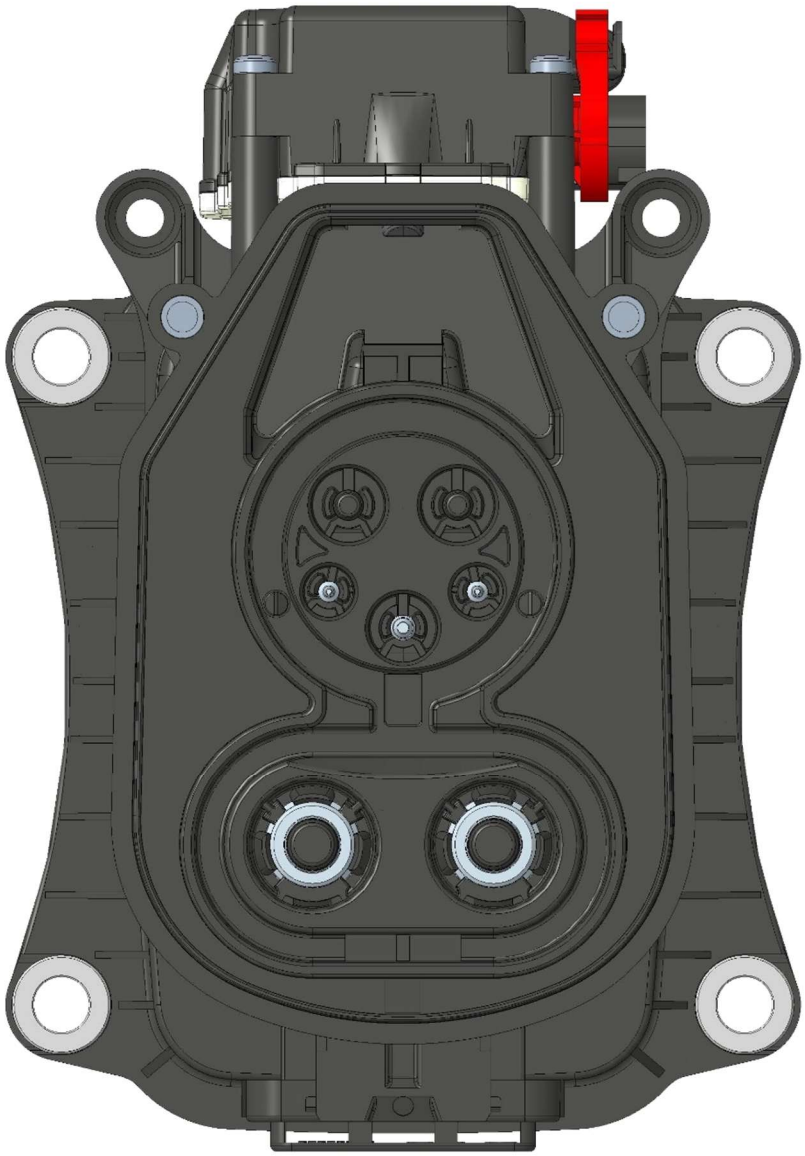
Class 1

Application Specification Vehicle Charge Inlet Type CCS1 Box Mount



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1. SCOPE

1.1. Content

This specification describes the assembly and handling of the vehicle charge inlets Combo 1 acc. IEC62196-3 for conductive charging of electric vehicles with DC current for fast charging. This specification applies to manual assembly of the components in series production configuration.

1.2. Processing Note

The processor is responsible for the quality of the manufacturing process to ensure the correct function of the system. The warranty and liability are excluded if quality deficiency or damages occur due to non-compliance to this specification or use of not specified or not released tools, cables, and components.

2. APPLICABLE DOCUMENTS

The following technical documents, if referred to, are part of this specification. In case of a contradiction between this specification and the product drawing or this specification and the specified documentation, the product specification has priority.

