order a new collector head (copper graphite: 051592-11 or graphite: 051592-12).

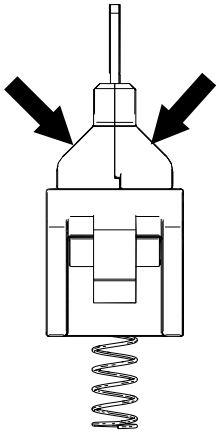


Fig. 154: Check sliding components for wear

→ In the event that the springs have loosened in the collector housing, they can be mounted as follows:

→ Apply the adhesive (LOCTITE 406) to the 1st turn of the spring (1) 2 times.

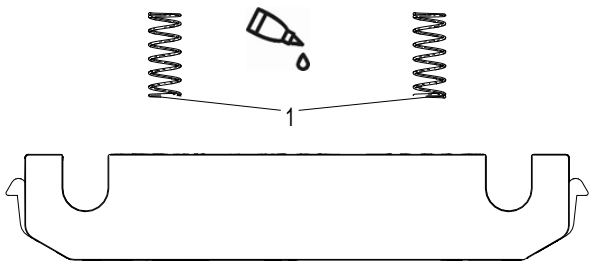


Fig. 155: Apply adhesive to first turn of spring

→ Glue the 2 compression springs into the centering.

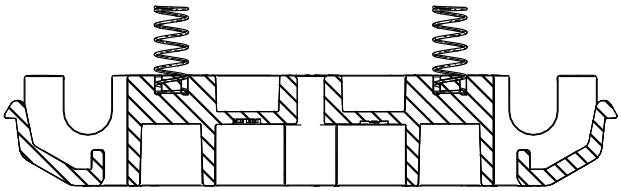


Fig. 156: Compression springs in centering

→ Allow the adhesive (LOCTITE 406) to harden for approx. 20 seconds.

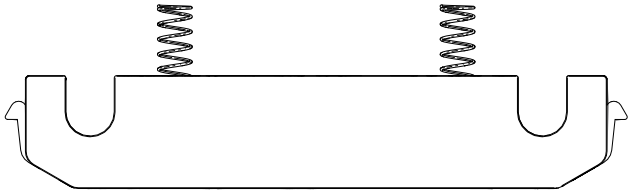


Fig. 157: Allow adhesive to harden

Remove worn sliding contact from the insulation:

→ Unscrew the STS-plus 1.4x4-T5 screw with a TX 5 Torx screwdriver (see Fig. 158) and remove the worn sliding contact (see Fig. 159).

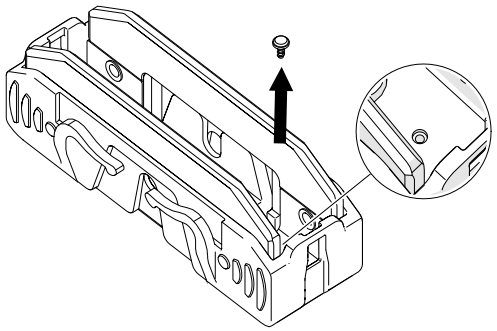


Fig. 158: Loosen STS-plus 1.4x4-T5 screw

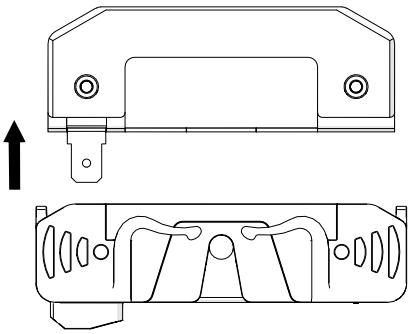


Fig. 159: Remove worn sliding contact

Mount new sliding contact (copper graphite: 051592-21 or graphite: 051592-22):

→ Insert the sliding contact (1) into the balance (3) (see Fig. 160).

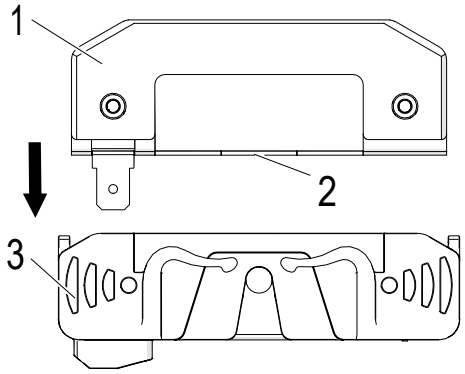


Fig. 160: Insert sliding contact (1) into balance (3)

→ Press the copper plate (2) of the sliding contact (1) to the bottom of the balance (3). Ensure that the sliding contact (1) is correctly centered (4) (see Fig. 160).

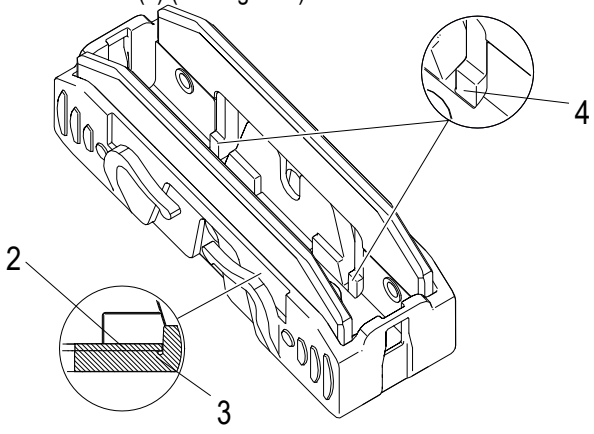


Fig. 161: Copper plate (2) of sliding contact is centered on bottom of balance (3)

→ Tighten STS-plus 1.4x4 – T5 screw (5) to secure the sliding contact (1). Tightening torque: 0.2 Nm (see Fig. 162)

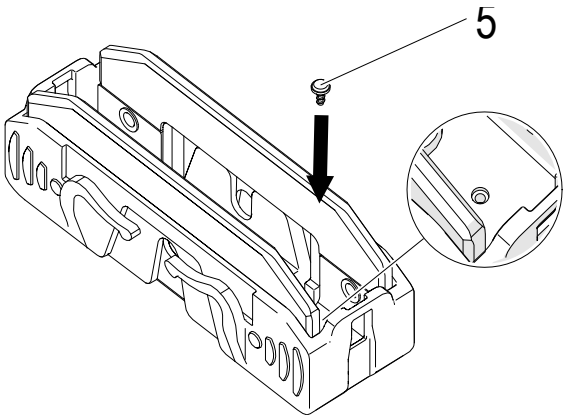


Fig. 162: Tighten STS-plus 1.4x4 – T5 screw

→ Mount the balance incl. sliding contact (1) onto the balance on the collector arm (2) (see Fig. 163).

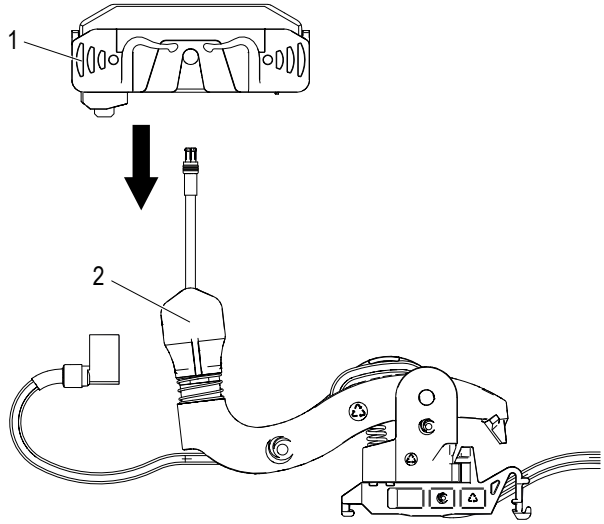


Fig. 163: Balance incl. sliding contact (1) is mounted

→ The balance must audibly click twice over the lateral bolts (see Fig. 164).

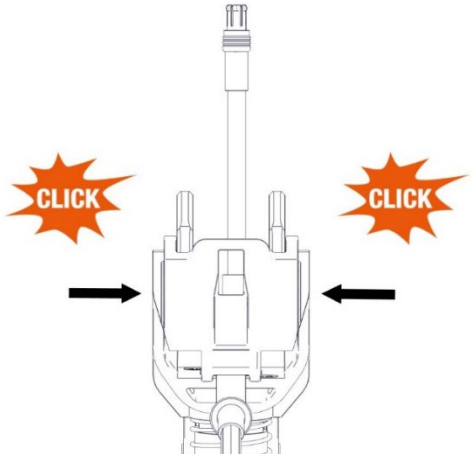


Fig. 164: Balance clicks audibly

→ The balance springs must rest correctly on the bearing (see Fig. 165)

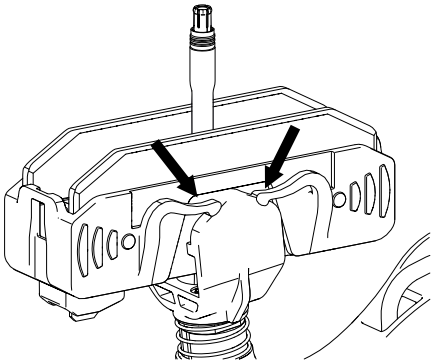


Fig. 165: Correct position of springs

→ Connect the collector housing, including the glued-in compression spring (1), to the data cable (2) (see Fig. 166).

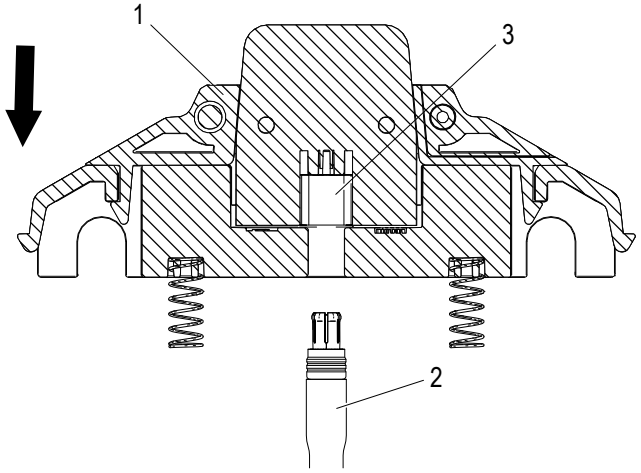


Fig. 166: Collector housing (1) is mounted on data cable (2)

→ The data cable connector (2) must audibly click into the circuit board connector (3) (see Fig. 167).

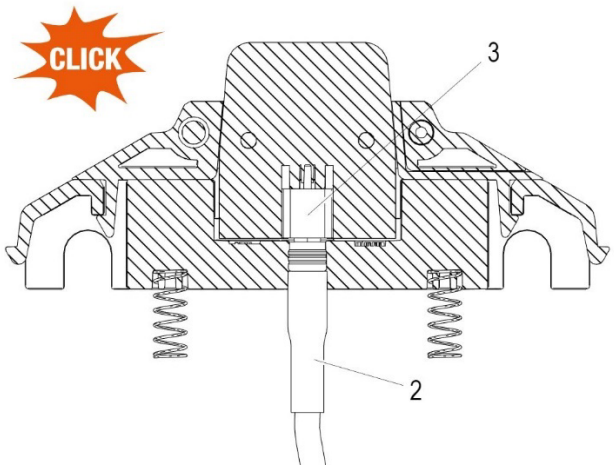


Fig. 167: Click in connector

→ Mount the collector housing (1) and balance (2). Carefully tighten the data cable (see Fig. 168).

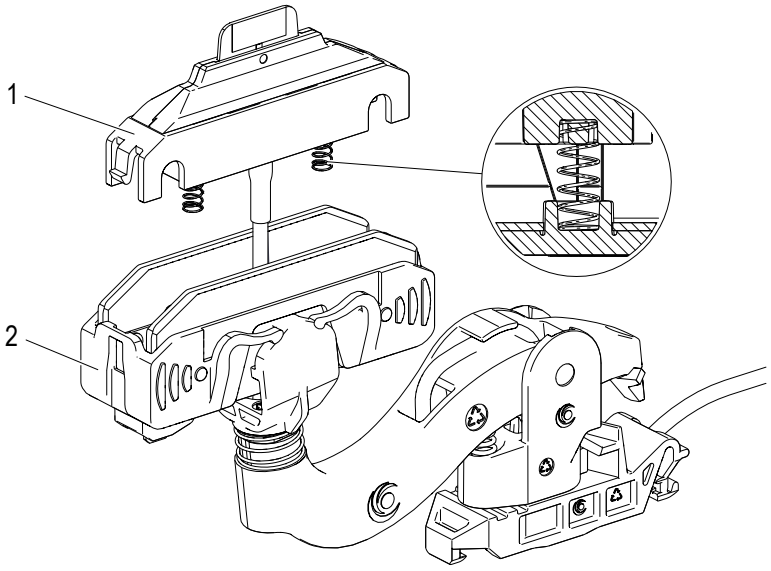


Fig. 168: Collector housing (1) is mounted on balance (2)

→ The collector housing must audibly click on both sides (see Fig. 170)

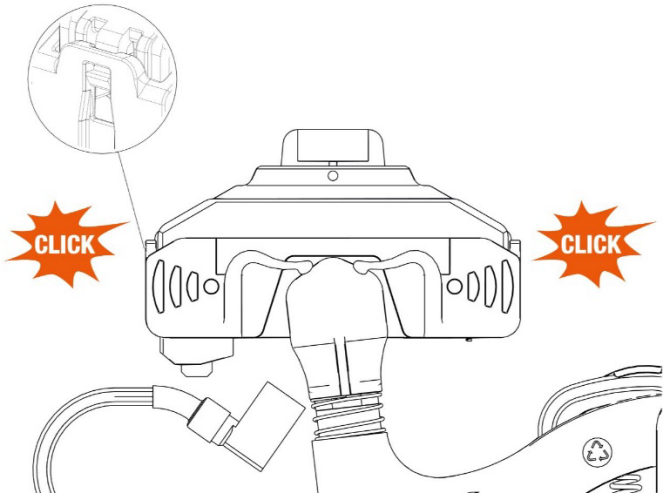


Fig. 169: Collector housing audibly clicks into place

→ Carry out the steps as shown on page 123.

