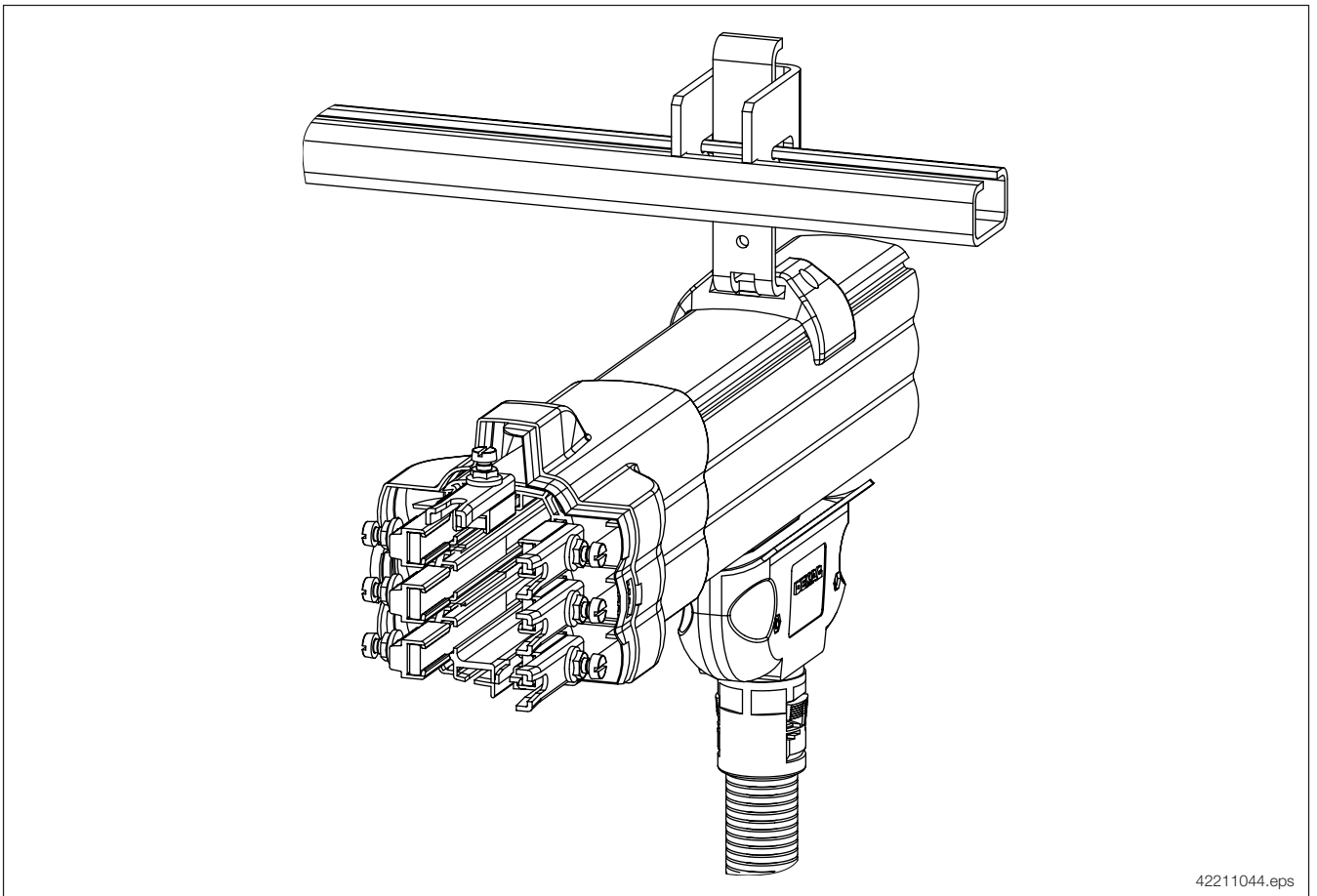


Operating / assembly instructions

Demag Compact Line DCL



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1 Safety

1.1 Symbol description

The following symbols and recommendations indicate potential safety hazards or causes of damage or provide useful information.



Hazard warning

This symbol appears in the operating instructions next to all instructions relating to safety at work wherever a potential hazard to life and limb exists if the instructions are not complied with.

Follow these instructions at all times and be particularly vigilant and cautious.

Pass on safety instructions to all persons entrusted with working on the product including any associated equipment and the power supply.

In addition to the safety instructions, observe all general safety regulations and accident prevention regulations at all times.



Warning against dangerous electrical voltage

Contact with live parts can result in immediate death. Protective covers (e.g. covers and enclosures of electrical devices) marked with this sign may only be opened by qualified electricians. Before opening, all relevant operating, control, feed or other voltages must be disconnected.



Operating hazard for the installation

This symbol in the operating instructions indicates all warnings which, if not complied with, may result in damage to the installation or the load to be conveyed.



Information

This symbol indicates tips and useful information.

1.2 Intended use

The product may only be operated when in perfect working order by trained personnel in accordance with the relevant safety and accident prevention regulations. This also includes compliance with operating and maintenance conditions specified in the assembly instructions.

This product is industrial equipment to be used with the rated voltage specified on the type plate.



During maintenance work the appropriate main switches must be switched off.

During operation or when the main switch is not switched off, electrical components inside enclosures, motors, switchgear cabinets, terminal boxes, etc., carry dangerous voltages. This voltage may cause fatal injuries.



Serious personal injury or damage to property may occur in the event of:

- unauthorized removal of covers,
- inappropriate use of the product,
- incorrect operation,
- insufficient maintenance,
- working on live parts.

1.3 Inappropriate use

Certain work and practices are prohibited when using the product as they may involve danger to life and limb and result in lasting damage to the product, e.g.:

- Manipulating electrical equipment,
- Connecting the unit to power supply with voltage or frequency other than those specified on the type plate,
- Non-compliance with specified mounting positions,
- Non-compliance with the max. permissible operating temperature.

1.4 Basic information on safety



Persons under the influence of drugs, alcohol or medicines which affect reactions must not install, operate, put into service, maintain, repair or disassemble the product.

Any conversions and modifications to the installation must comply with the technical safety requirements.

Work on electrical equipment may only be carried out by specialists in accordance with electrical regulations. In the event of malfunctions, the product must immediately be shut down, switched off and the relevant main switches locked.

Malfunctions must be eliminated immediately.

National accident prevention regulations and codes of practice and general safety regulations must be observed when operating our products. Important information and instructions are marked by corresponding symbols. Follow these operating and safety instructions to avoid personal injury and damage to machinery. The assembly instructions must be kept available at the place where the product is in use at all times. They include significant aspects and appropriate excerpts from the relevant guidelines, standards and regulations. The owner must instruct his personnel accordingly.



If the safety instructions given are not observed in any way, personal injury or even death can result.

Observe general statutory and other obligatory regulations relating to accident prevention and environmental protection and basic health and safety requirements in addition to those included in these assembly instructions.

Such requirements may also relate, for example, to the handling of hazardous materials or the provision/wearing of personal protection equipment.

Comply with these regulations and general accident regulations relevant for the place at which the product is used and follow the instructions therein when working with the product. The product may still constitute a danger to life and limb if it is not installed, operated, maintained or used appropriately by personnel which have not been trained or specially instructed.

The safety instructions must, if required, be supplemented by the owner with instructions and information (e.g. factory regulations) relating to organization of work, working procedures, operating personnel, etc. Supervising and reporting obligations as well as special operating conditions must also be taken into consideration.



Personnel assigned to working with the product must have read the assembly instructions and the safety instructions.

All activities relating to the product which are not described in the assembly instructions may only be carried out by specifically trained specialist personnel.

The owner must ensure that personnel work in a safety and hazard-conscious manner in compliance with the assembly instructions.

The owner must ensure that the product is only operated when in proper working order and that all relevant safety requirements and regulations are complied with.

The product must be taken out of service immediately if functional defects or irregularities are detected.

In the event of a stoppage (e.g. if defects regarding safe and reliable operation are detected, in emergency situations, in the event of operating malfunctions, for maintenance purposes, if damage is detected or after finishing work), the operator/experienced technician must carry out all prescribed safety measures or observe that they are automatically carried out.

Personal protective clothing must be worn as necessary or as required by regulations. Personnel must not wear loose clothing, jewellery including rings or long hair loose. Injury may occur, for example, by being caught or drawn into the mechanism.

All safety and hazard warnings on the product, its access routes and mains connection switches must be preserved completely and in legible condition.

Modifications, additions to and conversions of the product which might impair safety in any way must not be carried out without the approval of Demag.

Safety devices must not be rendered inoperative.

Only genuine Demag spare parts may be used. Observe prescribed deadlines or those specified in the assembly instructions for routine checks/inspections.

1.5 Safety instructions for installation and disassembly



- Installation and disassembly work may only be performed by experienced technicians.
- Installation and disassembly work must be co-ordinated by the person carrying out the work and the owner within the scope of their responsibility.
- The assembly zone must be made safe.
- The installation must be isolated in accordance with the relevant electrical regulations.
- Customer-specific regulations must be observed.
- Only appropriate, tested and calibrated tools may be used.

1.6 Safety instructions when first putting the product into service after completing installation



- The working area must be made safe.
- First check that the voltage and frequency specified on the type plates match the owner's mains power supply.
- In the course of putting the product into service, it may be necessary to render safety devices or features inoperative when carrying out adjustments or function checks.
- When putting the unit into service, it may be necessary to perform work in the danger zone, therefore, it must be ensured that only appropriately trained personnel are employed for this work.

1.7 Safety instructions for operation

All instructions and measures described in the assembly instructions with regard to safe operation and items concerning general safety and accident prevention which have to be observed before, during and after putting into service must be strictly complied with. Any failure to comply can lead to accidents resulting in fatalities.

The product must be taken out of service immediately or not put into operation if any defects relating to operating safety and reliability are detected.

Safety devices must not be rendered inoperative or modified in contradiction to their intended use.

Only operate the product when all protective devices and safety-relevant equipment, e.g. movable protective devices and emergency-stop devices, are fitted and fully functioning.

In the event of damage to electrical devices and cables as well as parts of the insulation, immediately switch off the product.

Before switching on/putting into operation of the product, it must be ensured that nobody is endangered by operation of the product.

If the operator notices persons who may be exposed to a risk to health or personal safety by operation of the equipment, he must suspend operation immediately and may not resume operation again until the persons are outside the danger zone.

Before putting the product into operation, the operator must be satisfied that the product is in safe and correct operating condition.



Work on the product may only be carried out when instructions to this effect have been issued, when operation and function of the equipment have been explained and when the working and danger zone has been made safe.

Cooling devices, such as ventilation openings, may not be rendered permanently inoperative (e.g. covered or closed).

Special local conditions or special applications can lead to situations which were not known when this chapter was written. In such cases, special safety measures must be implemented by the owner.

1.8 Safety instructions for maintenance

Maintenance measures are defined as regular maintenance, inspection and repair work.

Mechanical and electrical repairs and maintenance work may only be carried out by appropriately trained personnel (experienced technicians). Demag specialists are also trained to work on specific products.

Adjustment, maintenance and inspection activities and inspection deadlines including specifications concerning replacement of parts/assemblies prescribed in the assembly instructions must be observed.

Ensure that all electrical components are de-energized before commencing work on electrical installations and devices.

Unauthorised personnel must not be allowed to work on the product. Before starting all repair and maintenance work, the product must be switched off, taken out of operation and secured (switches must be locked) against accidental or unauthorized putting into operation (restarting).

It must be ensured that



- the product is switched off and checked that it is de-energized and, in special cases, isolated,
- moving parts are stationary and stopped,
- moving parts cannot start moving while maintenance work is being carried out,
- the power supply cannot be accidentally restored as long as the product has been taken out of service for maintenance and repair purposes. Ensure that operating and auxiliary materials as well as replaced parts are disposed of in a safe and environmentally sound way.

Instructions for repair work in the course of operation

The danger zone must be marked off with red/white safety chains or safety tape and indicated with warning signs.

In each individual case, the owner or the person employed by him must check whether the relevant work may be carried out in the course of operation without risk of personal injury owing to the particular local conditions.