2.1. TE Connectivity Documents

a) Customer drawings for inlet type Combo 1

CHARGE INLET KIT ASSY WITH / WITHOUT AC AND WITHOUT LED CCS1	
CHARGE INLET KIT, COMBO1, BOX MOUNT	2480725
PIN CONTACT, DIA 2.8, PE (25 mm²)	2293267
PIN CONTACT, DIA3.6, L/N, ASSY (16 mm²)	2293266
MICRO MNL	794617
4 POS MQS	967640
ACTUATOR UNLOCK PULL CABLE ASSEMBLY	2390301

Table 1

b) Specifications

108-94987	Product Spec. Vehicle Charge Inlets Combo 1
114-13000	Application Specification Micro Mate-N-Lock Connectors
108-94519	Product Specification Vehicle Charge Inlet Actuator
114-18061	Specification MQS Connectors sealed

2.2. General Documentation

Cable Specifications of Prescribed Cables

AC-cable: cross-section 16,0mm²

Supplier	Coficab (Cofflex)
Outer Diameter	6.4 to 7.2 mm
Min. bending radius	3xD (static)
Cable description	Unshielded single core XPO E-beam cross linked Supplier
Part No.:	HCF4SR164500

PE-cable: cross-section *25* mm²

Supplier	HUBER+SUHNER
Outer Diameter	8.20mm ±0.20 mm
Cable description	AUTOL 155 25MM2P GNYE
Supplier Part No.	85066283

Signal-cable: cross-section 0,5 mm²

Supplier	Several
Outer Diameter	1.6-0.2 mm
Cable description	*FLRY-0.5 A*
Supplier Part No.:	515274

3. APPLICATION TOOLS

To produce a correct wire crimp, as validated by TE with the wires listed in this specification, following application tools are required.

Wire Size [mm²]	Stripping Length single wire for crimp [mm]	Crimp /WELD height CH_1 [mm]	Cable Specification	Supplier	Contact P/N	Geometry	Applicator	TE Crimp Validation is based on crimp press stroke / cycle time
0.5	3.2 ± 0.1	0.89 ± 0.05	FLRY-A 0.5mm²	SEVERAL	0-794606-1	F	2151022-1	G-Terminator PN 354500-1 Cycle Time:<500ms
16	16 ± 0.5	4.6 ± 0.1	Unshielded single core XPO E-beam cross linked	COFICAB (COFFLEX)	2293266-9	W	2380196-1	Hanke 971-200. Cycle time: 1.7 - 2.5s Stroke: 44mm
25	18,0 ± 1	6,3 ± 0,1	AUTOL 155 25MM2P GNYE 25 mm²	HUBER+ SUHNER	2293267-5		2276149-6	

Table 2

Crimp Die Sets are subject to wear and their condition and quality must be monitored. Suspect and/or worn Die Sets have not to be used for the production of these crimps. Die Sets are available as spare parts.

4. WIRES

4.1. Assessment of the wires

To ensure the required electrical crimp contact ability with stable crimp resistance a permissible maximum storage period of 8 months for unprocessed cable (referring to cable manufacturer production date) has to be respected.

4.2. Wire selection

The contact system is released for the application with wires specified in chapter 2.2
The released contact-wire-combinations and crimp parameters are given in table 2.
Other wires require the validation and approval of the TE engineering department.
The wires are applied as single wire terminations. Double terminations are not intended.

4.3. Wire preparation

The cable has to be cut accurately with a 90 deg angle.
The cable insulation must be stripped before crimping. The stripping length of the outer insulation and shield is defined in the following Assembly Steps.
The insulation must be cut accurately and pulled off from the conductor. Offcut of insulation must not remain on the conductor. Single strands may not be damaged, fanned out, cut or pulled out. Furthermore, the operator should avoid touching the bare single strands and the strands shall not be twisted. All single strands need to be caught in the crimp and not a single strand must remain outside the crimp.

5. REQUIREMENTS ON THE CRIMPED CONTACT WITH W-CRIMP SHAPE (CLOSED BARREL)

The following terms shown below are used in this specification, see Figure 1.