8.2.4 Replacement of the collector head

Work steps:

→ Pull off the angled blade receptacle (1) of the PE cable (see Fig. 170).

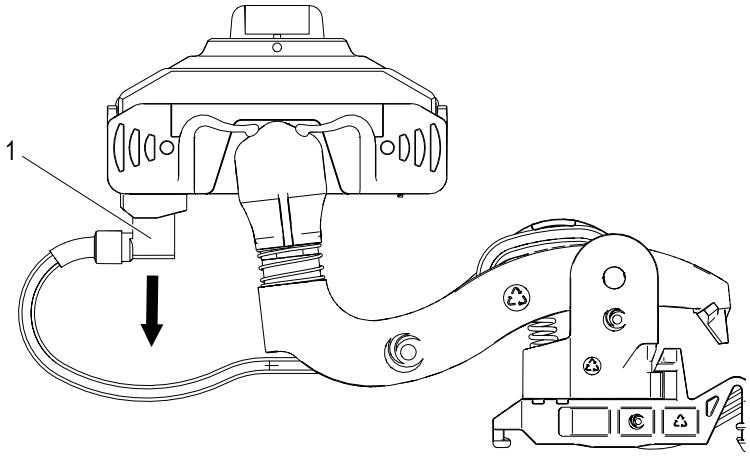


Fig. 170: Pull off angled blade receptacle

→ Pull the data cable so that the collector head can be better loosened from the joint (see Fig. 171 and Fig. 172).

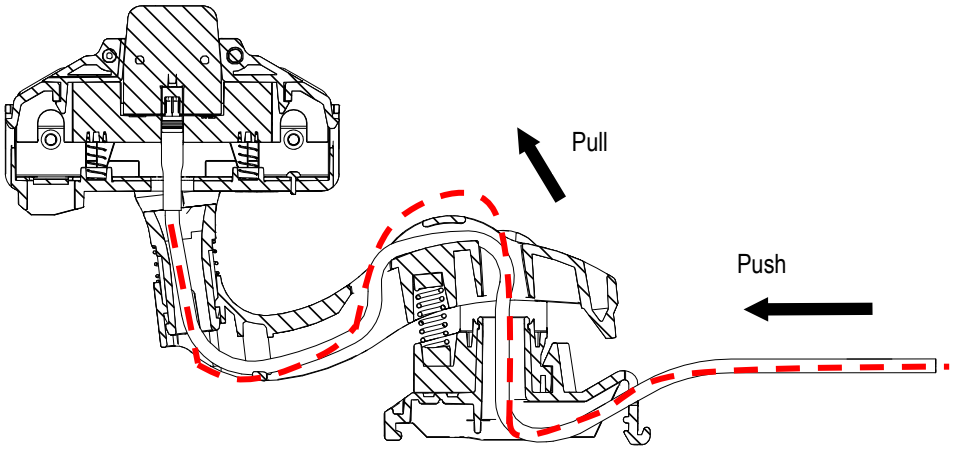


Fig. 171: Pull data cable (HF cable) (loop from above)

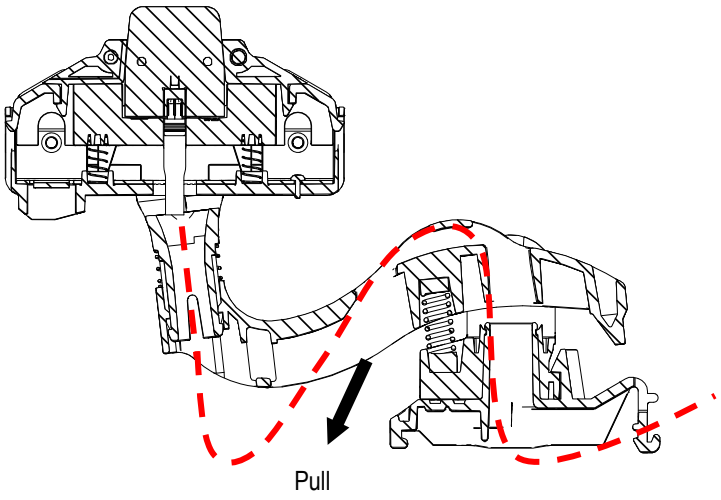


Fig. 172: Pull data cable (HF cable) (loop from below)

→ Using a flat-head screwdriver ≤ 3.0, carefully push a nose of the collector housing inward to disassemble the circuit board housing (see Fig. 173).

ATTENTION! **Springs can jump out!**

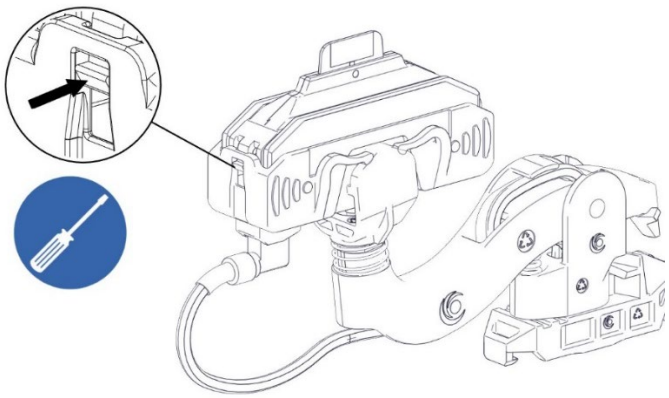


Fig. 173: Carefully press nose in collector housing inward with flat-head screwdriver

→ Disconnect the collector head (1) from the connector (2) of the data cable (HF cable) (3). The data cable (HF cable) must protrude approx. 80 mm from the joint (see Fig. 174).

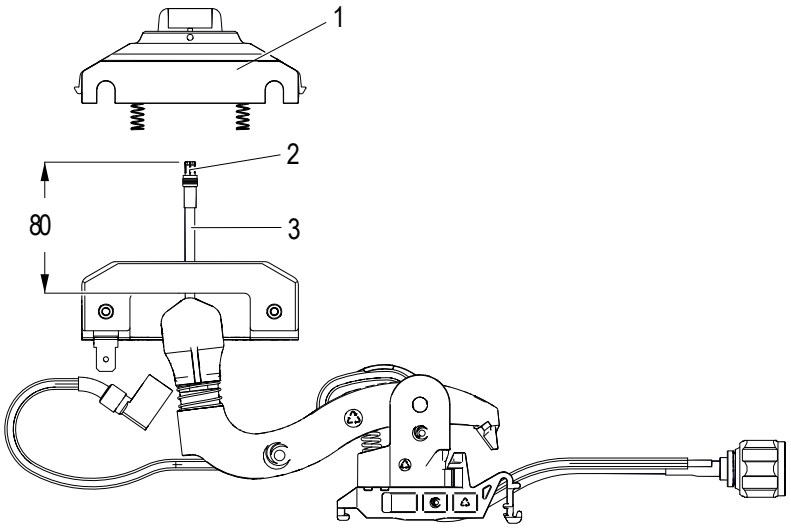


Fig. 174: Disconnect collector housing (1) from data cable (HF cable) (3)

→ Disassemble the balance (1) from the joint (2) (see Fig. 175 and Fig. 176). If necessary, use a flat-head screwdriver ≤ 3.0.

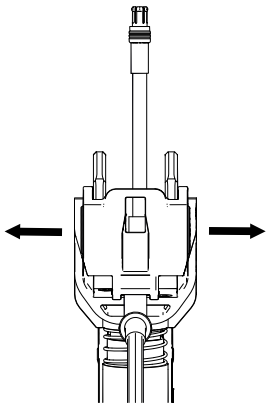


Fig. 175: Disassemble balance from joint

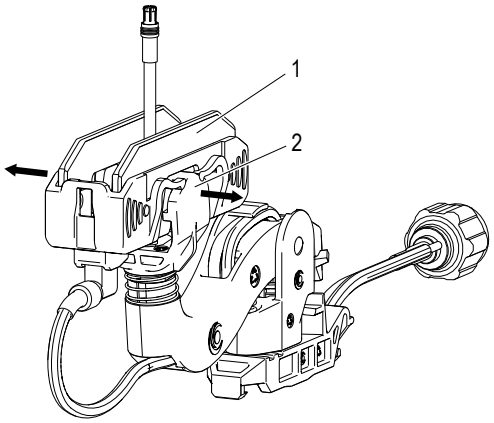


Fig. 176: Balance incl. sliding contact (1) and joint (2)

→ Mount new balance incl. sliding contact (1) on the joint of the collector arm (2) (see Fig. 177)

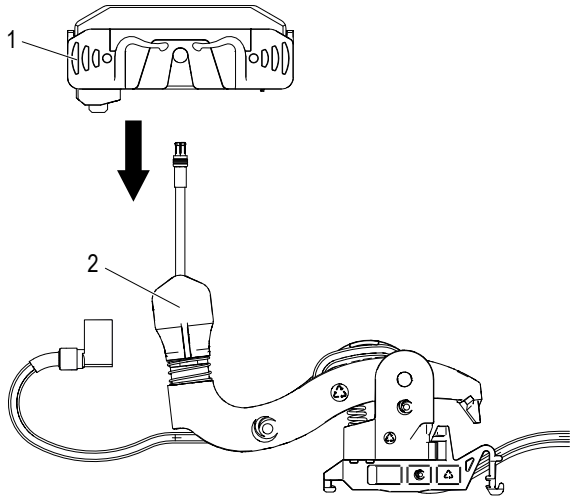


Fig. 177: Balance incl. sliding contact (1) is mounted

→ The balance must audibly click twice over the lateral bolts (see Fig. 178).

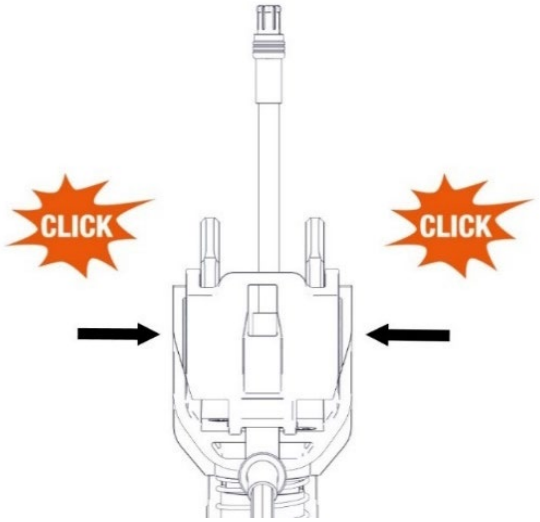


Fig. 178: Balance clicks audibly

→ The balance springs must rest correctly on the bearing (see Fig. 179)

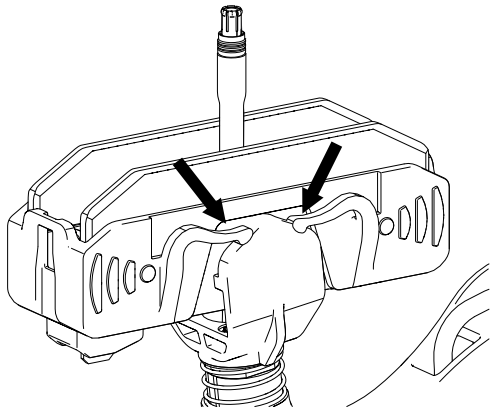


Fig. 179: Correct position of springs

→ Connect the collector housing, including the glued-in compression spring (1), to the data cable (2) (see Fig. 180).

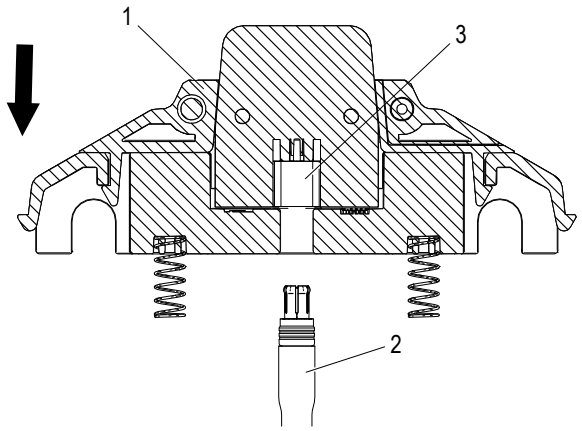


Fig. 180: Collector housing (1) is mounted on data cable (2)

→ The data cable connector (2) must audibly click into the circuit board connector (3) (see Fig. 181).