To avoid injury, use only calibrated and appropriate tools and auxiliary materials for maintenance and repair work.

If there is a risk of objects falling, the danger zone must be made safe.

Maintain a sufficient safety distance to rotating parts to prevent clothing, parts of the body or hair becoming entangled.



Avoid naked flames, extreme heat and sparks in the vicinity of cleaning agents and flammable parts or parts liable to deformation (e.g. wood, plastic parts, oil, grease) in electrical installations – non-compliance may result in fire hazard. Harmful gases may evolve or insulation may be damaged.

Only genuine fuse links with specified amperage and tripping characteristics may be used. Defective fuse links must not be repaired or bridged and must only be replaced by fuse links of the same type.

Switch off the product immediately in the event of electrical power supply malfunctions.

Work on the electronic and electrical components or equipment may only be carried out by qualified electricians.

If inspection, maintenance and repair work is to be carried out on parts of the product, these must – if prescribed by regulations – be isolated.

First verify the safe isolation of the parts from the supply before commencing work.

Defects, such as loose connections, damaged cables and worn contactor contacts must be rectified immediately.



Electrical equipment must be replaced as a preventive measure on reaching the limit of its service life. If work has to be carried out on live parts, a second person must be available to actuate the emergency-stop button or mains connection switch/isolating switch in order to disconnect the power supply in an emergency. The second person must be familiar with resuscitation measures.

Only use insulated tools.

Before disconnecting and connecting electrical plug-and-socket connections, always disconnect them from the supply (this does not apply to mains connections, provided they do not represent a dangerous contact voltage in the sense of the safety regulations).

2 Technical data

2.1 DCL-System

Version without protective conductor (PE)

Systems and current collecting trolleys without protective conductor connection (PE) will be supplied as follows.

Systems

The green-yellow marking of the protective conductor is not applicable. The conductor / pole is equipped resp. processed and can be used for the power- or for the control signal transmission. The cross section then corresponds to the conductor cross section of the power transmission (valid for sizes starting at 140).

Current collecting trolley

In this version the green-yellow core is replaced by a black core. The protective marking (PE) is not applied. The sliding contacts are equipped in accordance with the conductor- / poles-quantity.

The DCL is a conductor bar system with PVC-housing. The uniform housing can be effected with 4, 5, 6 or 7 conductors / poles acc. to the customer's requests. The standard material for conductors is copper. Alternatively, a stainless steel-plated copper bar is available. The special characteristic is the insensitive stainless steel-contact surface compared to copper. The stainless steel-plated copper bar is predestined for the use near the sea, outdoors, with chemicals or for systems with low application time. An oxidising of the sliding contact surface is excluded. The available conductor bar cross sections and conductor materials can be found in the table below.

Conductor lines						
Enclosure material		PVC				
Stand length	mm	4000				
No. of conductors / poles		4...7				
Suspension spacing max. ²⁾	mm	1000 ²⁾ / 2000				
Voltage U _N	V AC	24 bis 690				
Size ¹⁾		35	60	100	140	200
Capacity (100% ED bis 35 °C) ¹⁾	A	64	78	100	140	160
Conductor cross section	mm ²	10	15	25	38	56
Conductor cross section copper		X	X	X	X	X
Conductor material stainless steel plated ⁵⁾		X	-	-	-	-
Ambient temperature / enclosure temperature	°C	-30 bis +70				
Type of enclosure DIN VDE 0470 T.1/EN 60529	IP-Code	IP 23 / IP 24 with profile sealing lip				
Curved section smallest radius	mm	≥ 800 mm				
Fire protection		UL94 / VO; not free of halogen				
Current collector trolleys						
Number of poles		4...7				
Material sliding contact		Bronze	Graphite	Silver-Graphite		
Rated current I _N (80% ED)		40 A	20 A	20 A		
Connection cross-section for power connection (1, 2, 3, 4)	max. mm ²	6	4			
Connection cross-section for control cable (5, 6, 7)	max. mm ²	2,5				
Connection cable length (standard) ⁴⁾	mm	2000				
Fuses max.	A	100				
Travel speed max.	m/min	100 ³⁾ / 200				

1) In installations with large power feed sections and high current load, the voltage drop must be checked.

Calculations cf. Technical Data 203 386 44, chapter 3.

2) With effect of heat on one side.

3) For straight sections with entry/transfer funnel.

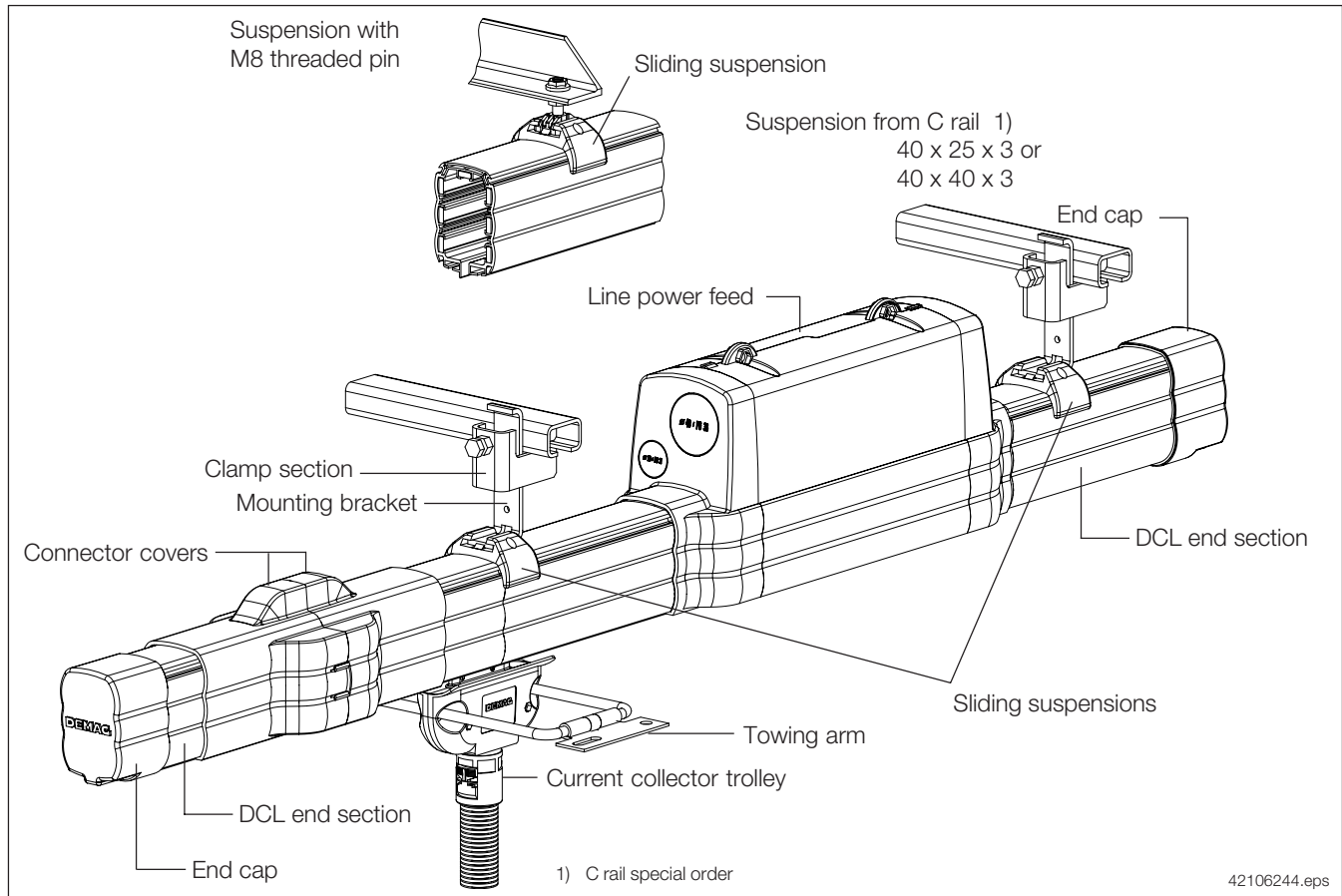
4) Other line lengths possible.

5) Copper conductor 10 mm² on the contact surface plated with stainless steel.

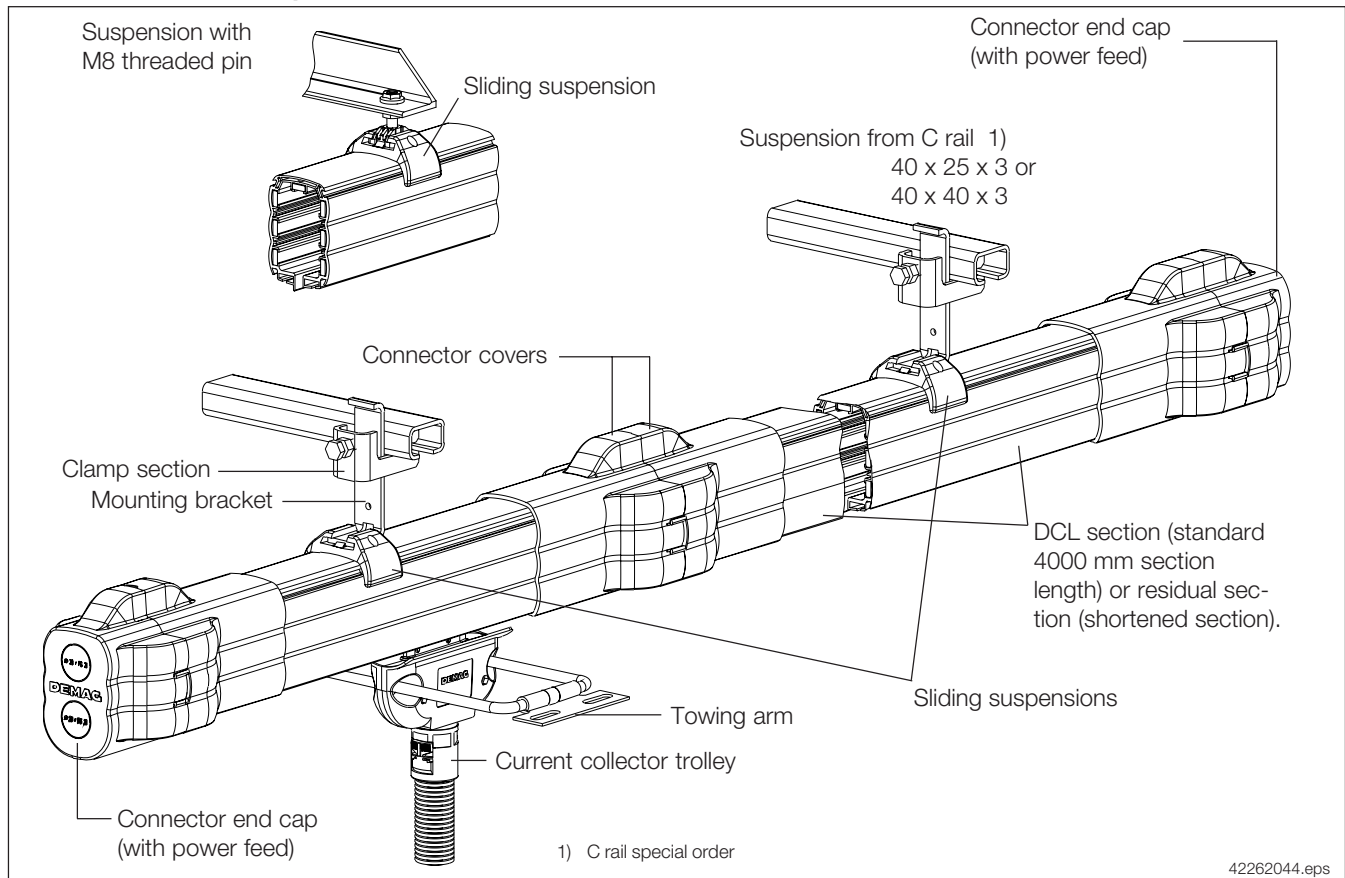
Applications and further notes cf. Technical Data 203 386 44, chapter 6.