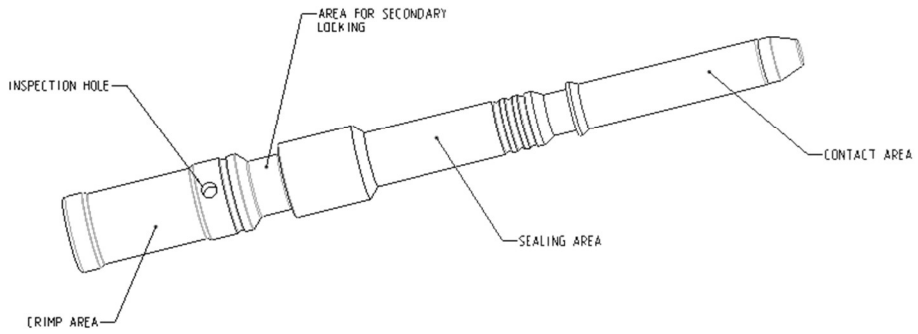


Figure 1

5.1. Conductor position

The single strands of the conductor are clamped inside the crimp area. All single strands need to be caught in the crimp and not a single stand must remain outside the crimp.

The wire end must be fully inserted into the crimp area and has to be checked via the inspection hole after crimping. Insulation must not be inside of the crimping area, see Figure 2

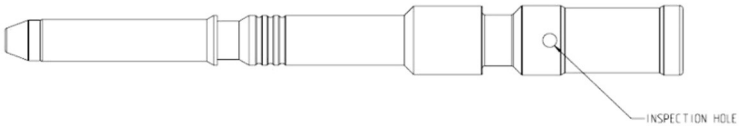


Figure 2

5.2. Crimp Geometry

The crimp geometry, crimp heights including their corresponding tolerances as well as wire sizes are given in table 2.
The crimp height is the key quality feature of a crimp connection. The measurement allows a non-destroying examination and a continuous process inspection. It is provided for every wire size and contact.
The crimp height is given in table 2.

Crimp height and width may also be measured in a cross-section image. The mechanical operated measurement though is preferred.

During the application process the crimp height must be checked. This is valid for each batch and after every change or switchover of contact reel or wire bundle or applicator respective it's setup or components.

The crimp height has to be measured over both extensions in middle of the crimp, Figure 3:

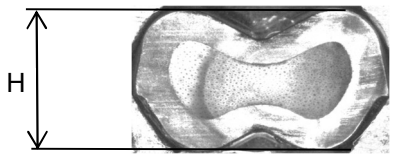


Figure 3 (picture exemplarily)

5.3. Cross Sections

When creating cross-sections, the correct grinding layer must be selected. The Grinding layer had to be at middle of crimp area and may not be inside of serration, see Figure 4.

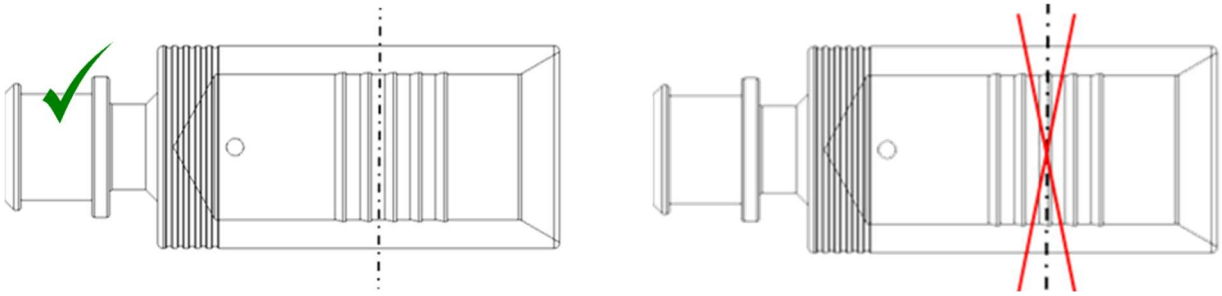


Figure 4 (picture exemplarily)

5.4. Wire pull-out forces

Measurement of wire pull-out forces from the wire crimp is a supporting manufacturing control.
The pull-out forces must fulfil the requirements according to application specification 114-94391.