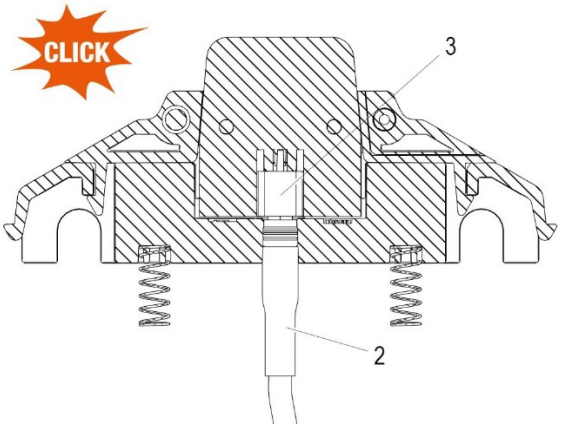


Fig. 181: Click in connector

→ Mount the collector housing (1) and balance (2). Carefully tighten the data cable (see Fig. 182).

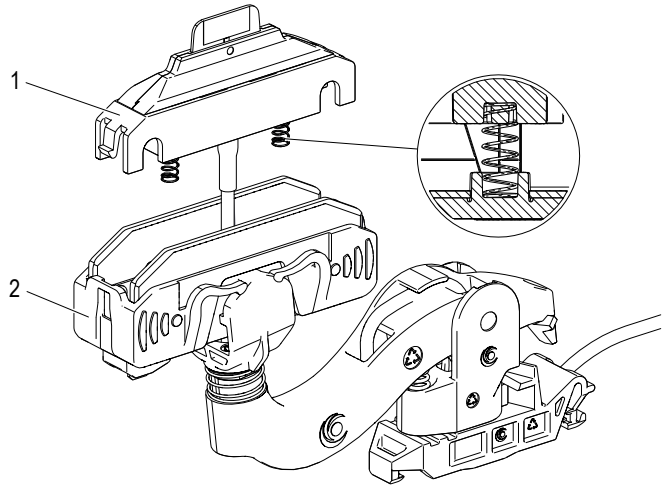


Fig. 182: Collector housing (1) is mounted on balance (2)

→ The collector housing must audibly click on both sides (see Fig. 183).

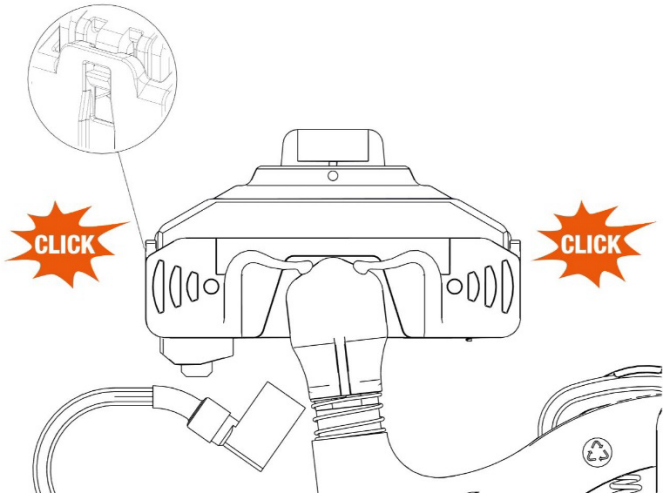


Fig. 183: Audibly click in collector housing

→ Pull the data cable (HF cable) back through (see Fig. 184).

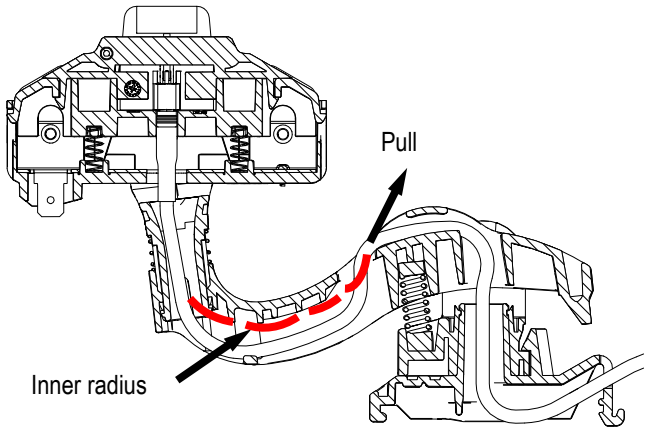


Fig. 184: Pull data cable back through (HF cable)

ATTENTION!

The data cable (HF cable) must rest on the inner radius after being pulled back through!

→ Check the ease of movement of the collector housing (1) (see Fig. 185).

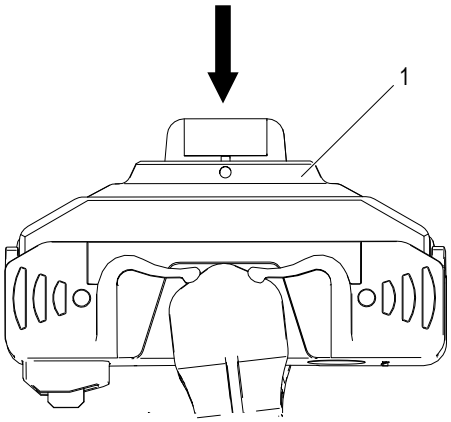


Fig. 185: Check collector housing ease of movement

ATTENTION!

The data cable (HF cable) must not apply any force on the cover from below!

→ Check the length of the PE cable (x = 120 mm) (see Fig. 186).

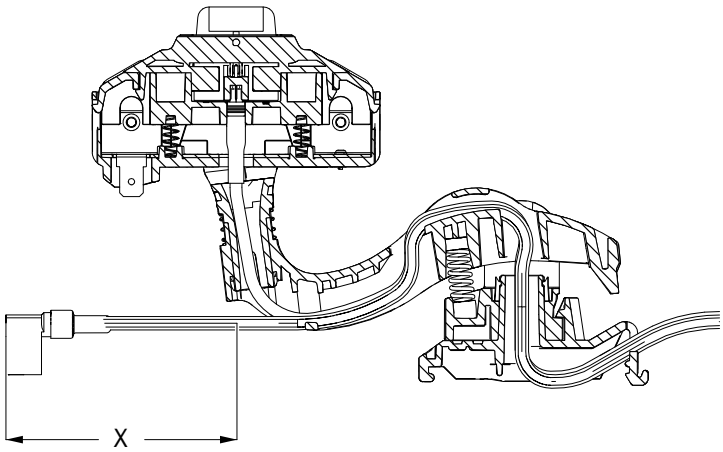


Fig. 186: Check length x

ATTENTION!

The angled blade receptacle must be facing down after pulling back through. It must not twist!

→ Attach the angled blade receptacle (see Fig. 187).

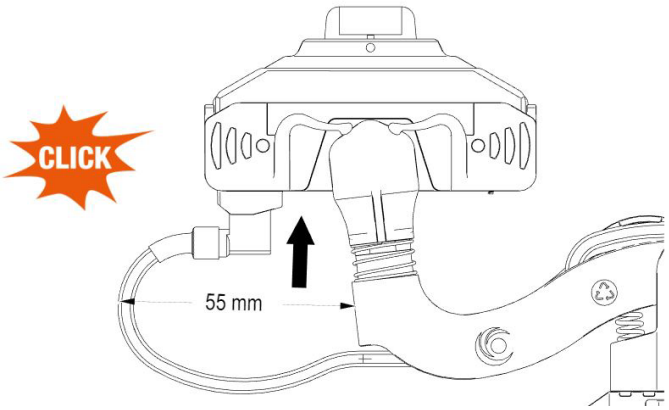


Fig. 187: Attach angled blade receptacle

ATTENTION!

After mounting the angled blade receptacle, the collector head must not be pushed upward or pulled downward by the PE cable.

→ Move the collector head back and forth (see Fig. 188).

→ Check the 4 plastic springs (1):

- → Are all 4 plastic springs (1) available?
- → Is the geometry of the plastic springs (1) completely filled with plastic?
- → Are all 4 plastic springs (1) in contact with the joint (2) and do the plastic springs (1) not have an oblique position?

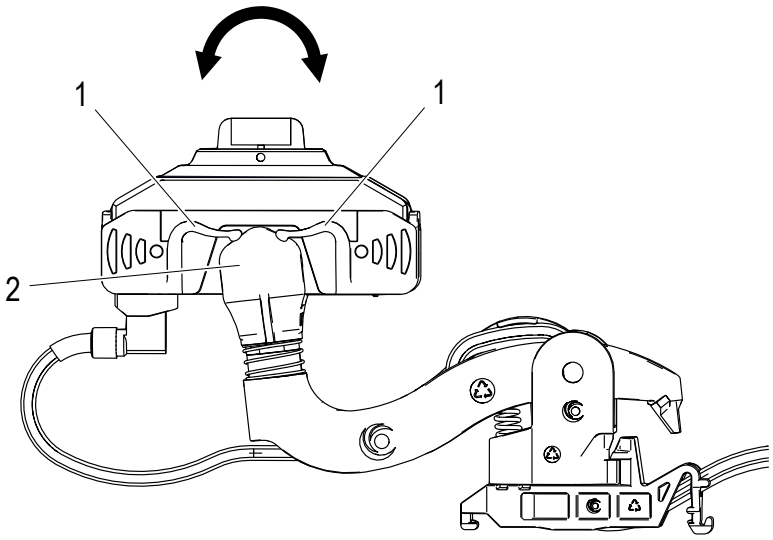


Fig. 188: Move collector head back and forth

ATTENTION!

The PE cable must not be bent or compressed!

→ Simulate ease of movement of the antenna in the installed state.

→ Retract the balance (1) back to mechanical stop and hold (see Fig. 189).

→ Check the ease of movement of the cover (2).

→ Press the cover (2) in so that it springs out again independently (see Fig. 189)

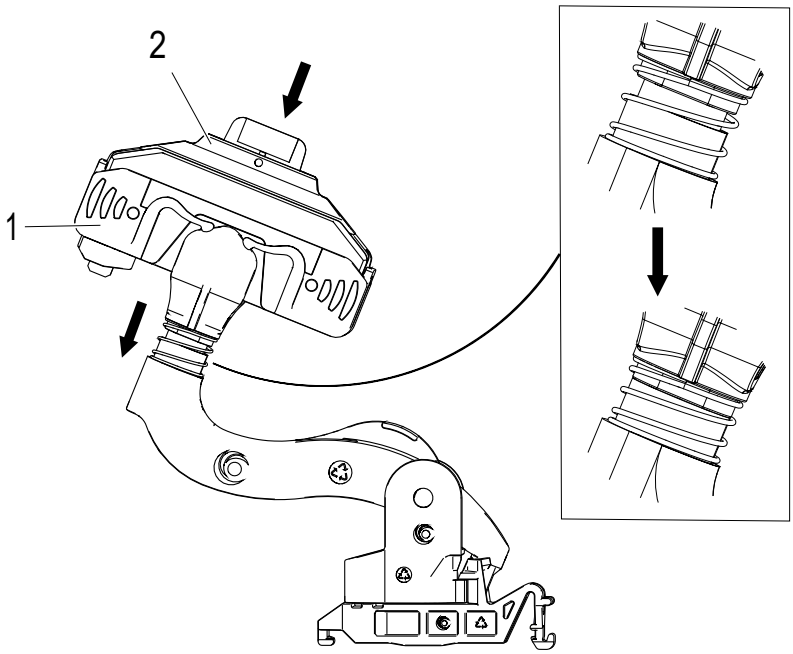


Fig. 189: Check collector head in installed state

ATTENTION!

The data cable (HF cable) must not apply any force on the cover from below!

8.3 Replacement of WLAN transceiver

If a WLAN transceiver needs to be replaced due to a defect, the following options are available:

1. Replace using the removable media (Key/C-plug)
2. Replace using the web interface

8.3.1 Replacement using the removable media (Key/C-plug)

Each WLAN transceiver is delivered with a removable media (Key or C-plug). This removable media contains the configuration of the WLAN transceiver and the firmware (depending on the settings).
In the event of a defect in the WLAN transceiver, it can be replaced with a new transceiver with little effort using the removable media.
The following steps are necessary for this:

1. Disconnect the old transceiver from the power supply.
2. Loosen the slot cover (2) by loosening the screw (1) and swivel the cover to the side.
3. Remove the connector.
4. Close the slot cover and screw it back into place.
5. Mount the removable media in the new, still unpowered transceiver in the same order.
6. Supply the new transceiver with power.