3 Preparation before assembly

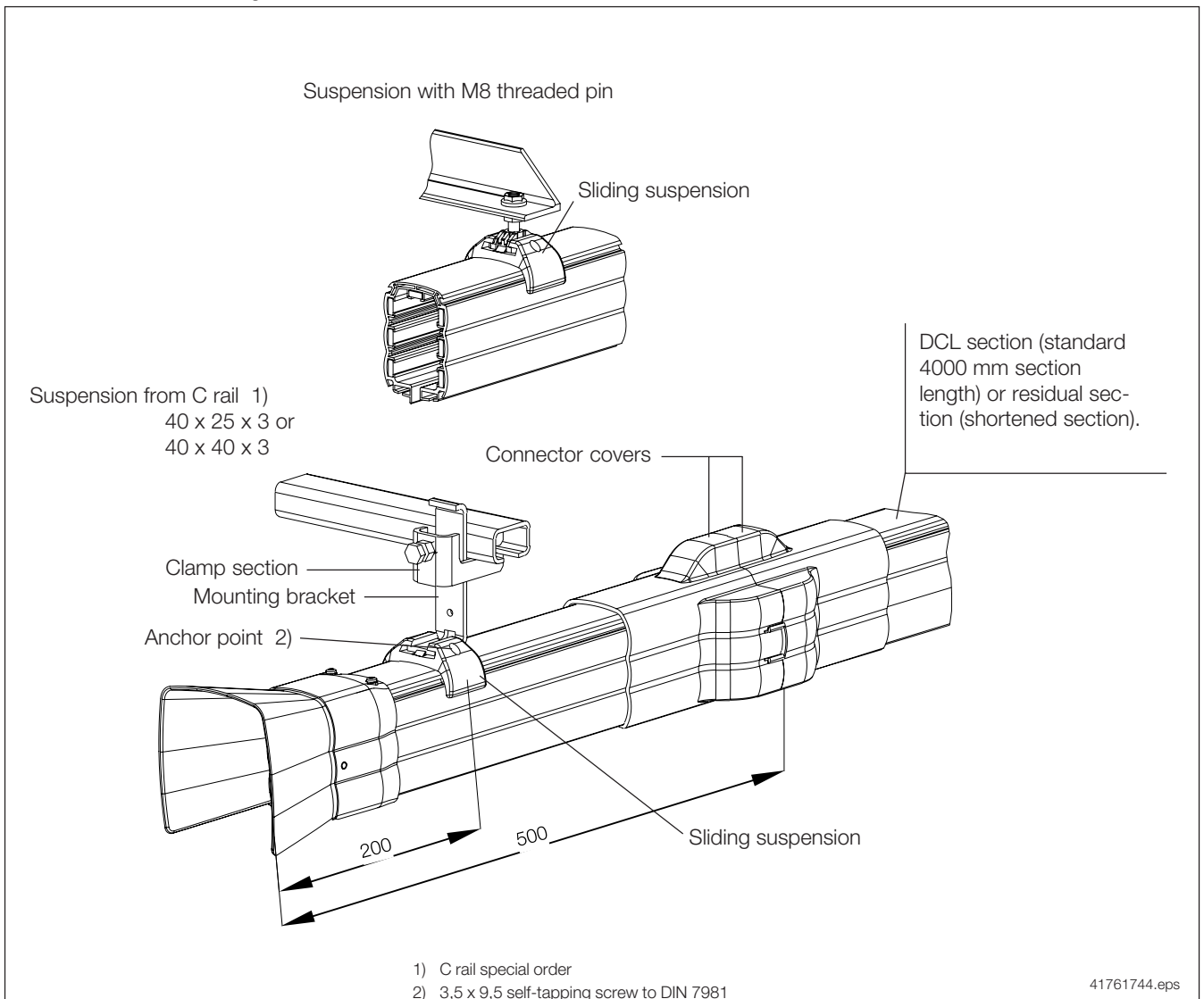
3.1 DCL with line power feed



3.2 DCL with end power feed



3.3 DCL with entry/transfer funnel



3.4 Preparation and tools

Check that all DCL parts are complete and undamaged before assembling.

Ensure that:

- DCL components are stored appropriately;
- sections are stored in a straight and flat position with no load applied to them;
- the DCL installation is not treated with any materials such as paint, etc.;
- the storage temperature does not exceed the -30°C to $+70^{\circ}\text{C}$ range.

The following tools are required to assemble the DCL installation:

- 0,8 x 4 flat-head screwdriver
- 1 x 5,5 flat-head screwdriver
- Size 2 cross-head screwdriver
- SW10 open-jawed wrench
- SW13 open-jawed wrench
- SW 8 socket wrench
- SW10 socket wrench
- 5 – 30 Nm torque wrench
- Cable stripper
- Cable terminal pliers
- Measuring rod

4 Assembly



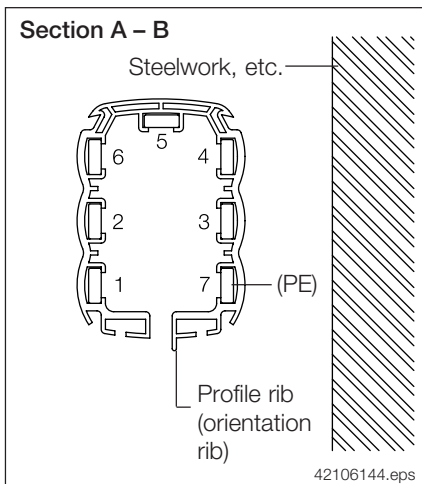
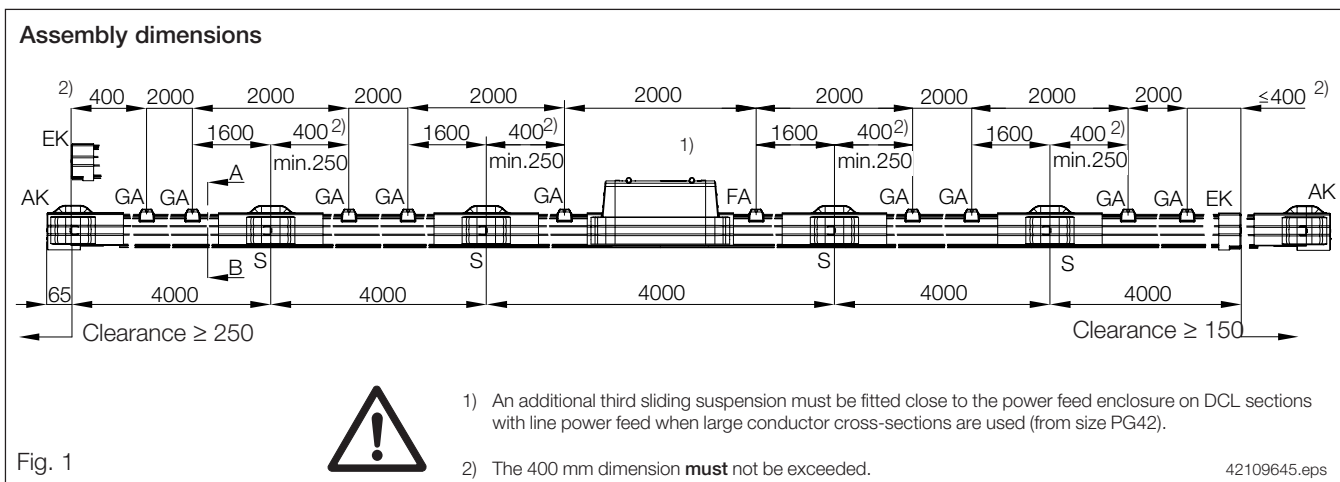
Pay attention to the orientation of the installation as specified in the design diagram when assembling the DCL components (see Assembling the suspensions, section 4.1)

Fit

- brackets
- C rail fittings
- supports

along the track layout to support the DCL sections.

Ensure the DCL installation is assembled parallel to the crane runway or girder, etc. The DCL installation may need to be aligned following assembly.



Designation		Dimensions in mm
Straight section		4000
Joint connector	S	
Sliding suspension	GA	
Fixed suspension	FA	
Line power feed		4000
Connector end cap with power feed	AK	
End cap	EK	

In place of an AK connector end cap, an entry/transfer funnel may be fitted.

The first suspension must be fitted 400 mm from the end of the track.

For entry/transfer funnels an additional suspension must be fitted at 200 mm from the end of the track.

Subsequent sliding suspensions must be fitted at intervals of 2000 mm.

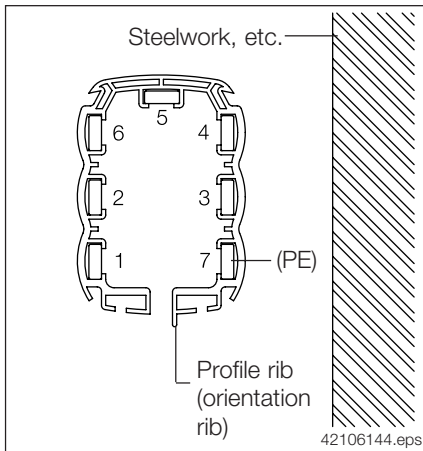
Additional sliding suspensions must be provided for DCL sections, e.g. shortened sections, which do not fit into the 2000 mm sliding suspension interval pattern.

The last sliding suspension for the end of the DCL installation must be fitted in such a way that the overhang does not exceed 400 mm.

Additional sliding suspensions are included in the delivery.

Ensure there is sufficient clearance for the connector end caps or end caps at the ends of the track.

4.1 Assembling the suspensions (C rail/threaded pin suspension)



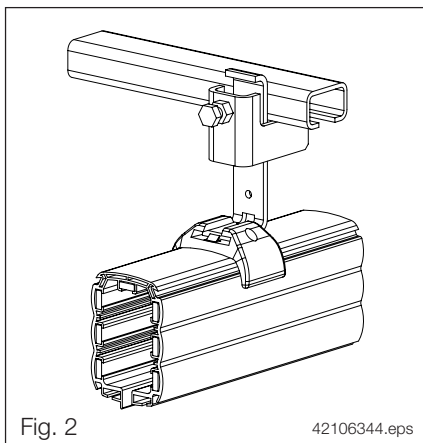
Unless the installation is designed otherwise, it must be ensured that all DCL sections are fitted in such a way that the protective earth conductor (PE) and the profile rib of the enclosure face towards the steelwork / mounting fixture.

Ensure that all DCL straight sections are installed in the same way.

There are two suspension variants for DCL power supply systems.

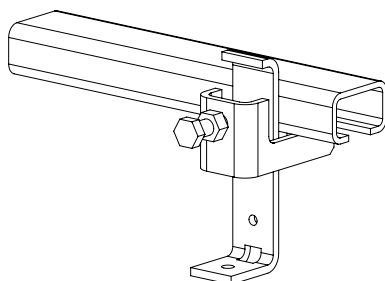
Section 4.1.1 Description of DCL suspension from C rails.

Section 4.1.2 Description of suspension from threaded pins fitted to prepared steelwork, etc.

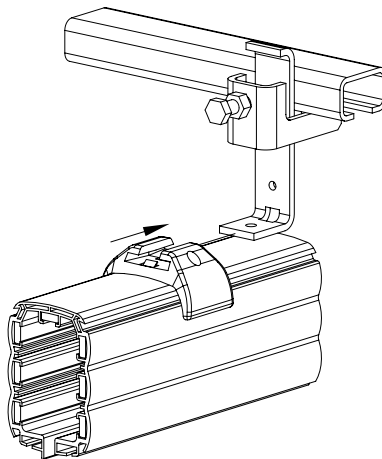


4.1.1 Suspension from 40 x 25 x 3 or 40 x 40 x 3 C rails

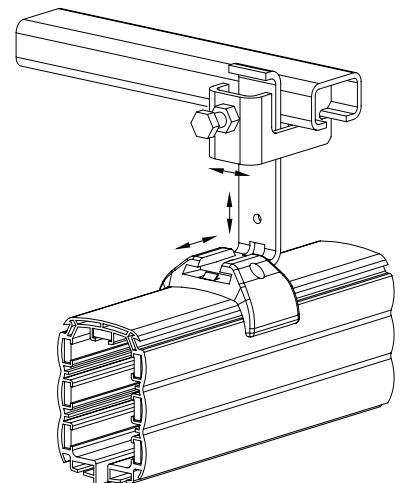
Fitting to C rails



Slide the clamp section onto the C rail and slightly tighten the M8 hexagon bolt.