5.5. Crimp Position

The TE applicator positions the contacts in the crimping tool at middle position as shown, Figure 5 and 6.
Correct position and condition of applicator has to be checked for every production lot.

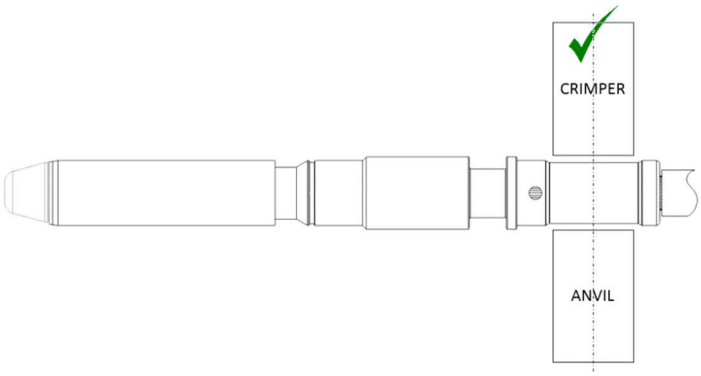


Figure 5 (picture exemplarily)

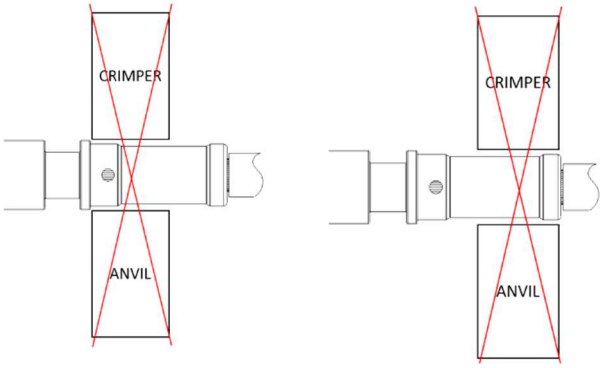


Figure 6 (picture exemplarily)

5.6. Contact area

During processing and following processing, the contact area may not be damaged or bended.

5.7. Sealing area

During processing and following processing, the sealing area may not be damaged or bended

5.8. Shape and position tolerances

Measuring the shape and position deviation is not always necessary if the contact is obviously straight by eye. In case a measurement is required, the measurement equipment required at least a 10-time better measuring precision compared with the requirement tolerances, see Figure 7 and 8.
Meeting the specific shape and position tolerances must be ensured before the contact is inserted into the housing. If contacts are bent during the application process and exceed the specified tolerances these must not be bent back or reworked but must be scrapped.

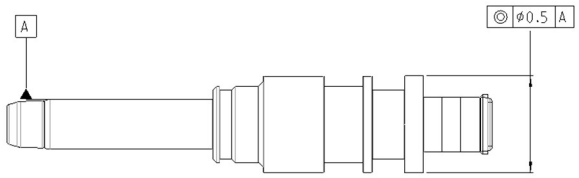


Figure 7 (picture exemplarily)

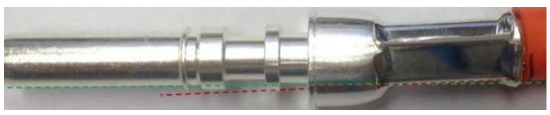


Figure 8 (picture exemplarily)

5.9. Measuring equipment and measuring position

As measuring equipment for measuring crimp height, a digital caliper with accuracy of measuring 0.01 mm is the minimum requirement. Measuring of crimp height had to be done according as following always in middle of crimp area across whole crimp, see Figure 9 and Figure 3.