The new transceiver will then start up with the connector settings and carry out a firmware upgrade/downgrade if necessary.
Also see the manufacturer's operating instructions, Section 6.6 "Replace connector"

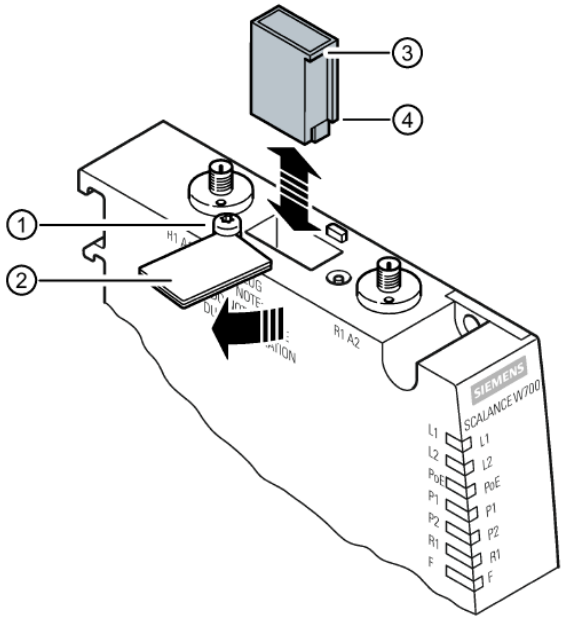


Fig. 190: Replace WLAN transceiver using removable media (Key/C-plug) (source: Siemens Operating Manual C79000-G8900-C325-15 page 62)

8.3.2 Replacement using the web interface

If there is no removable media or if it is defective, the configuration can also be transmitted using the web interface.
To do this, a backup ("Config" or "ConfigPack") and the firmware of the old transceiver must be available or these must be obtained by downloading from the old transceiver.
For uploading and downloading "Config", "ConfigPack" and firmware, see 9.3.2.

In order to reach a new transceiver via the web interface, it must first be assigned an IP address. This can be done via a DHCP server or via Siemens programming software (PRONETA, SINEC PNI, S7 manager, TIA portal).

1. Assign an IP address to the new transceiver.
2. Open the web interface and log in with the default access data (see manufacturer's operating instructions).
3. Load firmware, restart device.
4. Load ConfigPack, restart device.

The device can then be reached under the IP address and the "ConfigPack" access data.

9 Data Transmission Troubleshooting

WARNING!

Risk of injury due to improper fault correction!

Improper fault correction can result in serious injury to persons or material damage.

→ Contact the manufacturer in case of failures.

→ Only allow fault correction to be conducted by personnel from or authorized by the manufacturer.

ATTENTION!

In case of frequently occurring PROFINET faults:

→ Check the mechanical system.

Ensure that the data transfer rate to the ProfiDAT®*compact* system does not exceed the specified limit (see page 24).

Troubleshooting for the data transmission is possible using various approaches.

ATTENTION!

Observe the manufacturer's operating instructions!

The following sections provide a rough overview. They are not intended to replace the operating instructions and project planning documents of the transceiver manufacturer.

The troubleshooting procedure is significantly influenced by the system, so the troubleshooting approach must be selected on the basis of the individual system.

The primary tools for data transmission troubleshooting are integrated into the WLAN transceiver:

- Section "9.2 Diagnosis via the transceiver LED state"
- Section "9.3 Diagnosis via the transceiver web interface"

Secondarily, monitoring the data traffic at the protocol level can provide useful information about the source of the fault, e.g.:

- Which transmission protocol is disturbed?
- Is an individual vehicle disturbed or are several vehicles disturbed?
- Are there recurring patterns in which the disturbances occur, e.g. only at one of several WLAN access points?

For this, see Section 9.4 for a systematic approach in the event of a system disturbance.

Procedure for communication disturbances

1. If the fault is persistent:

   a) The fault only occurs in one vehicle (client) → carry out a vehicle-related troubleshooting.
   If the vehicle-related troubleshooting was not successful, the following components must be checked:
      - ProfiDAT®*compact* transceiver (primary diagnostic tool and non-potential fault source): Check client, use the diagnostic capability of the transceiver.
      - HF component (cabling, antenna) and equipotential bonding: Check between client and mobile antenna.
      - System layout: General check.
      - Ethernet connection: Check between client and communication device.
      - Communication device (PLC, …): Check data communication at the protocol level.

   b) The fault occurs in several or all vehicles (clients) on the same segment (AP) → carry out a route-related troubleshooting.
   If the route-related troubleshooting was not successful, the following components must be checked:
      - ProfiDAT®*compact* transceiver (primary diagnostic tool and non-potential fault source): Check access point, use the diagnostic capability of the transceiver.
      - ProfiDAT®*compact* data rail: General check.
      - HF components (cabling, antenna) and equipotential bonding: Check between access point and stationary antenna.
      - System layout: General check.
      - Ethernet connection: Check between access point and communication device.
      - Communication device (PLC, …): Check data communication at the protocol level.
      - Environment: General check.

   c) The fault occurs in several vehicles (clients) at different segments (access points) → carry out environment and analogue-related troubleshooting:
   If the environment and analogue-related troubleshooting was not successful, the following components must be checked:
      - ProfiDAT®*compact* transceiver (primary diagnostic tool and non-potential fault source): Use the diagnostic capability of the transceiver.
      - HF component (cabling, antenna) and equipotential bonding: General check.
      - System layout: General check.
      - Ethernet connection: General check.
      - Communication device (PLC, …): Check data communication at the protocol level.
      - Environment: General check.

   d) Combined faults from a) to c) occur → A narrowing down is not possible and the entire system must be checked.

2. If the fault is temporary (temporal, localized, random):

   a) The fault occurs at a specific position or area → Examine position or area.

   If the examination of a position or an area was unsuccessful, the following components must be checked:
   - ProfiDAT®*compact* transceiver (primary diagnostic tool and non-potential fault source): General check.
   - ProfiDAT®*compact* data rail: Check at position or area and between position and area and line feed.
   - System layout: General check.
   - Environment: General check.

   b) The fault occurs in a specific vehicle constellation → Examine particularities of vehicle constellation.

   If the examination of the vehicle constellation was not successful, the following components must be checked:
   - ProfiDAT®*compact* transceiver (primary diagnostic tool and not potential fault source): Particularly check in comparison to a functionally trouble-free vehicle constellation.
   - ProfiDAT®*compact* data rail: General check.
   - HF component (cabling, antenna) and equipotential bonding: General check.
   - System layout: General check.
   - Environment: General check.

   c) The fault occurs at a specific time → Check properties at this specific time more closely.

   If checking properties at this time was not successful, the following components must be checked:
   - ProfiDAT®*compact* transceiver (primary diagnostic tool and non-potential fault source): General check.
   - System layout: General check.
   - Environment: General check.

   d) The fault occurs randomly → A narrowing down is not possible and the entire system must be checked.

9.1 Fault sources

With reference to the systematic procedure in the event of a system disturbance, a selection of possible fault sources for the different areas is listed below.

9.1.1 ProfiDAT® transceiver

Hardware defects due to over voltage or mechanical damage to connections.

For a description of the diagnostic possibilities offered by the transceivers, see Sections 9.2 and 9.3.

9.1.2 ProfiDAT®*compact* rail

The following fault sources can lead to signal reflections, increased attenuation and increased ohmic resistance:

a) Soiling on the rail
b) Objects on the rail
c) Deformation of the geometry
d) Enlarged gaps at abutting edges
e) Poor contact with the connector

9.1.3 HF components (cabling, antenna) and equipotential bonding

a) HF connector
    a. Damaged by over-tightening (even without visible defects)
    b. Mechanically deformed (defective thread)
    c. Not tightened sufficiently
b) HF cable
    a. Bending radius too small
    b. Excess cable length incorrectly stowed
    c. Sheath damaged
c) Equipotential bonding cable
    a. Not laid directly next to HF cable
    b. Grounded at incorrect points
d) Mobile antenna
    a. Excessive wear of the sliding components
    b. HF cable not correctly engaged
    c. Incorrect position of the antenna in profile
    d. Antenna mechanically damaged (malfunction)
e) Stationary antenna
    a. HF cable incorrectly engaged
    b. Incorrect position of the antenna in profile
    c. Antenna mechanically damaged

9.1.4 System layout

Deviations from the project planning of the system layout can lead to malfunctions or completely prevent the successful commissioning:

a) Section and segment lengths
b) Access point positions
c) HF cable lengths
d) Installation sequence of HF components
e) Use of unsuitable HF components (not supplied by Conductix-Wampfler)

9.1.5 Ethernet cabling

a) Network connection faulty
b) Connected network devices faulty

9.1.6 Communication device

a) Communication parameter faulty
    a. Cycle time
    b. Packet repetitions
    c. Watchdog

See Section 9.4 for a description of the diagnostic options at the protocol level.

9.1.7 Environment

a) Disturbance due to parallel use of the same WLAN channels
b) Disturbance due to wire-bound EM interferences
c) Disturbance due to field-bound EM interferences

9.2 Diagnosis via the transceiver LED state

The first approach to diagnosing the transceivers without a computer is to evaluate the LED state on the transceiver itself. Essentially, the LEDs of all Siemens Scalance devices behave the same. As an example, an excerpt from the manual of the device family W774/W734 (source: Scalance W774-1 / W734-1 Operating Instructions) is listed.

LED	Color	Meaning
L1	Off	Power supply L1 too low.
	Green	Power supply L1 is applied.
PoE	Off	The device is not supplied using PoE.
	Green	The device is supplied using PoE.
P1	Off	There is no connection over the Ethernet port P1.
	Green	There is a connection over the Ethernet port P1 (link).
	Flashing green and yellow	Data transfer over the Ethernet interface P1.

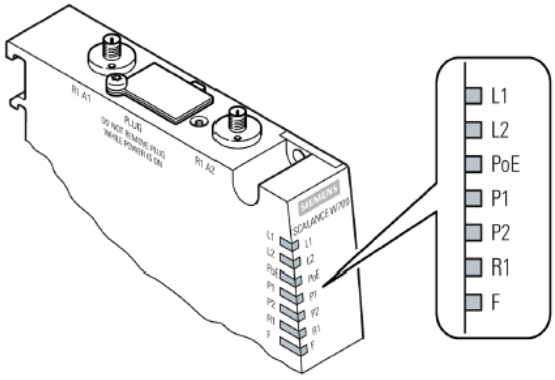


Fig. 191: Transceiver LED state (Source: Scalance W774-1 / W734-1 Operating Instructions)

R1	Off □	The WLAN interface 1 is deactivated.
	Green ■	*Access point mode:* The WLAN interface 1 is initialized and ready for operation. *Client mode:* There is a connection over the WLAN interface 1.
	Flashing green and yellow ☼	Data transfer via the WLAN interface 1.
	Flashing yellow ☼	*Client mode:* The client is searching for a connection to an access point.
	Flashing yellow ☼ Interval: 100 ms on / 100 ms off	*Access point mode:* With DFS (802.11h), the channel is scanned for one minute for competing radar signals before the channel can be used for data traffic. *Client mode:* The client waits for the MAC address due to the setting "Automatic" for the "MAC mode" parameter and is not connected to an access point.
	Flashing yellow and green ☼ Interval: 3x (100 ms on / 100 ms off) 1x 1000 ms on	*Client mode:* The client waits for the MAC address due to the setting "Automatic" for the "MAC mode" parameter and is connected to an access point.
F	Off □	No fault/error.
	Red ■	The device is starting up or an error has occurred.
	Flashing red ☼ Interval: 500 ms on / 500 ms off	The bootloader waits in this state for a new firmware file that you can download by TFTP.
	Flashing red ☼ Interval: 2000 ms on / 200 ms off	Firmware on PLUG: The device is performing a firmware update or downgrade.
	Red ☼ Simultaneous R1 yellow flashing ☼	A competing radar signal was found on all enabled channels.
P1 P2 R1	Flashing yellow ☼	The port LEDs flash for detection of device location. The "LED flash" function is • Either with SINEC PNI • Or via the WBM page "Discovery and Set via DCP"

Fig. 192: Transceiver LED state (Source: Scalance W774-1 / W734-1 Operating Instructions)

The following basic functions can be checked based on the LEDs:

- Power supply
- Network connection
- Wi-Fi connection
- Fault state

9.2.1 Power supply

If the LED "L1" does not light up green, the power supply is too low or not available.
Corrective steps:

1. Check the correct seating of the power supply connector on the transceiver.
2. Measure the voltage on the power supply connector on the transceiver and compare it with the input range of the transceiver (see Section 3.3).
3. If the existing voltage is too low, correct the cause of the power supply that is too low.
4. If, despite the correct existing power supply, the LED "L1" does not light up green and there is no function, the device must be replaced.

9.2.2 Network connection

If LEDs “P1” or “P2” do not light up (depending on which Ethernet ports are used), there is no connection to another network device connected to it. The prerequisite for the function of the LED is that the power supply is correctly connected to the transceiver.
Corrective steps:

1. Check the correct seating of the Ethernet connector, replace if defective.
2. Check the correct seating of the Ethernet connector and power supply on the other network device, replace if defective.
3. Check Ethernet cable, replace if defective.
4. Test the Ethernet port of the transceiver with another network device and another Ethernet cable.
5. If the Ethernet port on the transceiver remains as a fault source, replace it.

9.2.3 Wi-Fi connection

If the LED "R1" is switched off, the WLAN interface is deactivated by the software. The WLAN interface must always be activated.
The function of the LED "R1" differs between the access point and client when turned on.
If the LED "R1" on the client flashes yellow, it is not connected to an access point (no communication via ProfiDAT®!).
The LED "R1" on the client and access point must always be lit green or flicker green/yellow.

9.2.4 Fault states

If the LED "F" lights up red, an internal, device-specific fault has been detected. This must be read out and corrected via the web interface. See Section 9.3.5.

9.3 Diagnosis via the transceiver web interface

Additional diagnostic tools are accessible via the web interface.