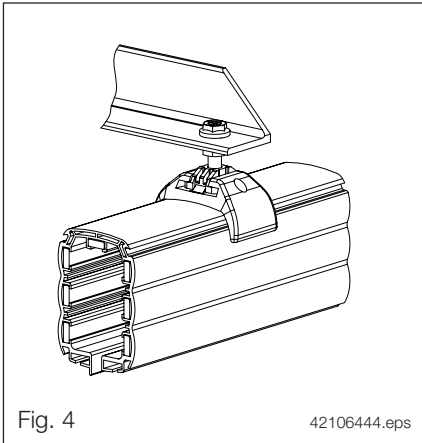
Clip the mounting bracket into the sliding suspension.



Align the profile section in the horizontal and vertical directions. Tighten the M8 hexagon bolt and counter with the M8 hexagon nut.



Tightening torque 20 Nm

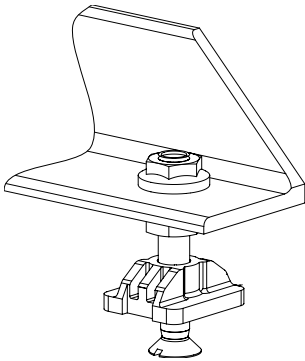


4.1.2 Suspension from threaded pins fitted to support steelwork / mounting fixture.

Fig. 4

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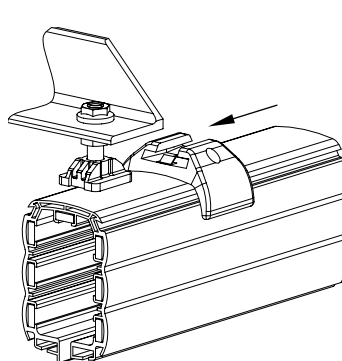
Fitting to threaded pins



Slip the M8 plastic fitting over the M8 x 70 countersunk screw. Insert the M8 x 70 countersunk screw into the support steelwork and secure with the Verbus-Ripp M8 self-locking nuts.

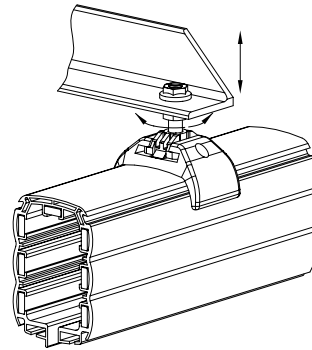
Fig. 5

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Clip the sliding suspension onto the mounting plate.

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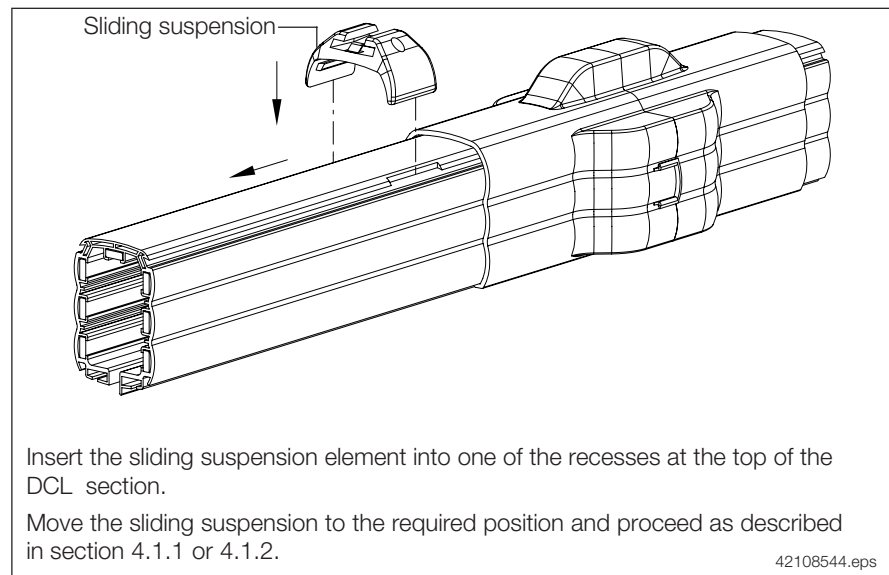


Align the profile section in the horizontal and vertical directions, and counter-tighten both Verbus-Ripp M8 nuts to secure.

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4.1.3 Additional sliding suspensions

Further sliding suspensions required for design reasons may be fitted as follows.



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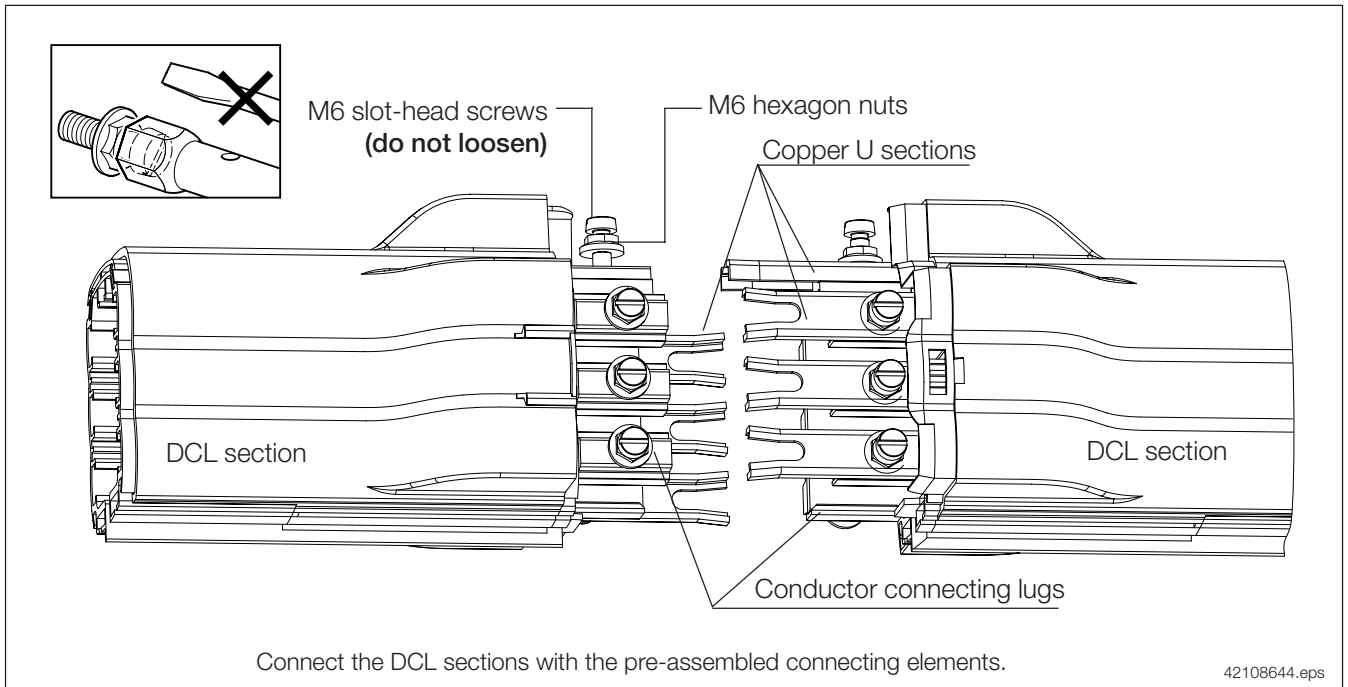
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4.2 Connecting the sections

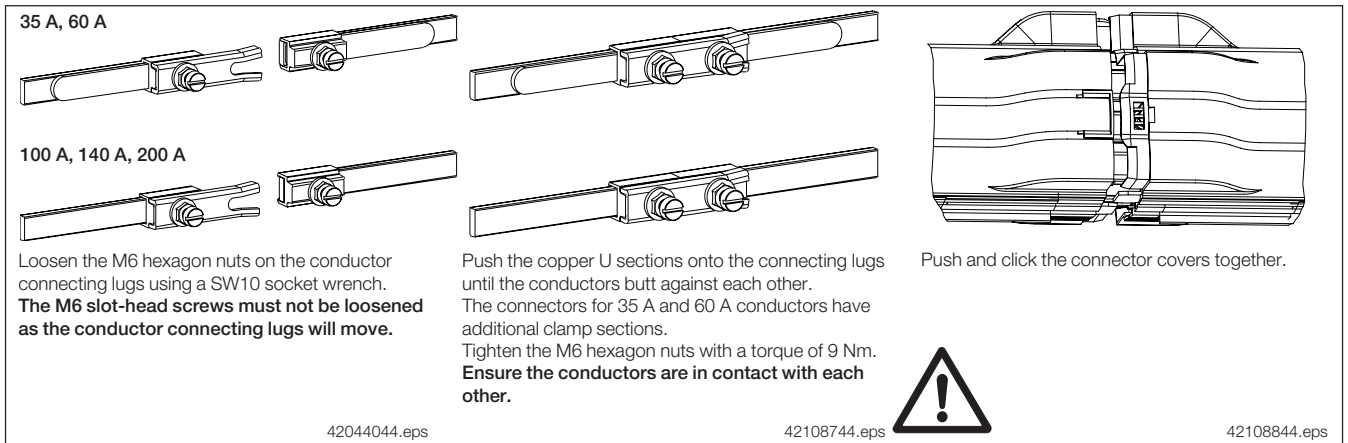


Fit the next DCL section as described in section 4.1.1 or 4.1.2.

Ensure that the protective earth conductor (PE) and profile rib are in the correct position.

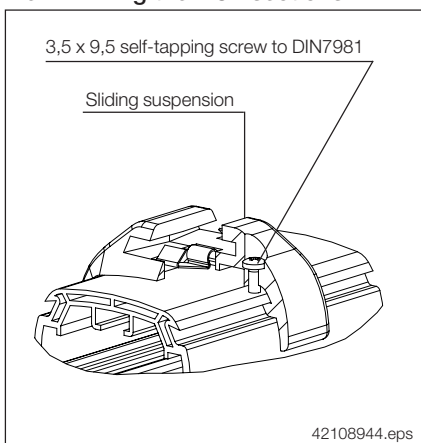


4.2.1 Fixing the connectors



4.3 Anchor point

4.3.1 Fixing the DCL sections



When all sections have been assembled, for installations without entry/transfer funnels **one** sliding suspension with anchor point (take thermal expansion into account) must be fixed in the middle of the track to prevent the DCL installation moving to the side.

For DCL installations with entry/transfer funnels, the funnels must be arrested.

In this case the anchor point in the middle of the track is omitted.

Screw the enclosed 3,5 x 9,5 self-tapping screw through the sliding suspension and into the DCL enclosure.



Use only the enclosed 3,5 x 9,5 self-tapping screws to DIN7981 as there is a risk of accidental contact with live parts if longer screws are used.