Figure 9 (picture exemplarily)

6. ASSEMBLY OVERVIEW CHARGE INLET KIT COMBO 1

6.1. Assembly overview Charge Inlet Combo1

Charge Inlet Combo 1 without AC & without LED Kit

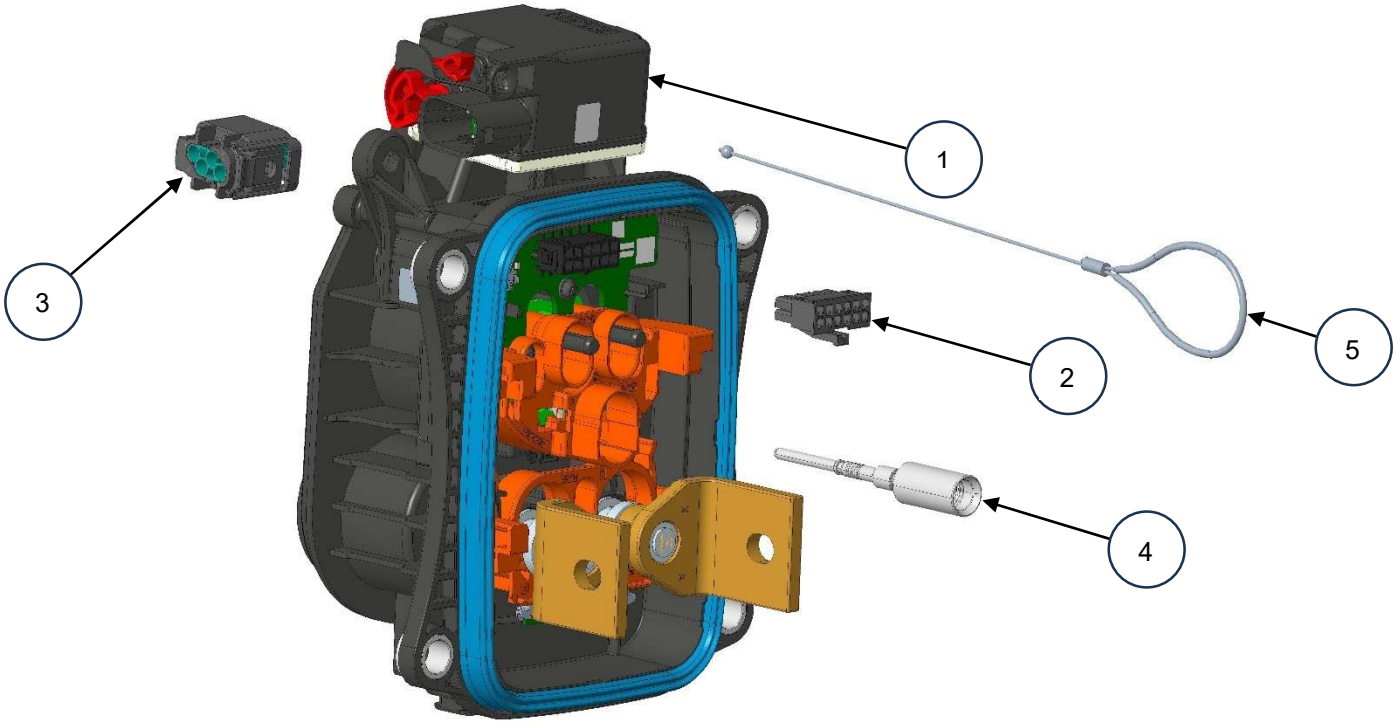
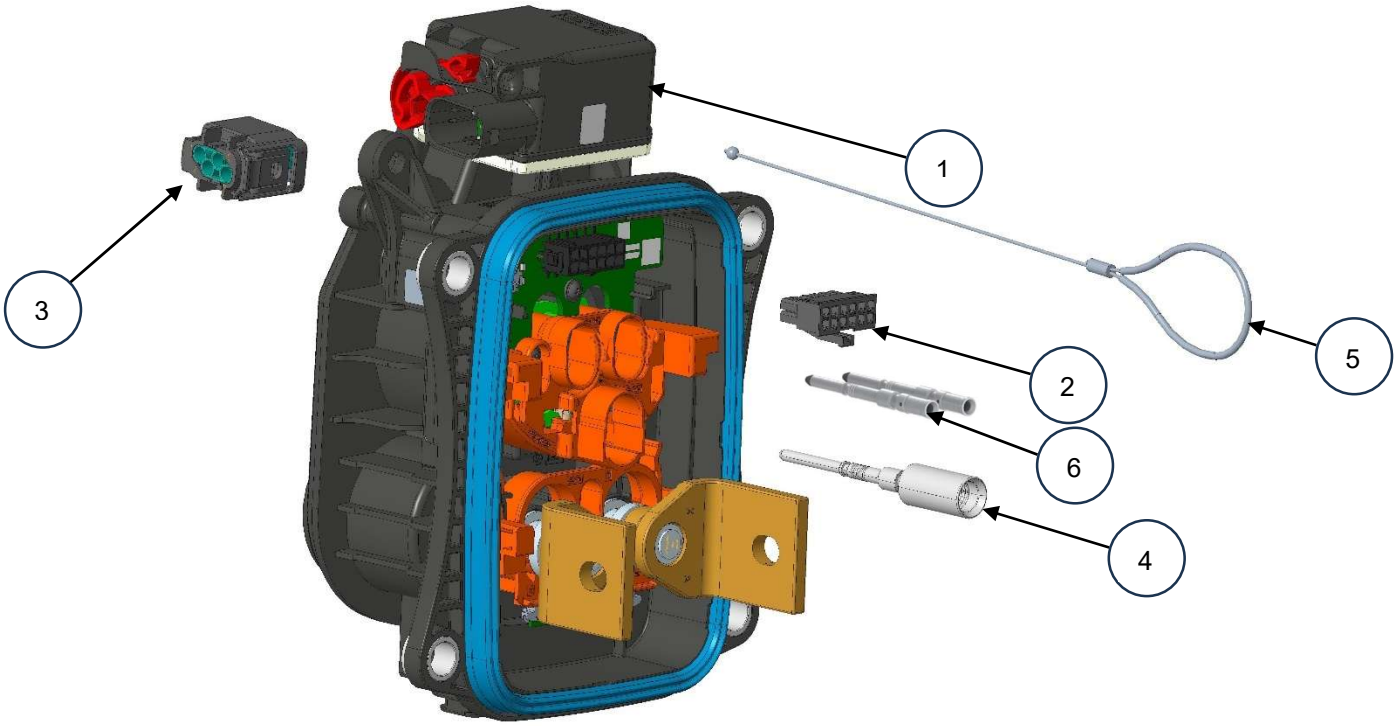