To access the web interface, the following steps are necessary:

1. Set the IP address of the laptop to the same subnetwork of the transceiver (see project-specific documentation).
2. Connect the laptop to the transceiver (via Ethernet, directly or via the devices connected to the WLAN).
3. Open a suitable web browser. See compatibility list within the transceiver manufacturer's operating instructions.
4. Access the web interface of the transceiver via the IP address.
5. Log in with the login data (see project-specific documentation).

ATTENTION!

In case of malfunctions in the web interface (frozen progress bars, fault messages from the interface) use different browsers or incognito mode!

Experience has shown that Microsoft Internet Explorer works most reliably.

9.3.1 Functional limitations of the web interface

- Browser changes in the case of functional problems in the web interface.
  If unforeseen behavior occurs in the web browser, it may help to change the browser.
- Firmware loading bar/ ConfigPack no progress.
  With firmware 6.5.1: If a file is loaded into the WBM (Web-based Management: The configuration and diagnostic interface of the WLAN devices, which can be accessed via a web browser), it may be that the transmission initially fails, but the file is still transmitted and applied.
  Whether the new firmware was actually loaded can be checked in the "Information" -> "Versions" menu in the "Firmware" line. The previously loaded firmware version must be listed here.
  Note: The line "Firmware running" represents the currently executed firmware version.
- Software limitations:
  Siemens programs such as Proneta or SinecPNI use SNMP to query transceiver properties such as serial number, firmware, hardware state and device names. If the SNMP interface of the transceivers is actively used, user-defined access data is assigned that prevents this query. However, an attempted query of these tools is classified as "Incorrect login" and therefore, after 10 failed attempts, the IP address is blocked for 60 minutes, i.e. the login is rejected with the message "Username/Password incorrect". A device restart corrects the problem.

9.3.2 Uploading and downloading files

Under "System" -> "Load&Save", files can be exchanged with the transceiver via the web interface.
To do this, click on "Load" in the respective line to upload the file and "Save" to download it.

The following files are relevant:

File type	Description
ConfigPack	Configuration of the device (complete backup of settings).
Debug	File type for manufacturer support. Contains all other information (only visible to the manufacturer).
Firmware	Currently running firmware / update
LogFile	Event Log (device)
WLANAuthLog	Authentication Log (WLAN)
WLANSigRec	Signal recorder (client only)

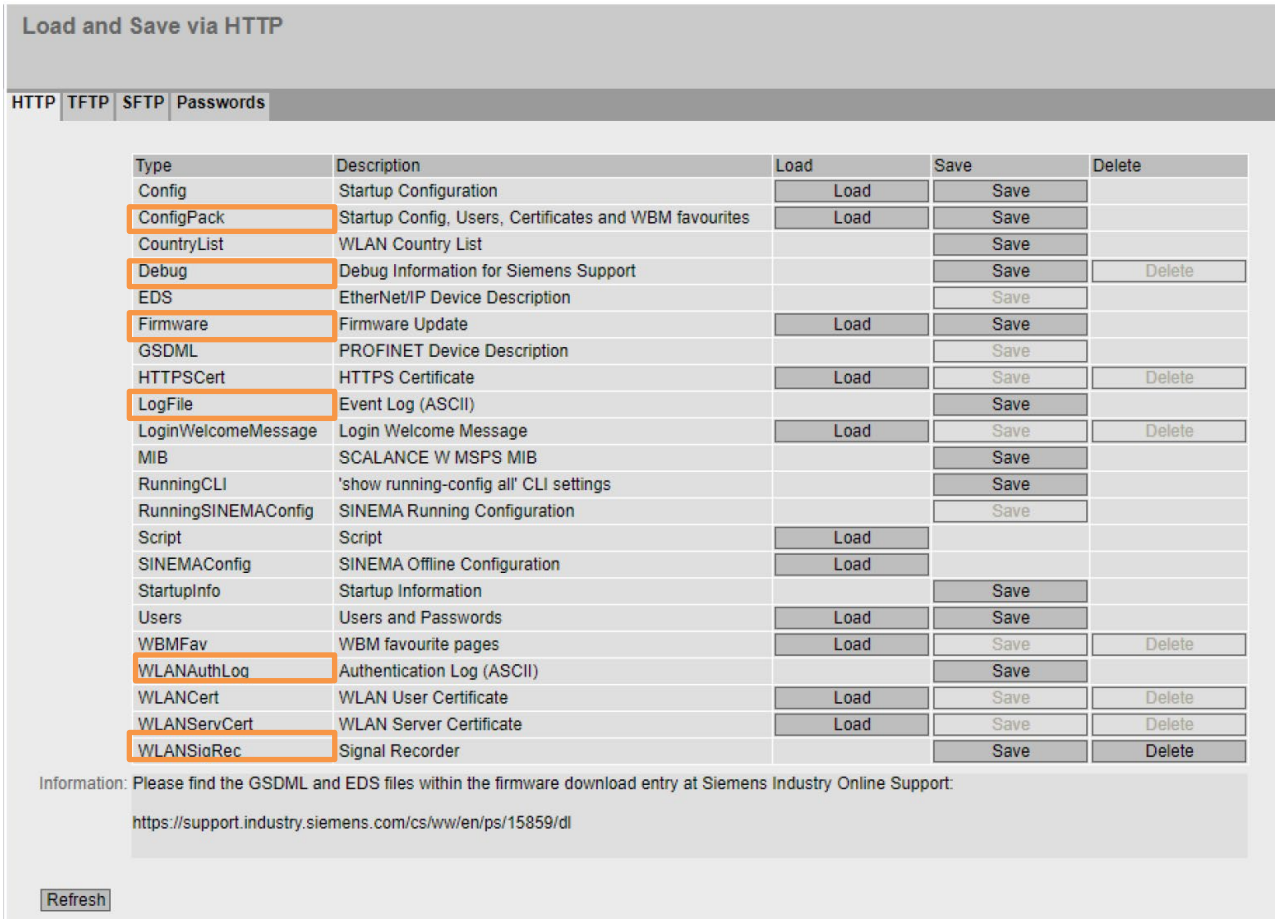


Fig. 193: Uploading and downloading files

9.3.3 Accessing and interpreting the Event Log (device)

In addition to downloading the Event Log, it can also be viewed on the website.
To do this, the menu "Information" -> "Log Table" -> "Event Log" must be accessed.
The number of log entries is limited, entries of lower severity (Info, Warning) are overwritten by entries of higher severity (Warning, Critical) when the maximum number of log entries is reached.
The content of the entries is displayed in plain text:

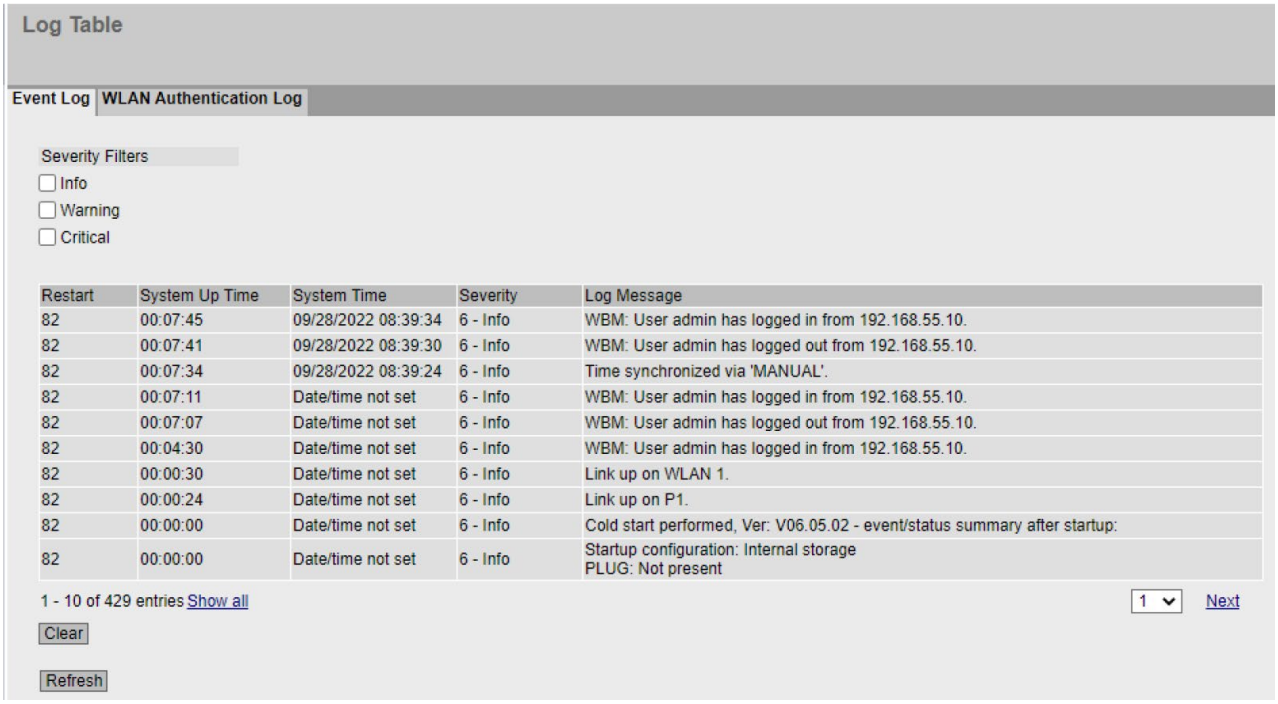


Fig. 194: Accessing and interpreting Event Log (device)

9.3.4 Accessing and interpreting the Authentication Log (WLAN)

In addition to downloading the Authentication Log, it can also be viewed on the website.
To do this, the menu "Information" -> "Log Table" -> "WLAN Authentication Log" must be accessed.
The number of log entries is limited, entries of lower severity (Info, Warning) are overwritten by entries of higher severity (Warning, Critical) when the maximum number of log entries is reached.
The content of the entries is complex, more information can be found in the manufacturer's operating instructions (see Section 11.2 "Applicable documents").

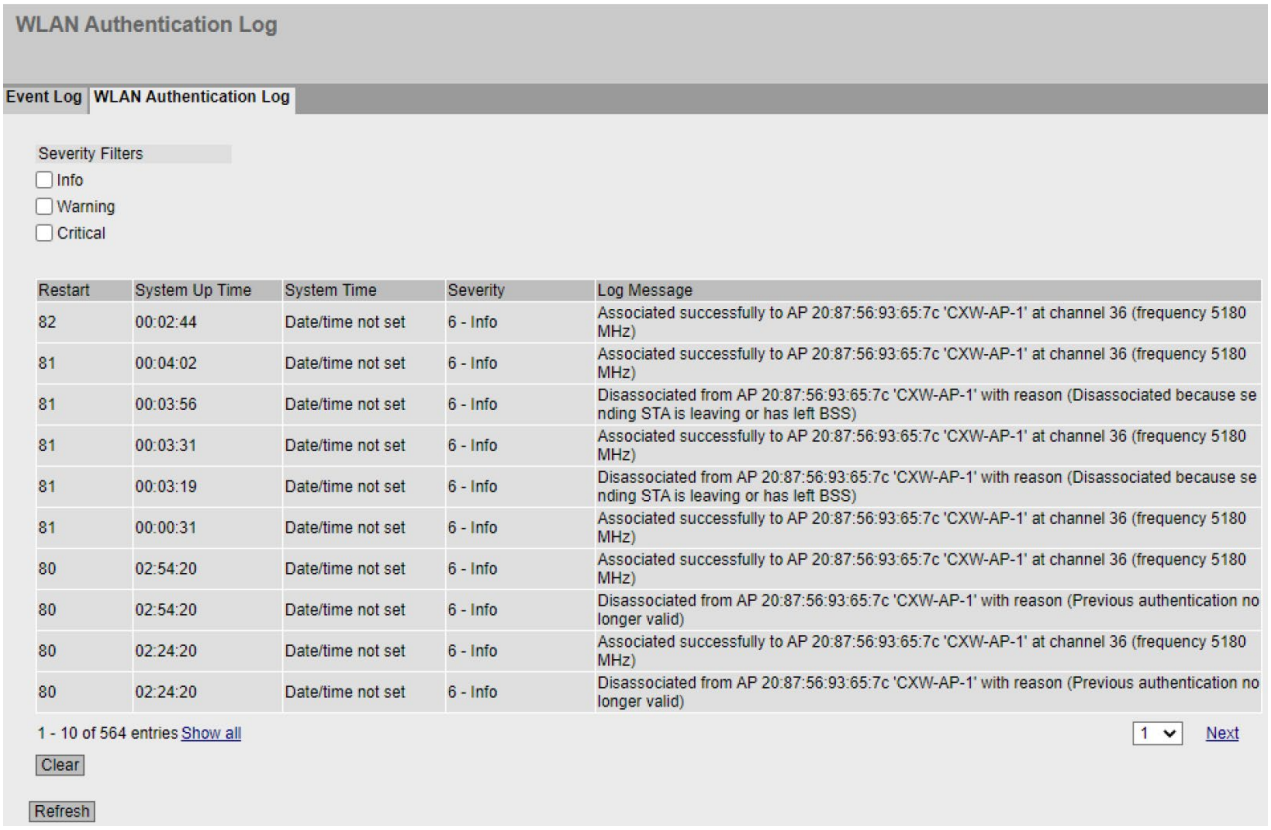


Fig. 195: Accessing and interpreting Authentication Log (WLAN)

9.3.5 Display of fault states

Faults are signaled by the red LED "F" and generate entries in the fault list. This is located in the menu "Information" -> "Faults". Faults are also entered in the "Event-Log".
The content of the entries is displayed in plain text. Eliminate the fault accordingly.