4.4 Line power feed

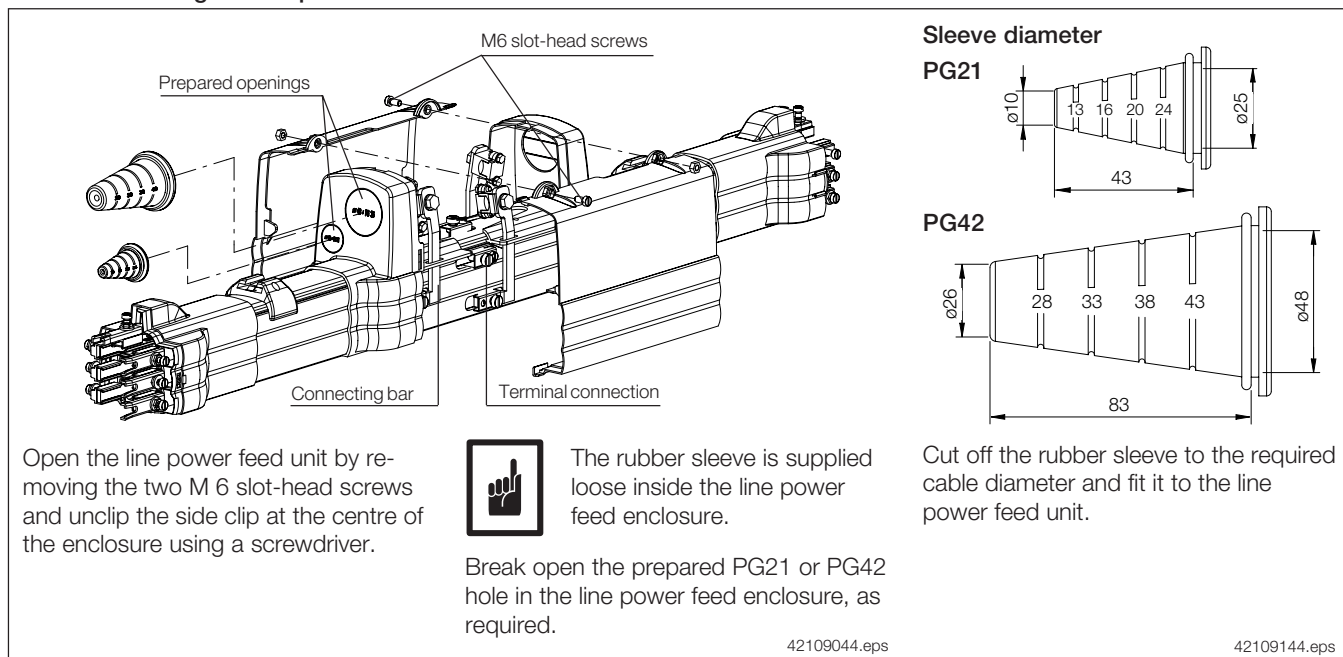
4.4.1 Fitting the line power feed

Line power feed units are fitted in the same way as any other DCL straight section.

Two connection variants are available

- Terminal connection for 1,5 to 16 mm² connection cross-sections, direct to the conductor (for 35 A and 60 A line power feed units).
- Screw terminal with connecting bar for 25 to 70 mm² connection cross-sections (for 100 A, 140 A and 200 A line power feed units).

4.4.2 Connecting the line power feed



Further procedure:

- Cut the connecting cable to the length required for the relevant connections.
- Remove the connecting cable outer sheath to a length of approx. 240 mm.
- Strip the insulation off the individual cores to the connection dimension.
- Insert the connecting cable through the PG21 or PG42 rubber sleeve.

– With connecting terminals

Attach cable lugs to the **1,5 mm² to 16 mm² single cores** and connect with a M6 slot-head screw (only for 35 A and 60 A line power feed units).

– With connecting bar

Lead **25 mm² to 70 mm² single cores** to the screw terminals on the connecting bar and secure them using the two M6 hexagon screws (only for 100 A, 140 A and 200 A line power feed units).

Tighten both M6 hexagon screws with a torque of 9 Nm.

- Use available free space when laying the cables and avoid sharp edges and live parts.
- Check the connections.
- Pay attention to the position of the protective earth conductor (PE).
- Close the line power feed unit, click and screw the halves together.
- Provide strain relief for the connecting cable outside the line power feed unit.



The connecting cable to the line power feed unit must be arranged in such a way that the power supply is not inhibited by any changes in length as a result of temperature differences.

4.5 Power feed end cap

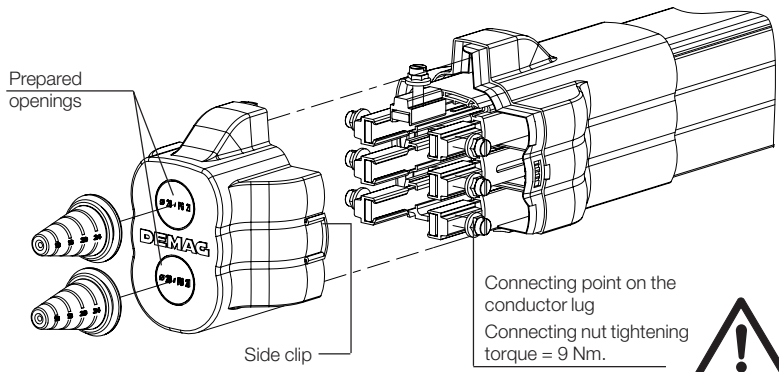
4.5.1 Fitting the power feed end cap

Fit the power feed end cap to the beginning or end of the DCL installation by clipping it onto the connector cover.

The power feed end cap may be used as an **end power feed unit** or as an **end cap** on a connector cover. It provides protection against accidental contact when used as an end cap.

Cores with a **1,5 to 16 mm²** cross-section are connected direct to the conductor connecting lugs. For this purpose the copper U sections must first be removed.

4.5.2 Connecting the power feed end cap



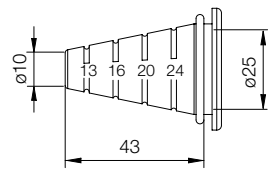
Prepared openings

Side clip

Connecting point on the conductor lug

Connecting nut tightening torque = 9 Nm.


Sleeve diameter PG21



Unclip the clips on the sides of the power feed end cap using a screwdriver.

Break open the prepared PG21 hole in the power feed end cap enclosure, as required.

Cut off the rubber sleeve to the required cable diameter and fit it to the power feed end cap.



The **copper U sections must be removed** in order to connect the cable.

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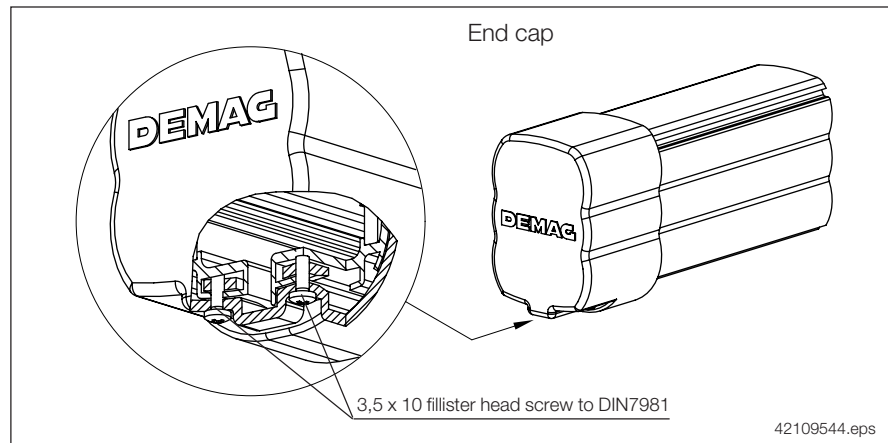
Further procedure:

- Cut the connecting cable to the length required for the relevant connections.
- Remove the connecting cable outer sheath to a length of approx. 100 mm.
- Strip the insulation off the individual cores to the connection dimension.
- Insert the connecting cable through the PG21 rubber sleeve.
 - Attach cable lugs to the **1,5 mm² to 16 mm² single cores** and connect with a M6 hexagon nut.
- Use available free space when laying the cables and avoid sharp edges and live parts.
- Check the connections.
- Pay attention to the position of the protective earth conductor (PE).
- Close the power feed end cap and clip into place.
- Provide strain relief for the connecting cable outside the power feed end cap.
- Distance to building walls, steel structure or any other objects, min. 250 mm.



The connecting cable to the power feed end cap must be arranged in such a way that the power supply is not inhibited by any changes in length as a result of temperature differences.

4.6 DCL end cap and connector end cap for shortened DCL sections



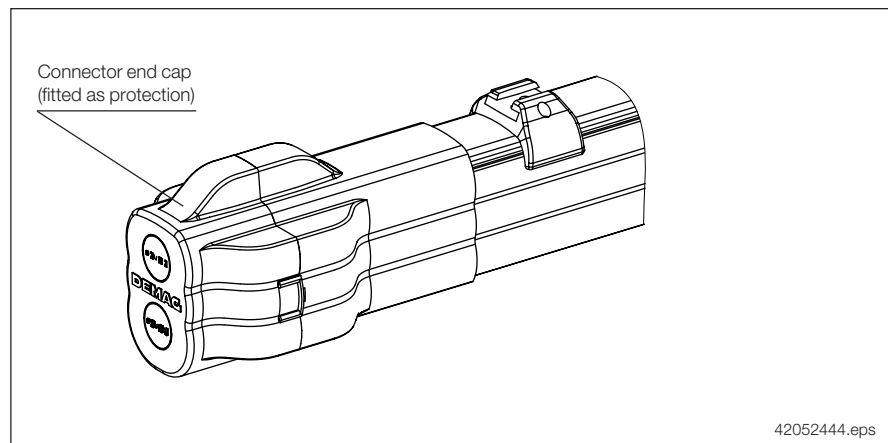
If a DCL section is shortened at a later date, an end cap must be fitted at the beginning or end of the track to prevent accidental contact with the conductors.

Before handling shortened DCL sections, the conductors must be prevented from slipping out of the enclosure. Temporarily fit a connector end cap (if available) to the connector cover (see diagram below).

This retaining arrangement must be removed as soon as the end section or shortened section is fitted to the suspensions in a horizontal position.

The end caps are fitted in the factory for DCL installations with line power feed.

In these cases, the conductors are protected against slipping out of the section by means of special packing.



4.6.1 Fitting the end cap on site



1. Shorten all conductors by 30 mm (pay attention to creepage distances).
2. Push the end cap onto the section and secure it using two 3,5 x 10 fillister head screws on the underside of the end cap.

Use only the enclosed 3,5 x 10 fillister head screws to DIN7981 as there is a risk of accidental contact with live parts if longer screws are used.

There must be a minimum distance of 150 mm between the end cap and building walls, suspensions or other obstacles.

4.7 Entry/transfer funnels

4.7.1 Fitting the entry/transfer funnels

Entry/transfer funnels are fitted at the beginning or end of a DCL section. The current collector trolley can freely enter the DCL through the entry funnel. On transfer points two opposite funnels (type "left" and type "right") are used.

The single-sided connection and the suspension must be made as for the DCL straight sections (see section 4.2).

The suspension of the funnel from the C rail or with threaded pin must be a fixed suspension (see section 4.3).

Subsequently align and secure the entry/transfer funnels.

Min. distance between transfer funnels 10 mm.

Max. lateral misalignment between the funnels ± 10 mm.

Max. vertical misalignment between the funnels ± 8 mm.

Comply with the transfer tolerances.