Figure 10

Charge Inlet Combo 1 with AC & without LED Kit



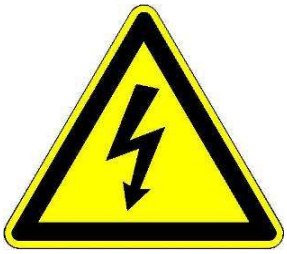
6.2. Parts to order

Pos.	Qty.	Name	C-sample Charge inlet without AC Variants	C-sample Charge inlet with AC Variants
1	1	COMBO1, CHARGE INLET ASSY	2480725-1	2480725-2
2	1	12 POS MICRO MNL HSG	Additional part for charge inlet cabling: 1-794617-2	Additional part for charge inlet cabling: 1-794617-2
	7	CONTACT MICRO MNL	Additional part for charge inlet cabling: P/N acc. Appl. Spec. 114-13000	Additional part for charge inlet cabling: P/N acc. Appl. Spec. 114-13000
3	1	4 POS MQS CONNECTOR HSG, SEALS AND CONTACTS	Additional part for Actuator cabling: P/N acc. Prod. Spec. 108-94519	Additional part for Actuator cabling: P/N acc. Prod. Spec. 108-94519
4	1	PIN CONTACT, DIA 2.8, PE (25 mm²)	2293267-5	2293267-5
5	1	ACTUATOR UNLOCK PULL CABLE ASSEMBLY	2390301-3	2390301-3
6	2	PIN CONTACT, DIA 2.8, AC (16 mm²)	-	2293266-9

Table 3

6.3. Security Advice

ATTENTION!
- HIGH VOLTAGE APPLICATION -
CABLE INSULATION MUST NOT BE DAMAGED!