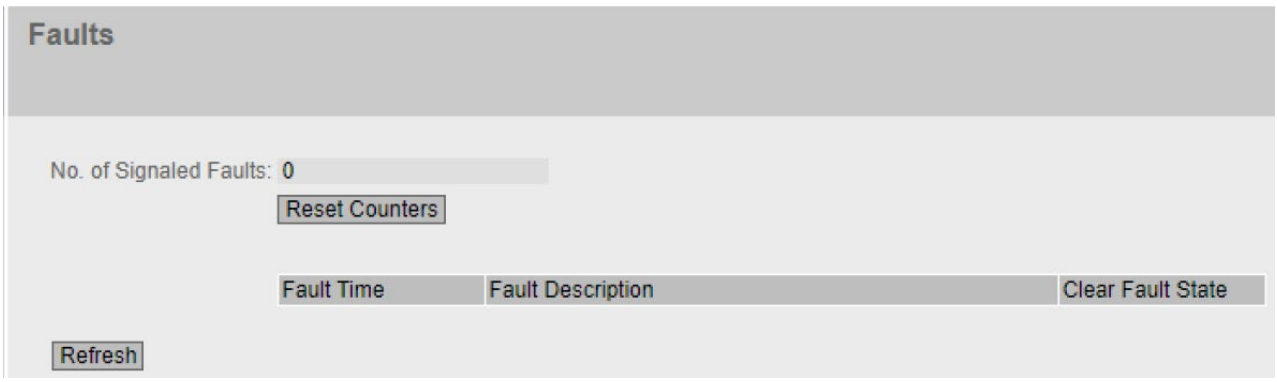


Fig. 196: Display of fault states

9.3.6 Power supply state

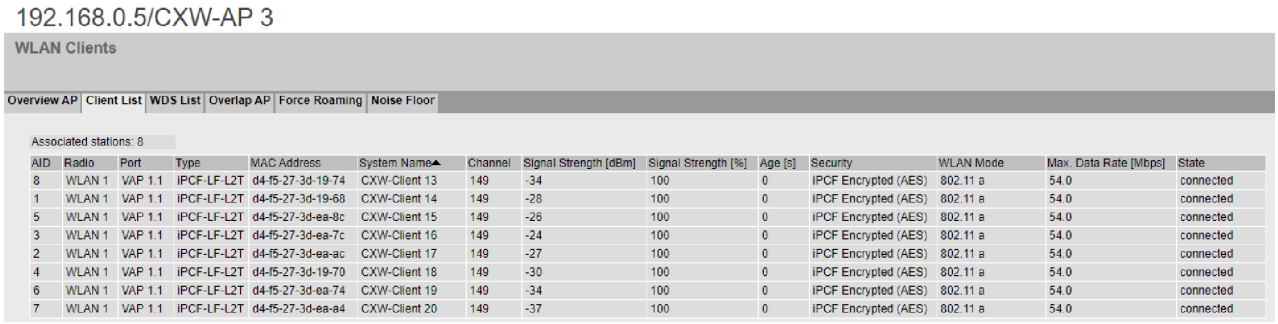
The power supply state is displayed in the menu "Information" -> "Start Page" in the lines "Power Line 1", "Power Line 2" and "Power over Ethernet".

9.3.7 Network connection state

The general state of the network interface can be viewed via the menu "Interfaces -> Ethernet -> Overview".
In addition, the Ethernet interface states can be observed over time in the Event Log.
Through this, for example, sporadic interruptions of the network connections can be observed.

9.3.8 AP: View associated clients

On the AP in the menu "Information -> WLAN -> Client List" all clients associated with the AP are listed.



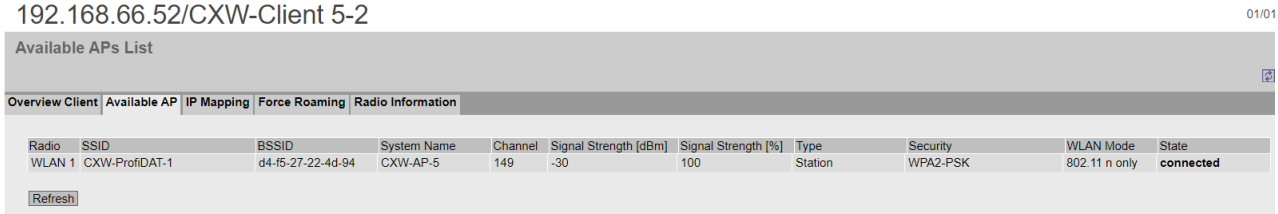
AID	Radio	Port	Type	MAC Address	System Name	Channel	Signal Strength [dBm]	Signal Strength [%]	Age [s]	Security	WLAN Mode	Max. Data Rate [Mbps]	State
8	WLAN 1	VAP 1.1	iPCF-LF-L2T	d4-f5-27-3d-19-74	CXW-Client 13	149	-34	100	0	iPCF Encrypted (AES)	802.11 a	54.0	connected
1	WLAN 1	VAP 1.1	iPCF-LF-L2T	d4-f5-27-3d-19-68	CXW-Client 14	149	-28	100	0	iPCF Encrypted (AES)	802.11 a	54.0	connected
5	WLAN 1	VAP 1.1	iPCF-LF-L2T	d4-f5-27-3d-ea-8c	CXW-Client 15	149	-26	100	0	iPCF Encrypted (AES)	802.11 a	54.0	connected
3	WLAN 1	VAP 1.1	iPCF-LF-L2T	d4-f5-27-3d-ea-7c	CXW-Client 16	149	-24	100	0	iPCF Encrypted (AES)	802.11 a	54.0	connected
2	WLAN 1	VAP 1.1	iPCF-LF-L2T	d4-f5-27-3d-ea-ac	CXW-Client 17	149	-27	100	0	iPCF Encrypted (AES)	802.11 a	54.0	connected
4	WLAN 1	VAP 1.1	iPCF-LF-L2T	d4-f5-27-3d-19-70	CXW-Client 18	149	-30	100	0	iPCF Encrypted (AES)	802.11 a	54.0	connected
6	WLAN 1	VAP 1.1	iPCF-LF-L2T	d4-f5-27-3d-ea-74	CXW-Client 19	149	-34	100	0	iPCF Encrypted (AES)	802.11 a	54.0	connected
7	WLAN 1	VAP 1.1	iPCF-LF-L2T	d4-f5-27-3d-ea-a4	CXW-Client 20	149	-37	100	0	iPCF Encrypted (AES)	802.11 a	54.0	connected

Fig. 197: Display of associated clients

This can be used to obtain information about the quality of the connection ("Signal Strength [dBm]"), the name of the client ("System Name"), the WLAN channel ("Channel") and the WLAN data rate ("Max. Data Rate [Mbps]").
If a client is clearly located the segment of the AP considered (see project-specific documentation) and is not listed here, it either has no connection for various reasons or is incorrectly connected to another AP.

9.3.9 Client: Available access points

All APs currently available for the client are listed on Client in the menu "Information -> WLAN -> Available AP". If the client is connected to one of these, this is noted in the "State" column.



Radio	SSID	BSSID	System Name	Channel	Signal Strength [dBm]	Signal Strength [%]	Type	Security	WLAN Mode	State
WLAN 1	CXW-ProfiDAT-1	d4-f5-27-22-4d-94	CXW-AP-5	149	-30	100	Station	WPA2-PSK	802.11 n only	**connected**

Refresh

Fig. 198: Available access points

This can be used to obtain information about the quality of the connection ("Signal Strength [dBm]"), the name of the AP ("System Name") and the WLAN channel ("Channel").
The range of the expected signal strength depends on the system layout, but should not drop below -70dBm and not rise above -20dBm.
If no compatible AP is listed, the AP assigned according to layout as well as the HF segment (HF cables, conductor rail) between the client considered and the AP must be checked. Either the attenuation is too high (wrong or defective components installed) and the AP cannot be received, or there is a fault on the AP itself.

9.3.10 Client: Display reception power of all antennas

If the client uses 2 mobile antennas, the signal strength of the individual antennas can be read in the menu "Information" -> "WLAN" – > "Radio Information".
The line with the "BSSID" of the AP must be read for this. The "BSSID" of the AP can be read in the menu "Available AP" and corresponds to the line with the "Connected" status.

If both mobile antennas are in the same ProfiDAT®*compact* segment, the measured value must be nearly identical (maximum deviation 3dB).
If the deviation is significantly greater, a defect may be present in the following assemblies:

- Mobile antenna with the weaker signal level
- Mobile antenna of the HF cable with the weaker signal level
- HF connector on the transceiver to which the mobile antenna with the weaker signal level is connected

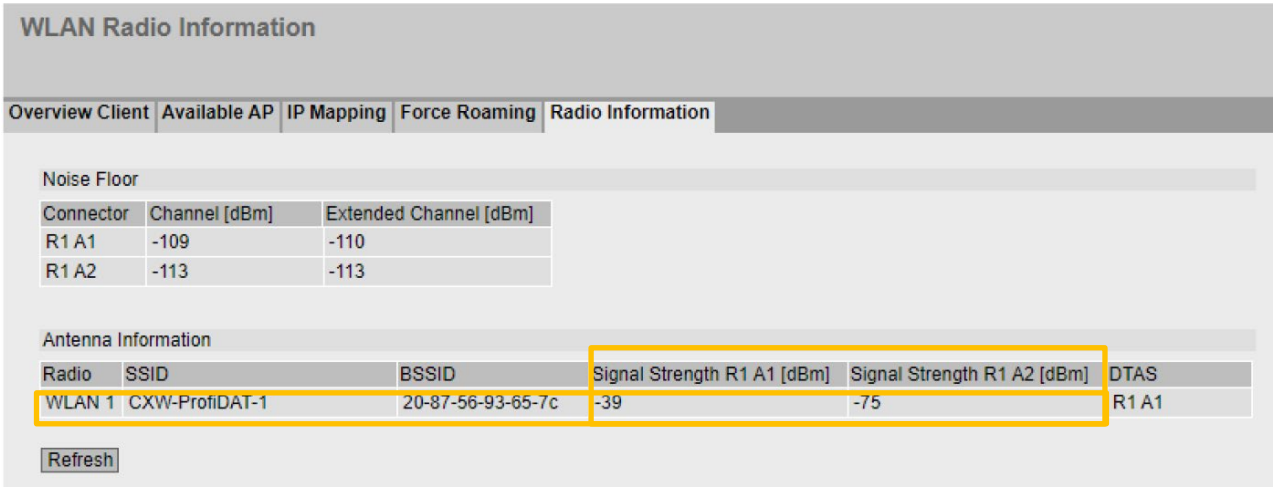


Fig. 199: WLAN radio information

9.3.11 Client: Carry out signal scan

Using the "Signal Record", the signal strength and other parameters can be recorded over time.
The "Signal Record" is located in the menu "Interfaces" -> "WLAN" -> "Signal Record" and is only accessible on the client.

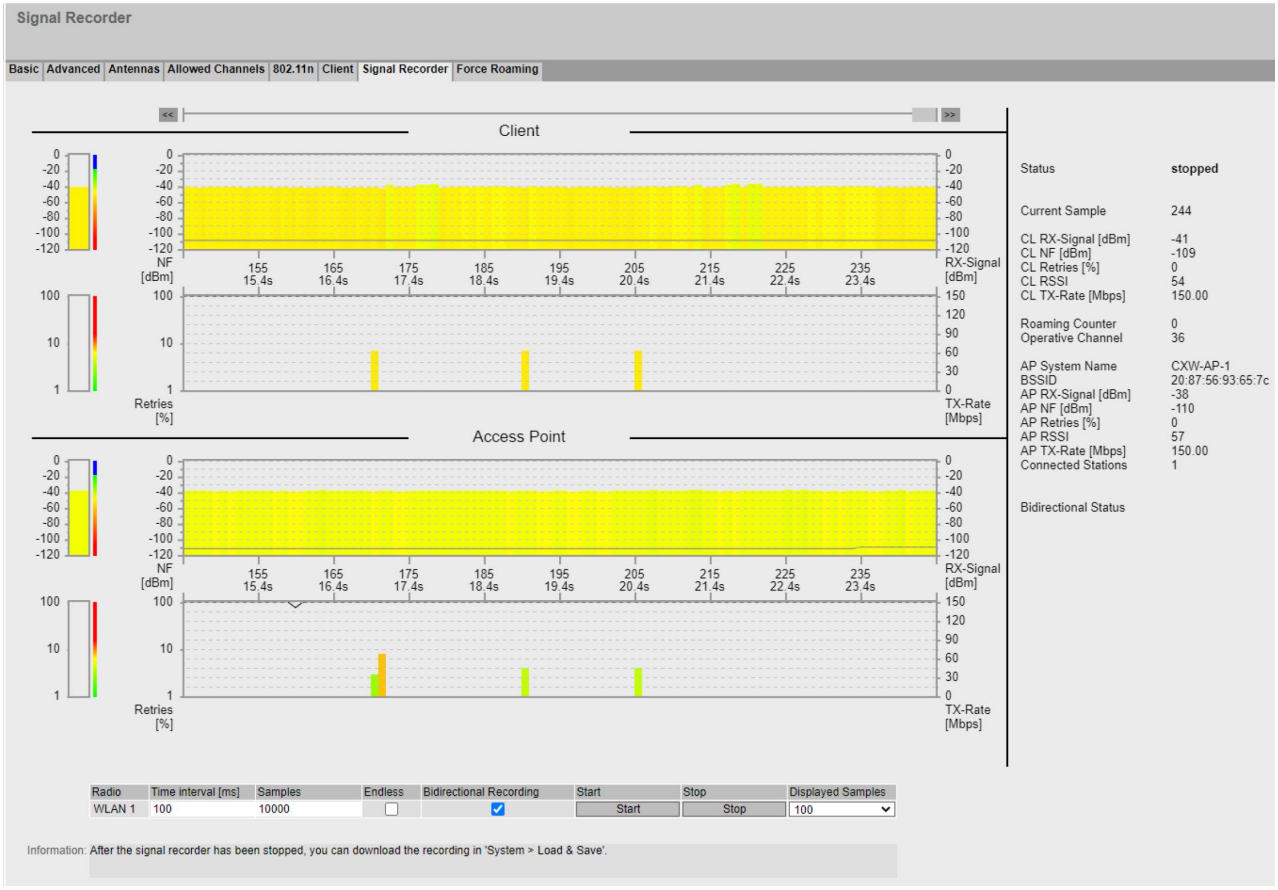


Fig. 200: Signal scan

The following variables are of particular interest for signal scanning:

- RX-Signal [dBm]: reception power, upper diagram for the WLAN client, lower diagram for the WLAN access point.
- TX rate [Mbps]: WLAN data rate.
- Retries [%]: Repeated packets during measurement interval (logarithmically scaled).
- Connected AP / roaming operations (vertical black lines labeled with the name and BSSID of the new APs).