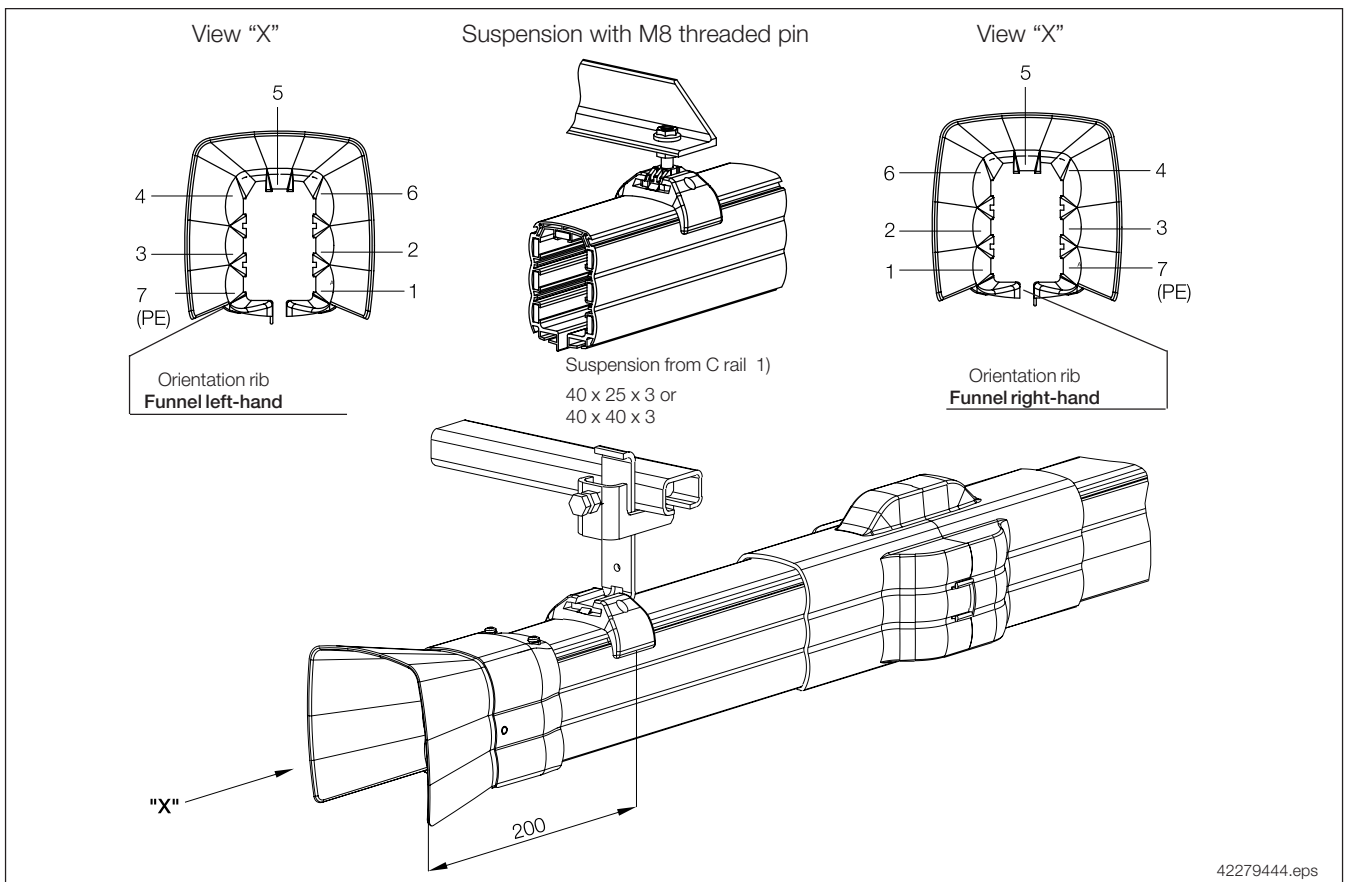
Observe travelling behaviour of the current collector trolley on the transfer point and readjust the DCL section, current collector trolley or towing arm, if required (use towing arm for unguided transfer points).

The current collector trolley must be prepared for DCL with entry/transfer funnels. Open the terminal box on the current collector trolley and separate the upper terminal box enclosure half on the prepared openings by means of a knife (prepared openings see fig., section 5.3.3).

The entry/transfer funnel is 500 mm long.

Observe the distance between suspensions of 200 mm from the beginning of the funnel.

Take care for the correct position of the PE conductor and the orientation rib on the entry/transfer funnel (see figure below).

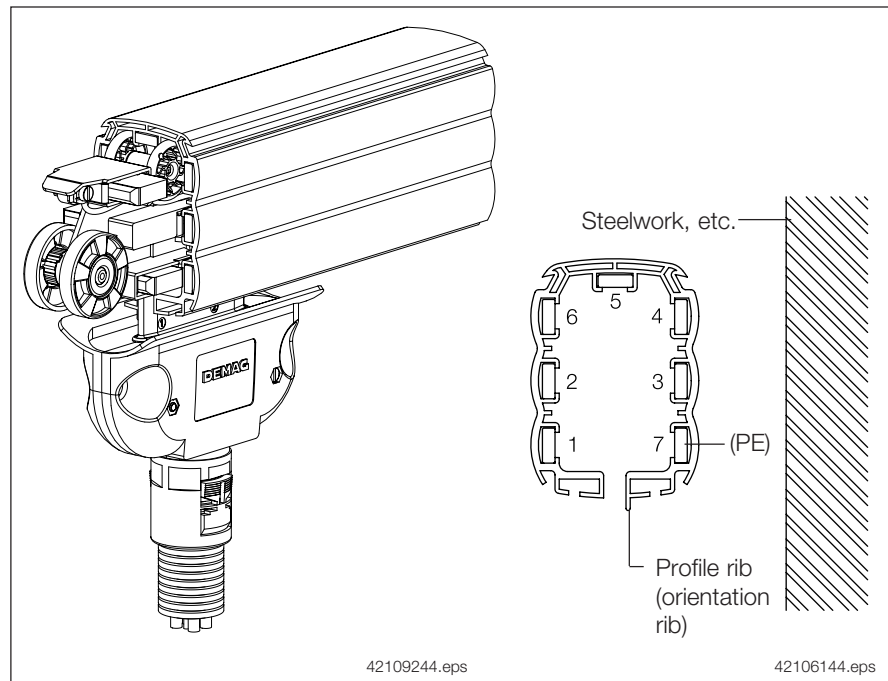


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4.8 Elongation

Within the admissible temperature range from -30 C° up to $+70\text{ C}^\circ$ the elongation is compensated by the DCL system without additional expansion joints being required.

4.9 Current collector trolley



4.9.1 Fitting the current collector trolley

The current collector trolley can be inserted into any open end while the DCL sections are being assembled.

The protective earth (PE) conductor side and the profile rib of the DCL section must be arranged opposite the orientation rib of the current collector trolley (see diagram above right).



Press the sliding contacts down and push the trolley into the DCL section.

The current collector trolley must be pushed by hand along the entire length of the DCL track once to ensure the mechanical elements function correctly.

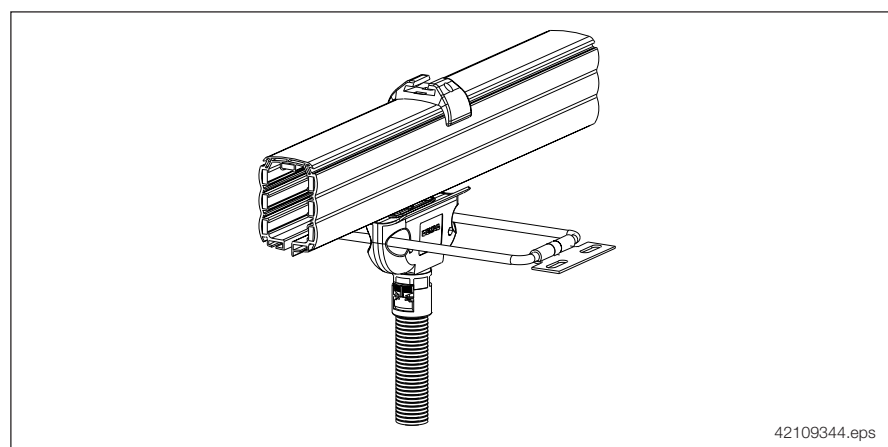
Connect the cables in the corrugated tube to the consumer.

Arrange the connecting cable in a large radius curve to ensure that **no lateral forces** act on the current collector trolley.



When the cables have been connected and the corrugated tube arranged in a large radius curve, the current collector trolley must run in the DCL section in a vertical position. Not doing so will result in increased wear.

4.10 Current collector trolley towing arm

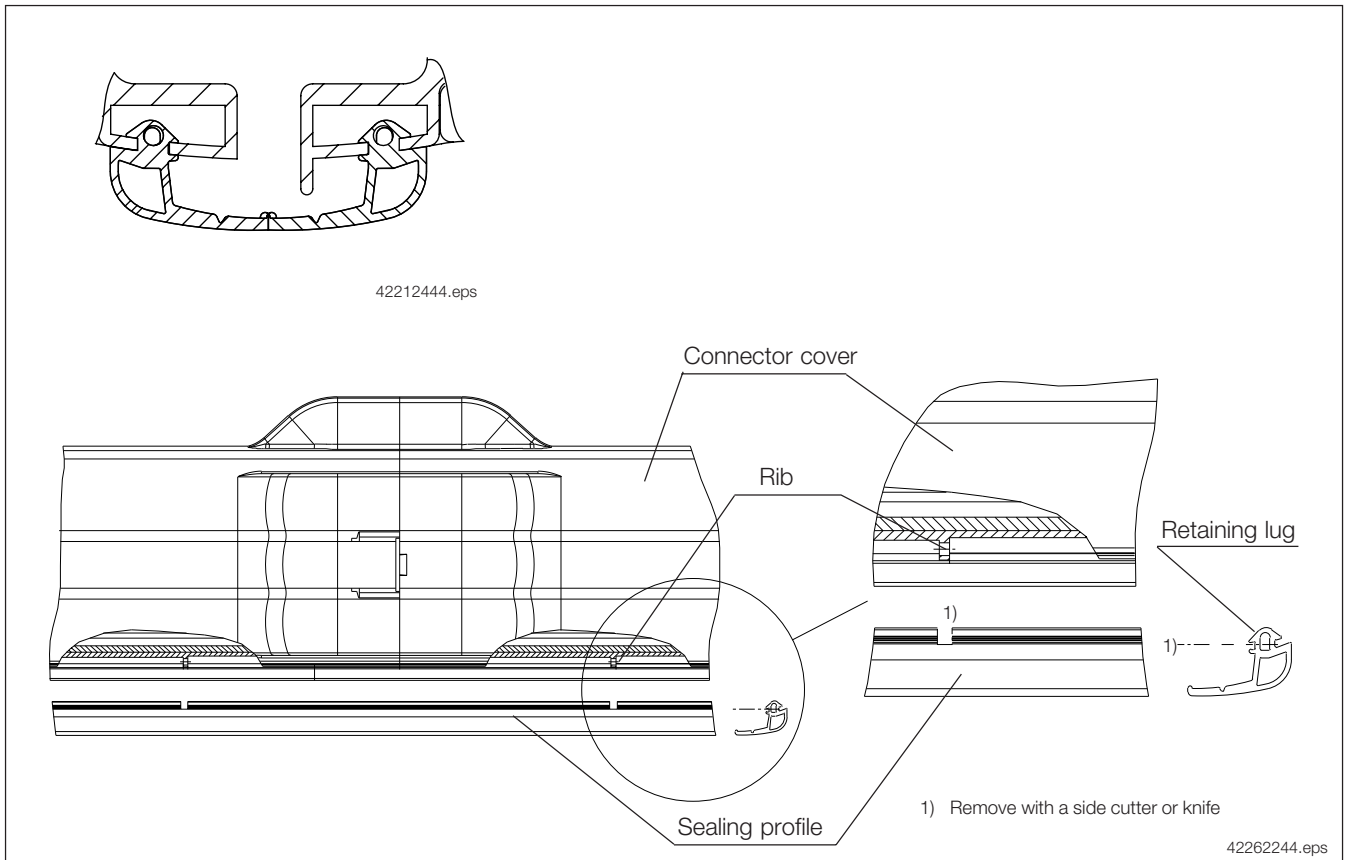


4.10.1 Fitting the towing arm

Insert both pins of the towing arm into the current collector trolley.

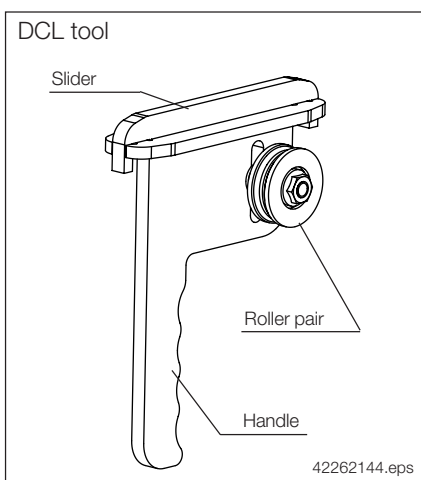
The towing arm must be fitted in such a way that any horizontal and vertical displacement in relation to the consumer does not result in any forces acting on the current collector trolley.

4.11 DCL profile sealing lip



Disconnect the DCL installation from the power supply before fitting the profile sealing lip.

4.11.1 Fitting the profile sealing lip



The profile sealing lip is supplied on rolls in lengths measuring 40 m.

Profile sealing lip sections have to be bonded together at the joints using cyanoacrylate glue (part no. 000 383 44) for longer DCL tracks.

Ensure the bonding surfaces are clean and fit together.

The end cap/connector end cap and current collector trolley should not be fitted.

Assembly is facilitated by use of the DCL tool.

Lubricate the retaining lug of the profile sealing lip with a silicon-free lubricant (e.g. domestic detergent, liquid soap).