The assembly has only be performed by trained personnel.

Avoid prolonged or repeated skin contact with silver plated contacts (wear protective gloves)!

ATTENTION!
ESD SAFETY REQUIRED!
THE PRINTED CIRCUIT BOARDS ARE STATIC SENSITIVE DEVICES, WHICH CAN BE DAMAGED IF TOUCHED WITHOUT THE NECESSARY ELECTROSTATIC DISCHARGE PRECAUTIONS! DURING HANDLING OF THE OPENED INLET ASSEMBLY ESD SAFETY IS REQUIRED!

6.4. Assembly Steps

Step 1– Crimping of LV signal wires and assembly to MNL connector

Strip LV single wires and crimp the corresponding contact acc. to application spec. 114-13000. See also Figure 11 and Table 4.

The single braid must not be cut or damaged during wire stripping!

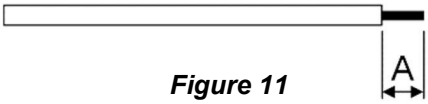


Figure 11

A (Removal of isolation)	Needed wire length inside inlet
Acc. 114-13000	NA

Table 4

Push crimped MNL contacts into the Micro MNL connector housing acc. to application spec 114-13000. Pinning acc. to Figure 12 and Table 5

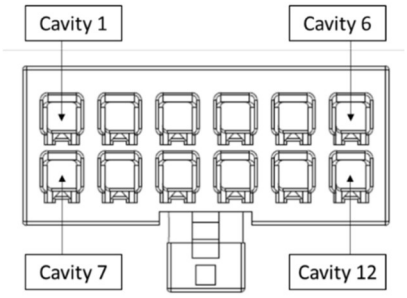


Figure 12

Cavity no.	Function
1	-
2	-
3	-
4	-
5	-
6	T DC+
7	PROXI
8	GND Temp.
9	T DC-
10	T AC
11	PE S
12	CP

Table 5

Step 2 - Dismantle the wires and crimp the contacts: **16 mm² AC- Cable**

Remove outer insolation shield and filler of AC cable acc. Figure 13 and Table 6.

Figure 13 (schematic view)

Wire Size	Removal of insulation dim. "A"
16 mm²	16 mm ± 0.5mm

Table 6

Step 3 – Crimping of PE wire

Strip PE-single wire cable acc. to *Figure 14* and *Table 7*
The single braid must not be cut or damaged during wire stripping!

Crimp the conductor to PIN CONTACT DIA 2.8 PE [Pos. 4] with the specified tools listed in *Table 2*. Care must be taken that all braids are caught in the crimp. Not inserted braids may jeopardize HV requirements Wires shall be completely inserted to be visible through the inspection hole, as shown in *Figure 15*. Crimp height CH_1 must correspond to the value in *Table 2*.

Any damage of the wire insolation must be avoided!

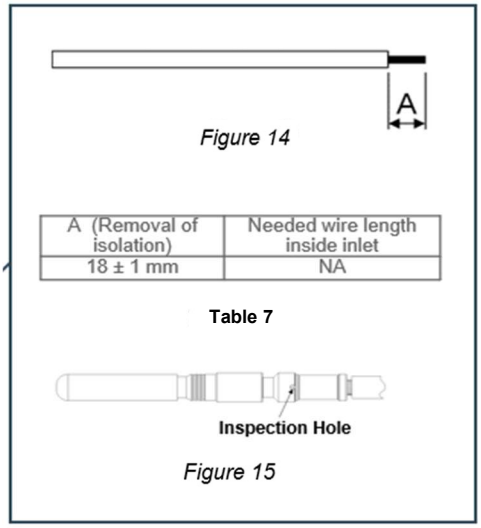


Figure 14

A (Removal of isolation)	Needed wire length inside inlet
18 ± 1 mm	NA

Table 7

Figure 15

Step 4– Assembly of contacts & connectors into inlet assembly

Insert the contacts (AC & PE Terminals with Cable crimped), into the inlet housing according to the cavity description given on the secondary locks and / or inlet housing into their locking position. It must be ensured that the contacts are correctly inserted in the primary lock which can be done by checking the audible locking click and by pulling and pushing on the cables with a low force (max. 10N).
Connect the Micro MNL Connector to the corresponding PCBA header. Ensure the latching hook is properly engaged with the header.