Interpretation of the record:
Theoretical and practically measured signal strength unpredictably deviate from each other.
Determining the actual physical route quality is only possible with an HF spectrum analyzer.
Nevertheless, the signal scan of the WLAN device can give a rough impression of the attenuation values and route conditions.
Signal strength:
Maximum signal strength: Approx. -20dBm (Mobile antenna on AP line feed probe)
Minimum signal strength: Approx. -75dBm (depending on distance to the line feed probe, number of other antennas between the considered device and line feed probe, wear of sliding components, aging of the rail, type of transmission and lowest permissible transmission speed).

The attenuation values are calculated within the framework of technical feasibility in the so-called link budget. Deviations from these assumptions and the measurement inaccuracy of the WLAN devices can lead to a deviation of the measured values from this theoretical link budget.
If the route set up corresponds to the plans and the received power nevertheless deviates from the specification, this can have multiple causes:

- HF components defective (e.g. cables or connector damaged during mounting).
- Route attenuation too high (detailed test with HF spectrum analyzer possible).
- WLAN chip in the WLAN device damaged due to excessive power.
- Transmission power incorrectly set.
- …

Roaming behavior:
The power received from the old AP becomes significantly weaker (i.e., attenuation is significantly greater) by travelling over the segment transfers. Signals with high attenuation in conjunction with increased retries must lead to a targeted roaming process. There should not be frequent switching between the different APs in the area of the segment transfer.

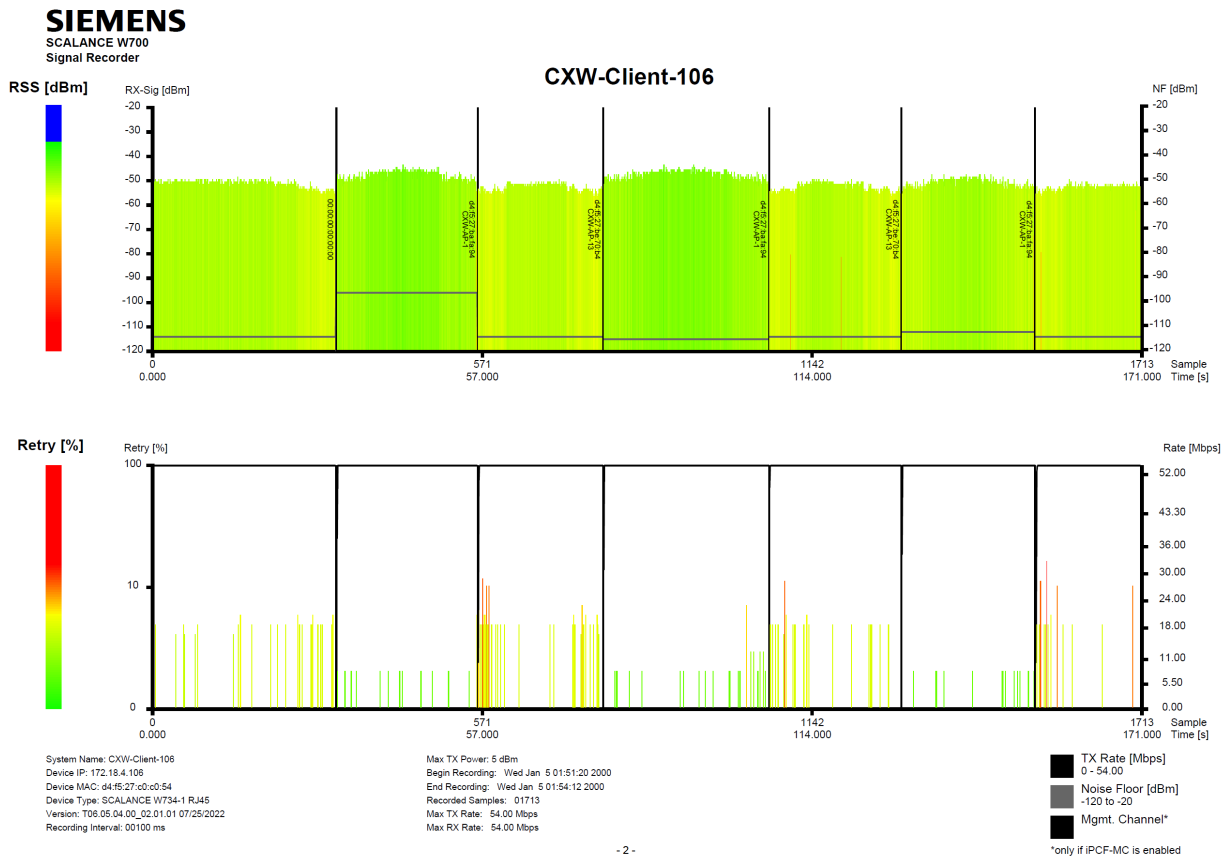


Fig. 201: Multiple crossing of same segment transfer with fault-free roaming operations (only single vertical black lines in transfer area)

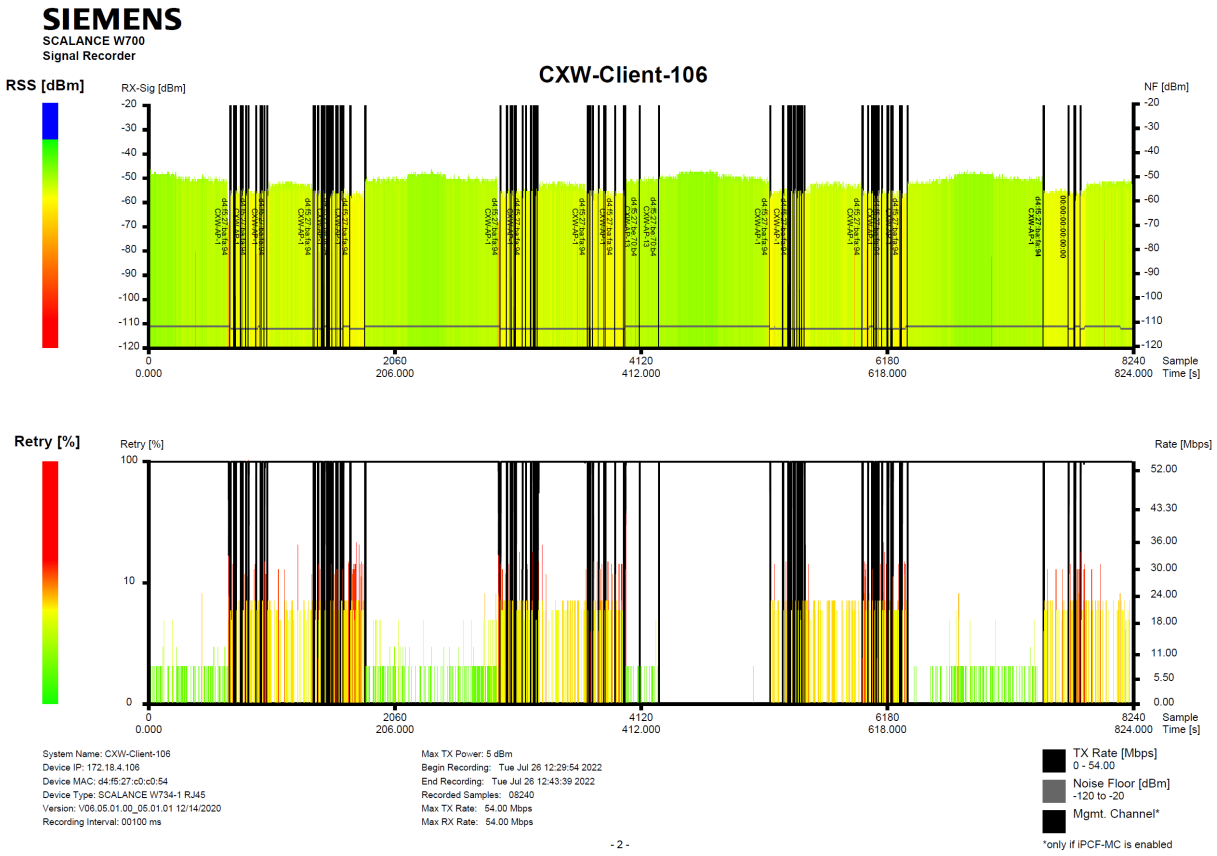


Fig. 202: Multiple crossing of same segment transfer with incorrect roaming processes (multiple vertical black lines in transfer area)

Retries and WLAN data rate:

Reflections and overlays can destroy WLAN packets, creating retries – repetitions of WLAN packets.

The figure in the diagram shows the percentage of retries in the measurement interval based on the (unknown) number of WLAN packets transmitted.

- Example 1: 100% retries in 100 ms; Assumption: 1 packet was transmitted. Meaning that 1 out of 1 packet has been repeated.
- Example 2: 10% retries in 100 ms; Assumption: 100 packets were transmitted. Meaning that 10 out of 100 packages have been repeated.

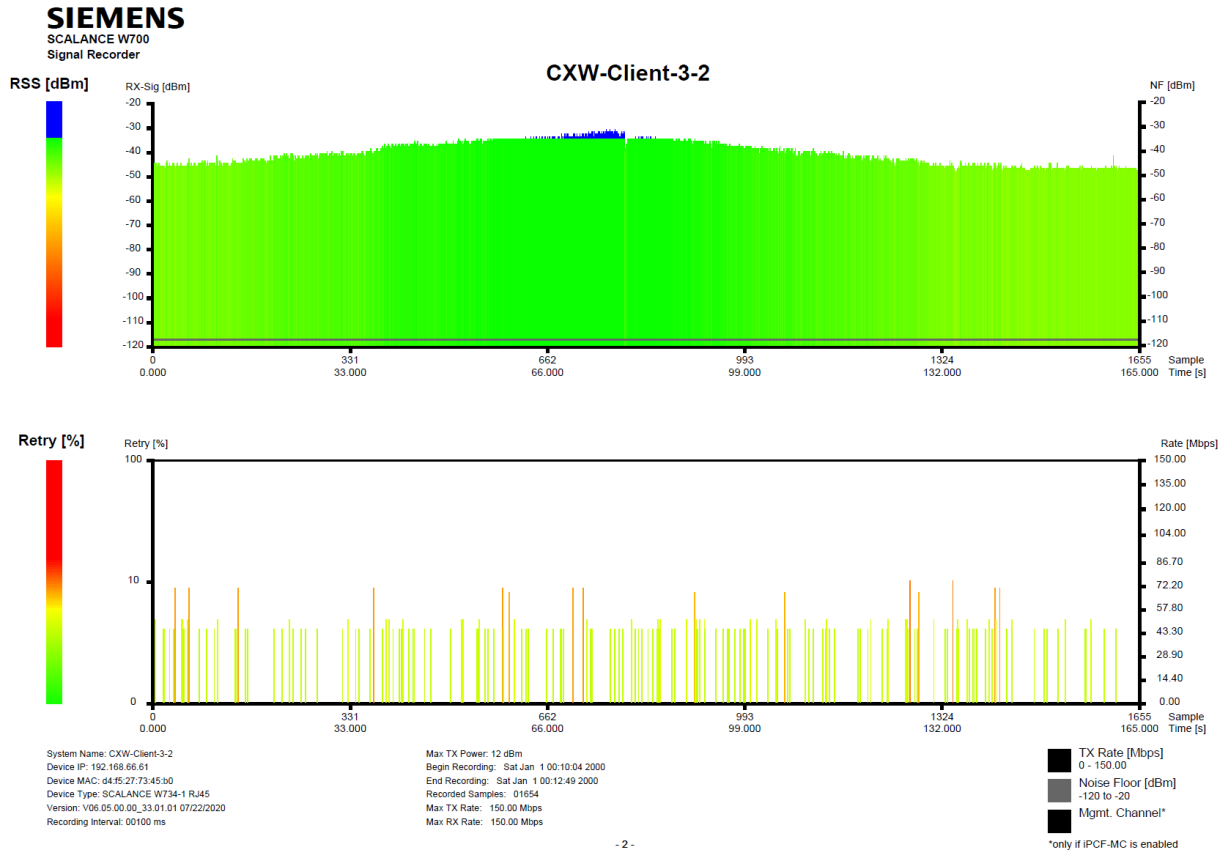


Fig. 203: Signal scan with low retry rate and constant WLAN data rate (150 Mbps)