Push the profile sealing lip into place on the zipper principle.

The connector covers have small ribs cast into the profile sealing lip slots.

A small slot has to be cut in the profile sealing lips at this point (with a side cutter or knife) as they cannot otherwise be fitted.

The current collector trolley must be prepared for DCL with profile sealing lip.

Open the terminal box on the current collector trolley and separate the upper terminal box enclosure half on the prepared openings by means of a knife (prepared openings see fig., section 5.3.3).

Introduce the current collector trolley into the DCL and fit the end cap/connector end cap.

Insert each profile sealing lip approx. 50 mm into the relevant end caps/connector end caps.

Ensure the retaining lugs are correctly fitted.

Do not twist profile sealing lip during assembly.

Only use current collector trolley prepared for profile sealing lip.



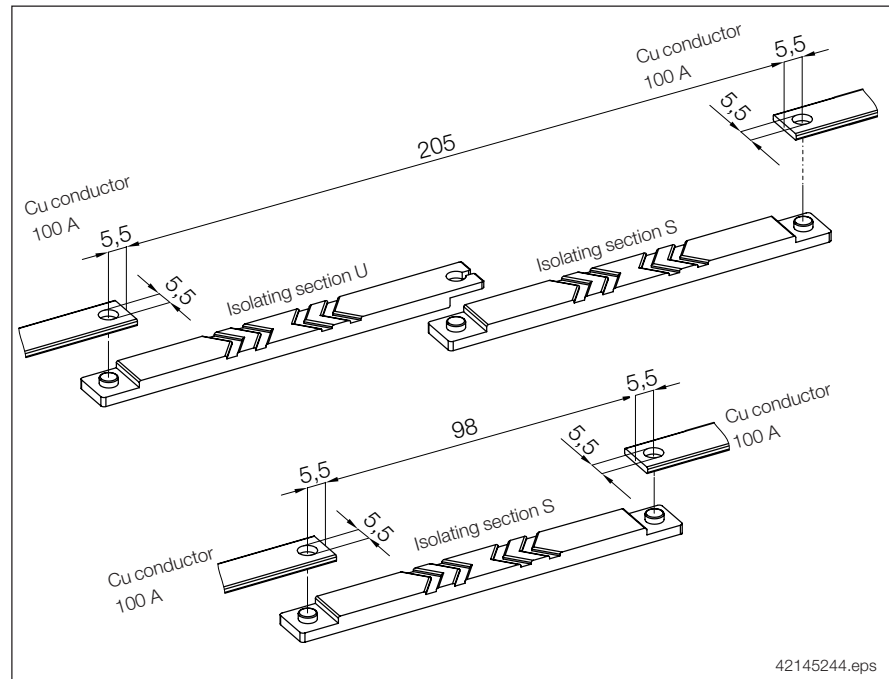
4.12 Isolating section

For control purposes, the DCL conductor line can be interrupted by means of isolating sections on straight sections or line feeds.

The isolating section can be fitted in the factory or on site.

If the isolating sections are fitted in the factory, the following detailed information is required:

- position of the isolating section/sections in the installation
- conductor no.
- length of each isolating section



4.12.1 Fitting on site

Depending on the length of the isolating distance, one or more isolating sections can be fitted.



- Pull the copper conductor to be interrupted out of the PVC conductor line enclosure.
The isolating sections can only be combined with 100 A copper conductors, if required, the existing copper conductor must be replaced by a 100 A copper conductor.
- Shorten the copper conductor on the predetermined point by the length of the isolating sections to be fitted.
- Bore 5,5 mm holes into both ends of the separated copper conductors (for dimensions see figure above).
- Connect the isolating section(s) to the copper conductor.
- Slide the copper conductor with the isolating section into the DCL enclosure.
Avoid ripples and kinks of the copper conductor.
- Fit joint connectors and insert DCL section into the track.

4.13 Installation instructions for DCL curved section

Curved sections are generally assembled and completed in the factory. If dispatch of the assembled system is not possible as a consequence of a large overall curved section length, the system is assembled directly at the customer's.

In the following, instructions for easy assembly of the system at the customer's are provided.

All curved sections are completed in the factory and assembled to their complete length. If necessary, they are dismantled again after checking and packed safely for transportation.

The curved section components comprise a left-hand and a right-hand curved section with connector cover and bolted connectors and no or one or several centre curved sections (depending on the angle, radius and overall curve length).

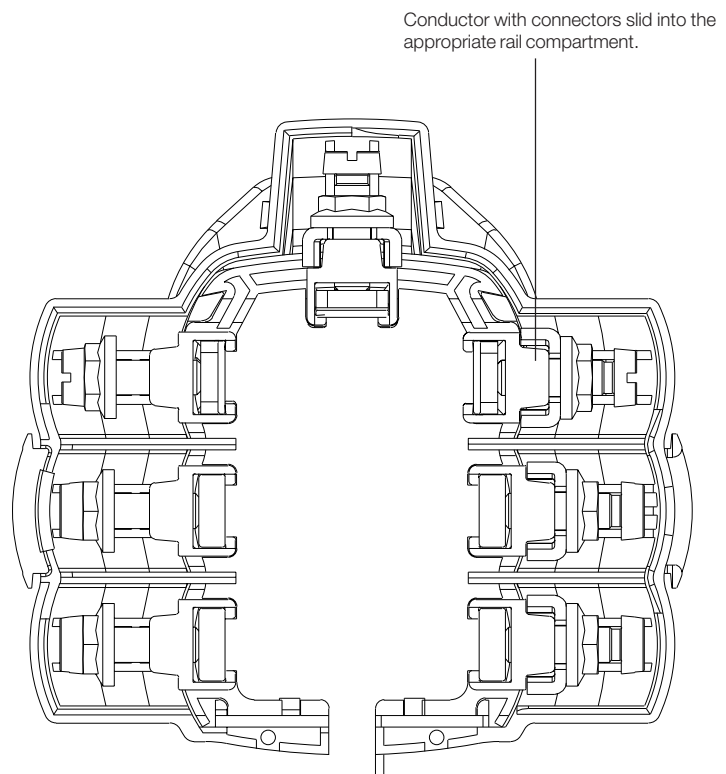
Assembly of the entire curve includes drawing in the copper strips (conductor) and bolting of the enclosure parts by means of the enclosed or pre-assembled connector covers.

For combination of the sections, refer to the shipping documents and the packages included in the delivery. If the curve consists of more than 3 sections (see above), every section is identified with a letter in the sequence of assembly.

The copper strips (conductors) that must be drawn in are also identified. The figures applied on the conductors correspond to the figures on the curved sections and the conductor fittings in the profile sections.

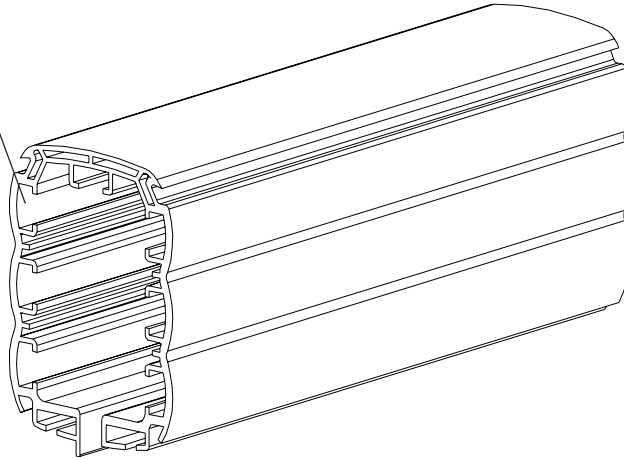
Example: Slide figure 1 of the conductor into the conductor compartment with figure 1.

View into the fully assembled DCL enclosure profile



View of DCL enclosure profile with conductor compartments

Conductor compartments identified by hand with figures.

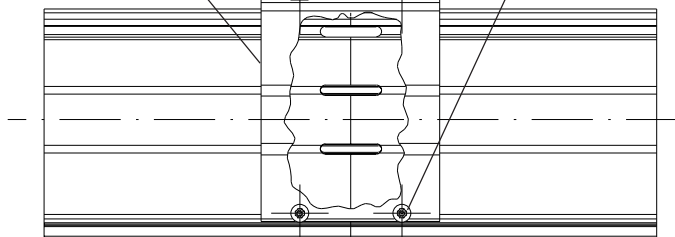


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View of DCL enclosure profile with fitted connector cover

Connector cover fitted on enclosure profile.

St 3,5 x 6,5 -C-H self-tapping screw, 6 off
Part no. 351 850 99



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The conductor can be fitted by sliding or drawing it in. If required, the conductors may also be drawn into the relevant sections segment by segment.

When the copper conductors have been fitted into the entire curve, connect the curve sections with the connector covers and the screws included in the delivery. Bolt the connector covers onto the DCL enclosure profiles.

As the last assembly step, fit the connectors included in the delivery on the copper conductors.



Use only the enclosed assembly material /self-tapping screws, etc. as there is a risk of accidental contact with live parts if longer screws are used.

5 Removal and maintenance

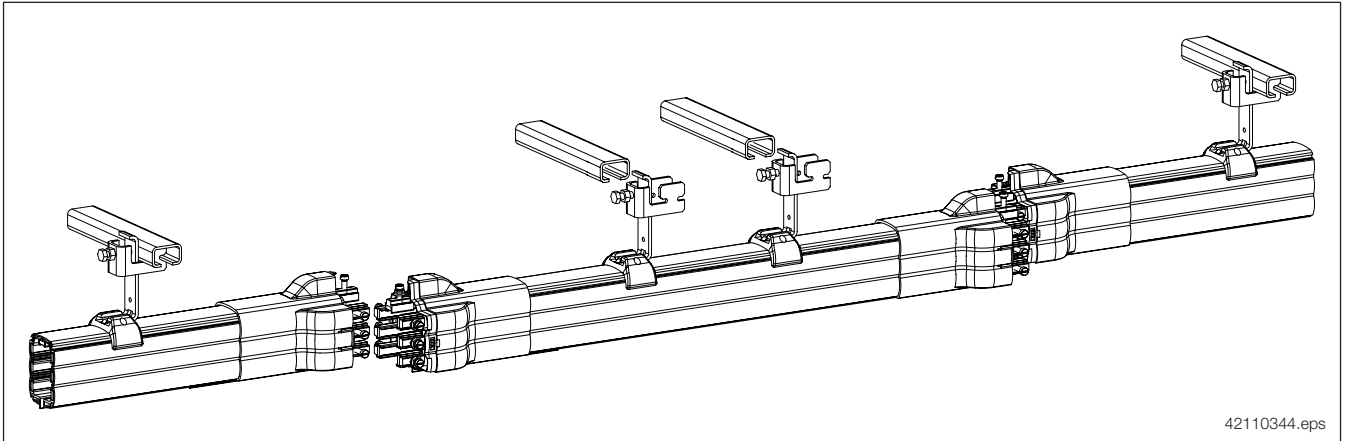
5.1 Check before starting work



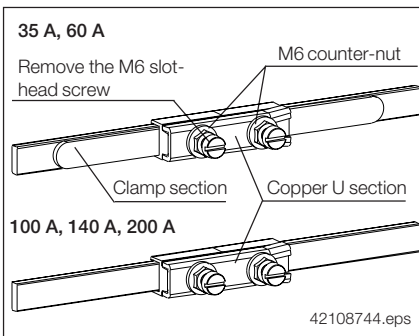
The DCL installation must be disconnected from the power supply before maintenance and installation work is carried out. This must be checked by the specialist personnel who do the maintenance and installation work.

5.2 DCL straight sections

5.2.1 Removal



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Open the connector covers:

1. Undo the two side clips between the covers using a screwdriver.
2. Pull the connector covers apart.

Remove the DCL section:

3. Loosen all M6 counter-nuts.
4. Loosen and completely remove the M6 slot-head screws **opposite the cut-out in the copper U section** (see diagram on the left).
5. Remove the copper U sections by pushing them aside.

Loosen the suspensions:

This can only be done by two fitters as there is otherwise a **risk that the section may be dropped**.

For further disassembly from

- 6a. Suspension from C rail, or
- 6b. Suspension from threaded pin, see below.