If the data rate is not fixed (application-specific), it can drop under a data load and depend on the retries. This is normal behavior and should only be checked if:

- it is accompanied by a malfunction or
- the retries are permanently in the red range (>10%)

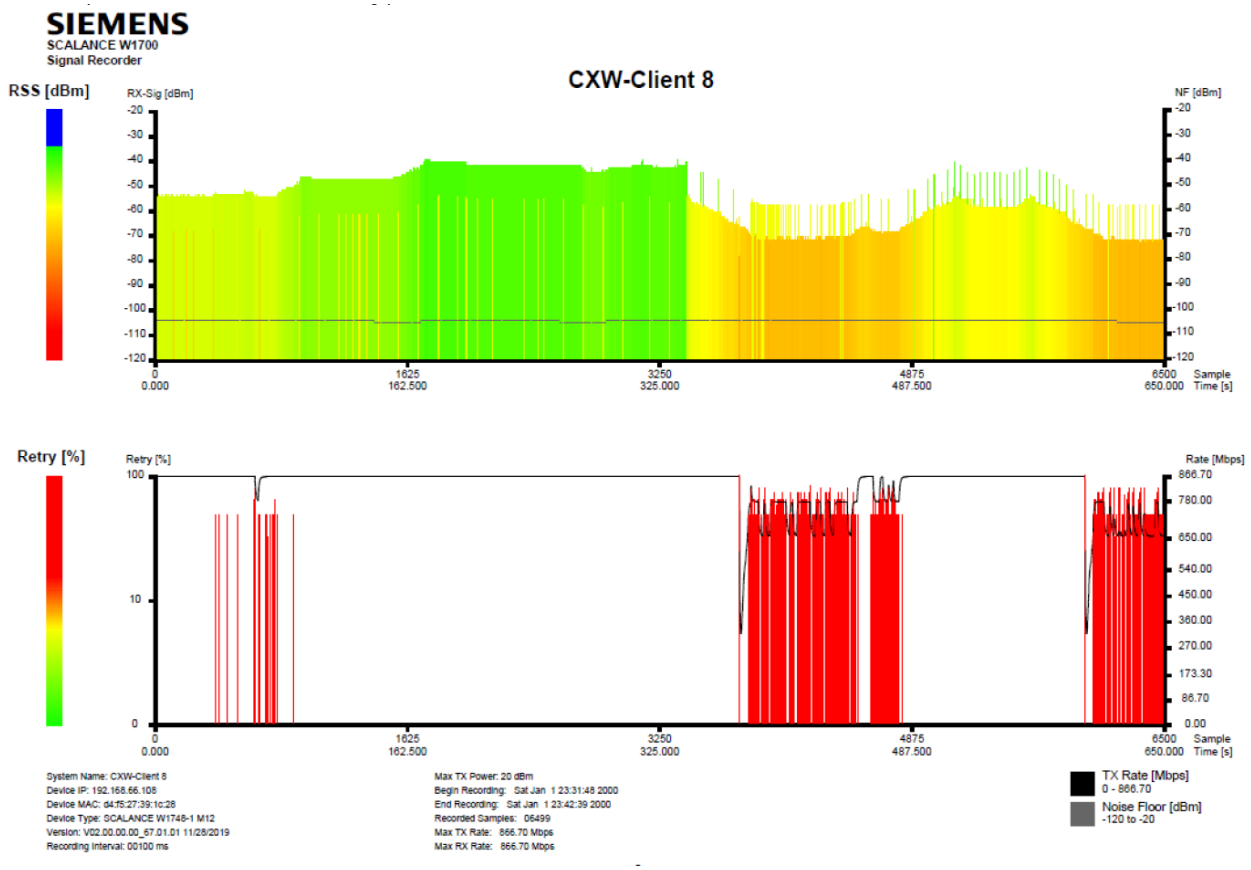


Fig. 204: Signal scan with too low signal strength, resulting in many retries and data rate drop

Settings parameters for recording:

To carry out the signal scan, various parameters can be specified at the bottom of the Signal Recorder screen. These are listed below with recommendations.

Parameters	Recommendation
Time Interval [ms]	Should be selected similar to the cycle time of the transmitted protocol, e.g. 64 ms Profinet cycle time -> 100ms Time Interval
Samples	Maximum recording capacity: 10,000 measurement points
Endless	Deactivated
Bidirectoinal Recording	Enabled (recording of the reception power at the AP)
Displayed Samples	As required

Saving and naming the recording:
Each generated signal scan should be documented with information on the route, time and, if necessary, configuration characteristics (see Section 9.3.2).

Note: Up to Firmware v6.5.0, the scaling of the displayed attenuation values in the signal scan is incorrect. The measured values are only correct when the file is downloaded (PDF, CSV).

9.4 Diagnosis by monitoring data traffic with external devices

For a detailed fault analysis, the transmitted protocols can be viewed with specific software and hardware tools. An overview is below.

- Protocol independent analyses:
  - Customer control fault memory
  - Recording of Ethernet packets (e.g. via mirror port on connection to customer control)
- Protocol-dependent analyses:
  - Profinet: Profinet Inspector

10 Disassembly and Disposal

10.1 Safety

WARNING!

Risk of injury due to improper disassembly!

Stored residual energy, sharp components, points and edges on and in the data transmission system or the tools needed can cause injuries.

→ Ensure sufficient space before starting work.

→ Use caution when working with open, sharp-edged components.

→ Ensure that the work area is tidy and clean! Loosely stacked or scattered components and tools are a source of accidents.

→ Disassemble components properly. Observe the high dead weight some components. Use lifting gear, if necessary.

→ Secure components so they cannot fall or topple over.

→ Consult the manufacturer in case of doubt.

10.2 Disassembly

After the end of its service life, the data transmission system must be disassembled and disposed of in an environmentally friendly manner.

→ Remove operating and auxiliary materials, as well as residual processing materials, and dispose of them in an environmentally appropriate manner.

WARNING!

Observe the dangers due to electrical shock, harmful dusts, sharp edges and moving parts!

→ Clean the assemblies and components properly and disassembly and dispose of them in compliance with locally applicable occupational safety and environmental protection regulations.

10.2.1 Disassembly of the assemblies

DANGER!

Risk of fatal injury due to falling parts!

Falling parts can cause serious injuries or even death.

There is a risk of components falling down while disassembling the data transmission system. These can lead to extremely serious injuries or even death.

→ Secure all components against falling during disassembly work.

→ Never walk underneath the disassembly area.

→ Cordon off the disassembly area.

Personnel

- May only be carried out by trained technicians
- Min. 2 persons

Required tools

- Open-end wrench SW8 (M5)
- Open-end wrench SW10 (M6)
- Open-end wrench SW13 (M8)
- Cordless drill driver
- Torx attachment TX8
- Tools for securing

10.3 Disposal

In the absence of return and disposal agreements, recycle the disassembled components:

- All metal parts must be scrapped
- Plastic components must be sent for recycling
- All other components are to be disposed of according to their material composition.

CAUTION!

Environmental damage due to improper disposal!

Electrical scrap, electronic components, lubricants, and other auxiliary materials are subject to hazardous waste treatment and may only be disposed of by authorized specialists!

Local authorities or disposal specialists can provide information regarding environmentally appropriate disposal.

11 Additional Documents

11.1 Declaration of Conformity

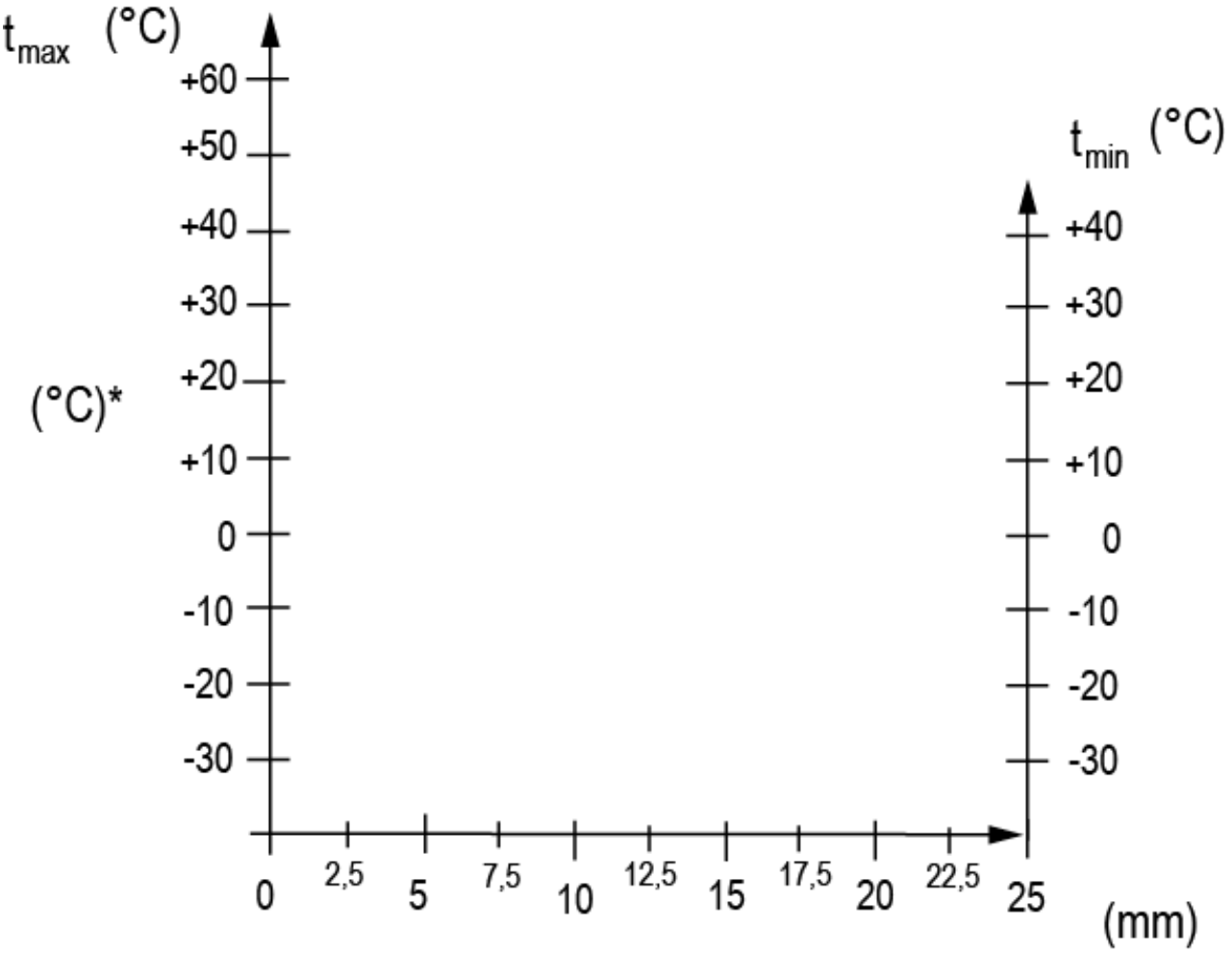
The Declaration of Conformity for this product can be obtained from Conductix-Wampfler upon request.

11.2 Applicable Documents

Seq.No.	Document No.	Document Name
Conductix-Wampfler GmbH		
01	WV0800-0001	Cleaning of conductor rails
02	TI0514-0001	ProfiDAT®/ProfiDAT®*compact* Network Integration
03	TI0514-0003-EN	Accessing Diagnostic Information of ProfiDAT® 0514-0515
04	-	Project-specific documentation
05	BAL0514-0003-EN	ProfiDAT® HF Measurement Kit Operating Instructions
Siemens		
06	C79000-G8900-C323-12	Configuration Manual Scalance W770 / W730 Web Based Management
07	C79000-G8900-C325-15	Scalance W774-1 / W734-1 Operating Instructions
08	FAQ 109475919	FAQ Setting Profinet IO Update Time and F-monitoring Time
09	FAQ 26562314	FAQ Layer 2 Tunnel Quantity Framework

11.3 Air Gap Diagram

The diagram can be used as an aid for determining the air gap at the installation site (see also Section 6.4.4.2)



11.4 Project-specific documentation

The project-specific documentation can include the following points:

- Layout Plan
- HF layout (only based on data transmission: ProfiDAT®*compact* conductor rail and HF cables, positions of access points, channel distribution, expected values of attenuation measurement, definition and installation location of attenuators for leveling the system, if available)
- Transceiver list with IP addresses, serial numbers and transceiver login data
- Mechanical drawings if components deviate from the standard

12 Index

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