6a. Suspension from C rail

- Loosen the M8 counter-nut on the clamp section.
- Unscrew the M8 hexagon screw until the mounting bracket fits through the clamp section and the DCL section can be removed by **two fitters**.

6b. Suspension from threaded pin

- Loosen the lower M8 counter-nut on the threaded pin.
- Remove the upper M8 hexagon nut so that two fitters can remove the DCL section.

Re-install or replace the DCL section in reverse order to that described above when maintenance or repair work has been completed.



Ensure the conductors are in contact with each other when installed.

See also section 4.1.1 or 4.1.2 to sections 4.2.1 for installation.

5.3 Current collector trolley

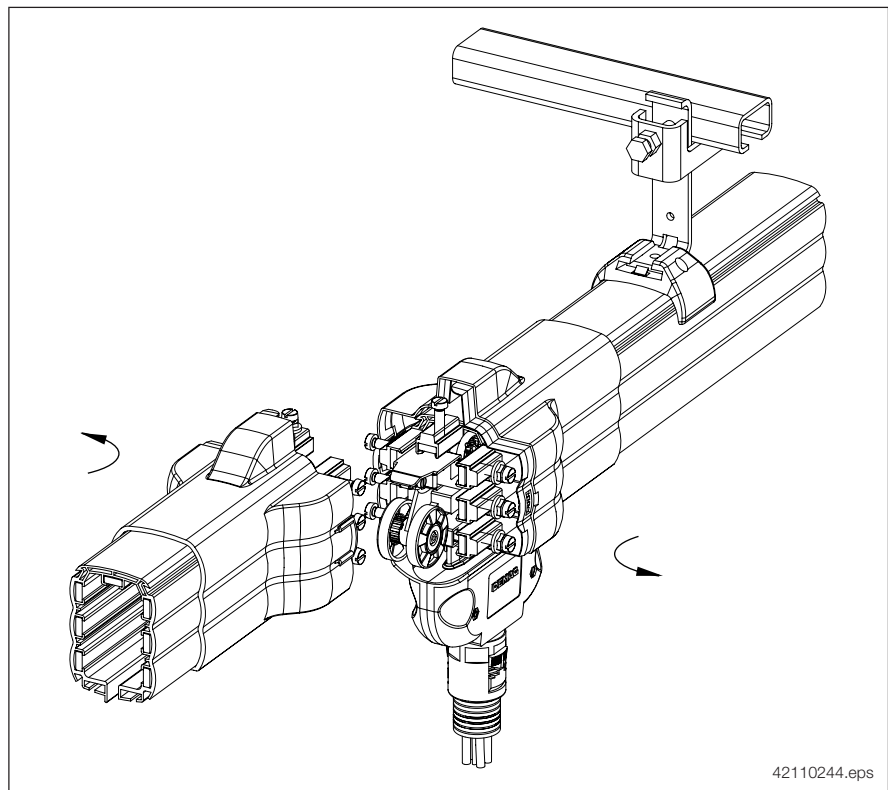
5.3.1 Visual check for wear

1. Position the current collector trolley so that it straddles a joint between two sections.
2. Open the connector covers:
 - Undo the two side clips between the covers using a screwdriver.
 - Pull the connector covers apart.
3. Check the condition of the current collector trolley, in particular the sliding contacts.

If the visual inspection indicates that **the current collector trolley needs to be removed**, proceed with removal in **section 5.3.2, item 2**.

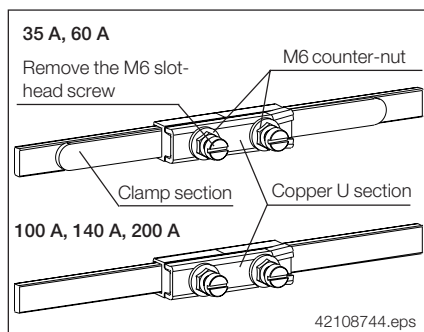
Re-connect the sections in reverse order.

5.3.2 Replacing the current collector trolley



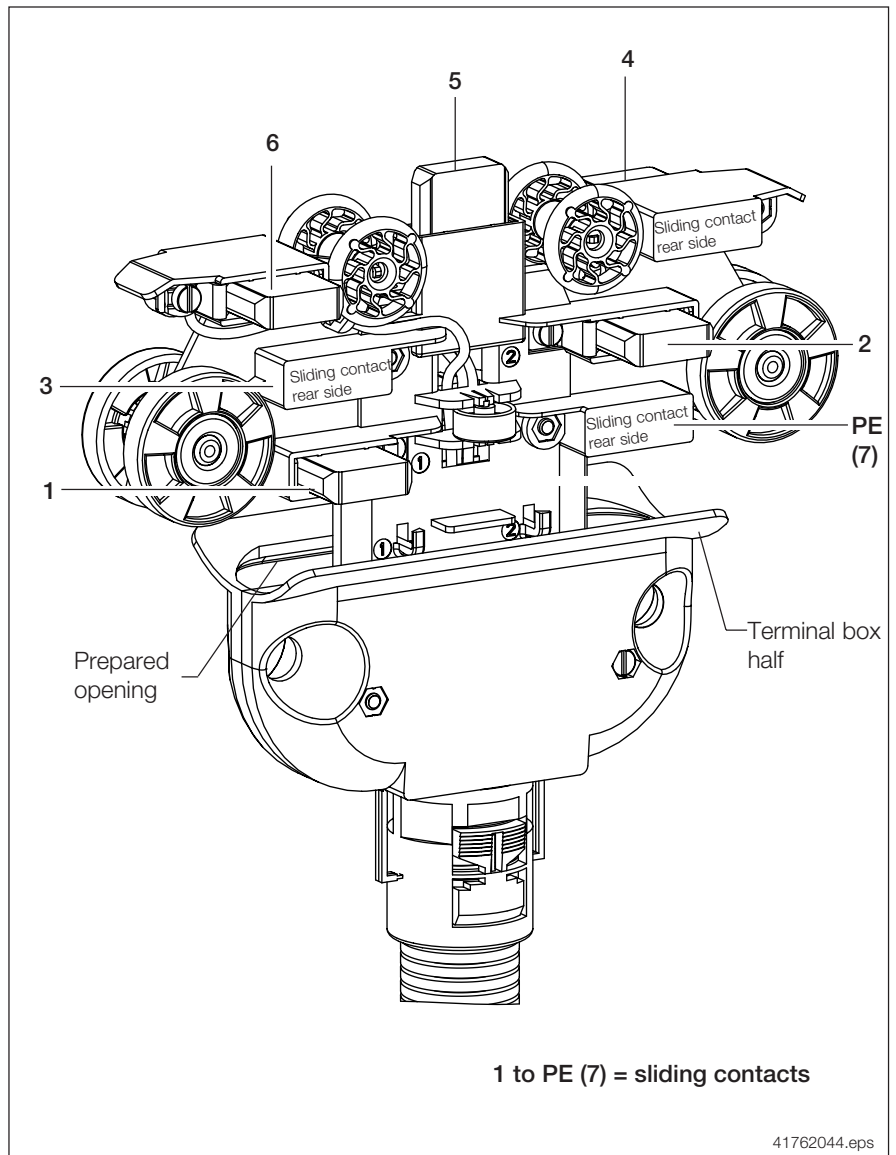
The following steps are only necessary if, for design reasons, the current collector trolley cannot be removed at either end of the DCL installation.

1. Open the connector covers:
 - Undo the two side clips between the covers using a screwdriver.
 - Pull the connector covers apart.
2. Disconnect the connectors:
 - Loosen all M6 counter-nuts.
 - Loosen and completely remove the M6 slot-head screw **opposite the cut-out in the copper U section** (see diagram on the left).
 - Remove the copper U sections by pushing them aside.
3. Remove the towing arm fitting for the current collector trolley.
4. Pull the ends of the sections apart in the horizontal direction as shown above until the current collector trolley can be removed.



Re-install or replace the current collector trolley in reverse order to that described above when maintenance or repair work has been completed. See also section 5.3.3 Replacing the sliding contacts.

5.3.3 Replacing the sliding contacts



Replace the sliding contacts on the current collector trolley as follows:

1. Loosen and remove the M4 slot-head screws on the sliding contacts.
2. Remove sliding contacts 1 – PE (7).
3. Fit new sliding contacts 1 – PE (7). Pay attention to the correct arrangement of the connecting cables to sliding contacts 4, 5 and 6 with an external cable connection.
4. **Ensure the sliding contacts are correctly assigned.**
Use sliding contacts 2 and 3 with increased spring pressure for 6 and 7-pole current collector trolleys (see publication 203 387 44, section 7.2.2).
5. Secure the sliding contacts using M4 slot-head screws with a tightening torque of 1,2 Nm.



5.3.4 Preparing the terminal box half

The current collector trolley must be prepared for DCL with entry/transfer funnels or profile sealing lips. Open the terminal box on the current collector trolley and separate the upper terminal box enclosure half on the prepared openings by means of a knife (prepared openings see figure above).

6 Component parts

6.1 Straight sections and accessories

6.1.1 Component set for sliding suspension with C-rail bracket

Designation	Part no.
Sliding suspension	876 638 44
Mounting bracket	
C-rail clamping section	

6.1.2 Component set for sliding suspension with M8 threaded pin

Designation	Part no.
Sliding suspension	876 637 44
Fitting	
Lock nut M8 (2 pcs.)	
Countersunk screw M8 x 70	

6.1.3 Component set for conductor connector

Designation	Quantity	Part no.
Conductor connector U section	1	876 693 44
Conductor connector lug	2	
Round head screw M6 x 20	2	
Lock nut M6	2	
Clamp section 1)	2	
Round head screw M6 x 22	2	

Per conductor / pole one set of components is necessary

6.1.4 Isolating sections

Designation	Part no.
Isolating section U 2)	876 676 44
Isolating section S 2)	876 678 44

1) Clamp section not required for 100 A, 140 A and 200 A conductors.

2) off, isolating section S = 97 mm isolating distance

off, isolating section S + off, isolating section U = 205 mm isolating distance

The isolating distance can be extended by adding further isolating sections (isolating section U) (see assembly instructions 214 399 44, section 4.12).

6.2 Current collector and current collector trolley



The parts listed below are subject to a greater or lesser amount of wear while a current collector trolley is in operation.

Wear depends on various factors and is not determined by the current collector trolley operating period alone.

Preventive maintenance is therefore required.

Worn current collector trolleys or other components must be replaced immediately.

Sliding contact set bronze or graphite

Sliding contact sets DCL - SAW - 4 + 5 / 6 + 7 - 40 A, bronze	
Designation	Part no.
Sliding contact set 5-pole 40 A (for 4 + 5-pole SAW)	876 715 33
Sliding contact set 7-pole 40 A (for 6 + 7-pole SAW)	876 716 33
Sliding contact sets DCL - SAW - 4 + 5 / 6 + 7 - 20 A, graphite	
Designation	Part no.
Sliding contact set 5-pole 20 A (für 4 + 5-pole SAW)	876 717 33
Sliding contact set 7-pole 20 A (für 6 + 7-pole SAW)	876 718 33

Sliding contact set bronze / silver-graphite

Sliding contact sets DCL - SAW - 5 / 6 + 7 - 40 A, bronze / 20 A silver-graphite³⁾	
Designation	Part no.
Sliding contact set 5-pole 40 A / 20 A (for 5-pole SAW)	876 726 33
Sliding contact set 7-pole 40 A / 20 A (for 6 + 7-pole SAW)	876 727 33

Line power feed set

Designation	Qty.	Part no.
Connection side 70 DCL (enclosure front parts)	2	876 532 33
Centre part (enclosure side parts)	2	
Entry spout PG 21	1	
Entry spout PG 42	1	
Hex. nut M6	2	
Cyl. screw M6 x 12	2	

End power feed set

Designation	Qty.	Part no.
End cap	2	876 534 33
Connecting cap DCL-AK-16	2	
Entry spout PG 21	4	
Self-tapping screw ST 3.5 x 9.5	6	

- 1) Sliding contacts power + control conductor: bronze
- 2) Sliding contacts power + control conductor: graphite
- 3) Sliding contacts power: bronze
Sliding contacts control conductor: silver-graphite