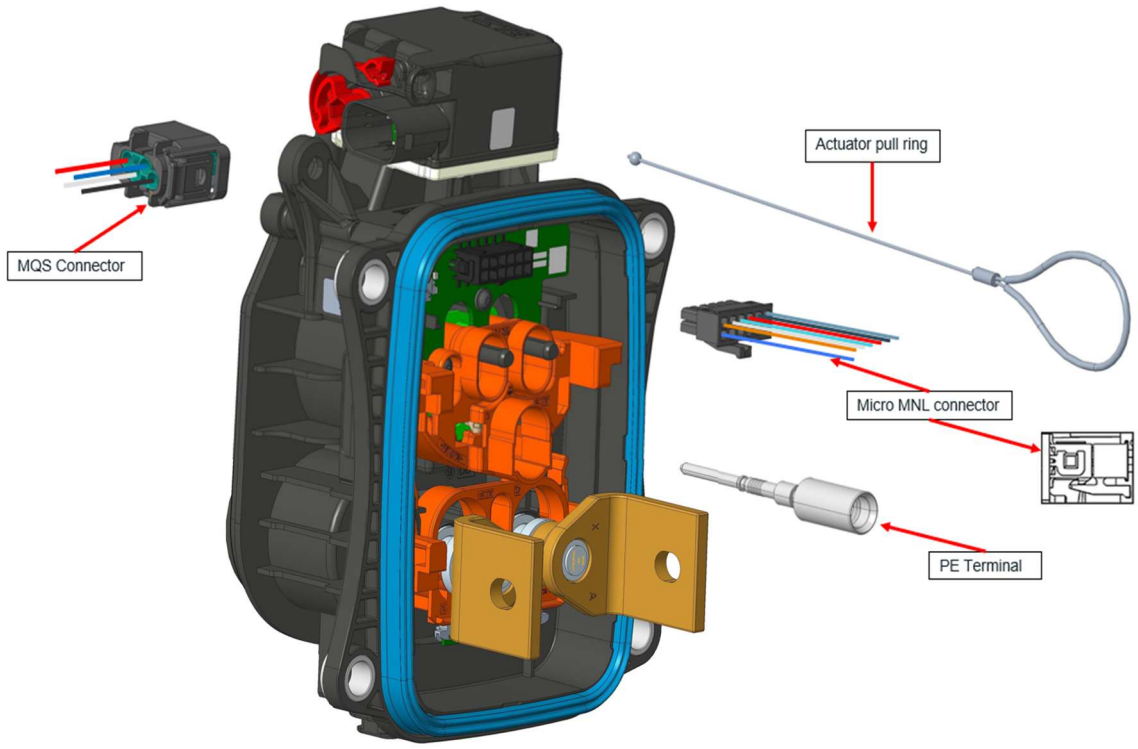
ESD safety required - The printed circuit boards are static sensitive devices, which can be damaged if touched without the necessary electrostatic discharge (ESD) precautions. During handling of the open inlet assembly ESD safety is required.

Assemble the Connector for the Actuator connection acc. to application spec of MQS-Connector. (Applicator 2151038; Die Set 5-1579001-1). Push connector on actuator housing. To ensure that the connector is correctly inserted, pull and push with a low force on the housing (max. 10N).

All above assembly to be done as shown in Figure 16 & 17.

ATTENTION: The correct contact positions must be ensured BEFORE pushing the contacts into their cavities into locking position. In case of a wrong positioning of the contacts the complete assembly must be scrapped. There is no rework allowed (risk of damaging contacts and/or locking geometry in housing)!

Non-AC Variant



AC Variant

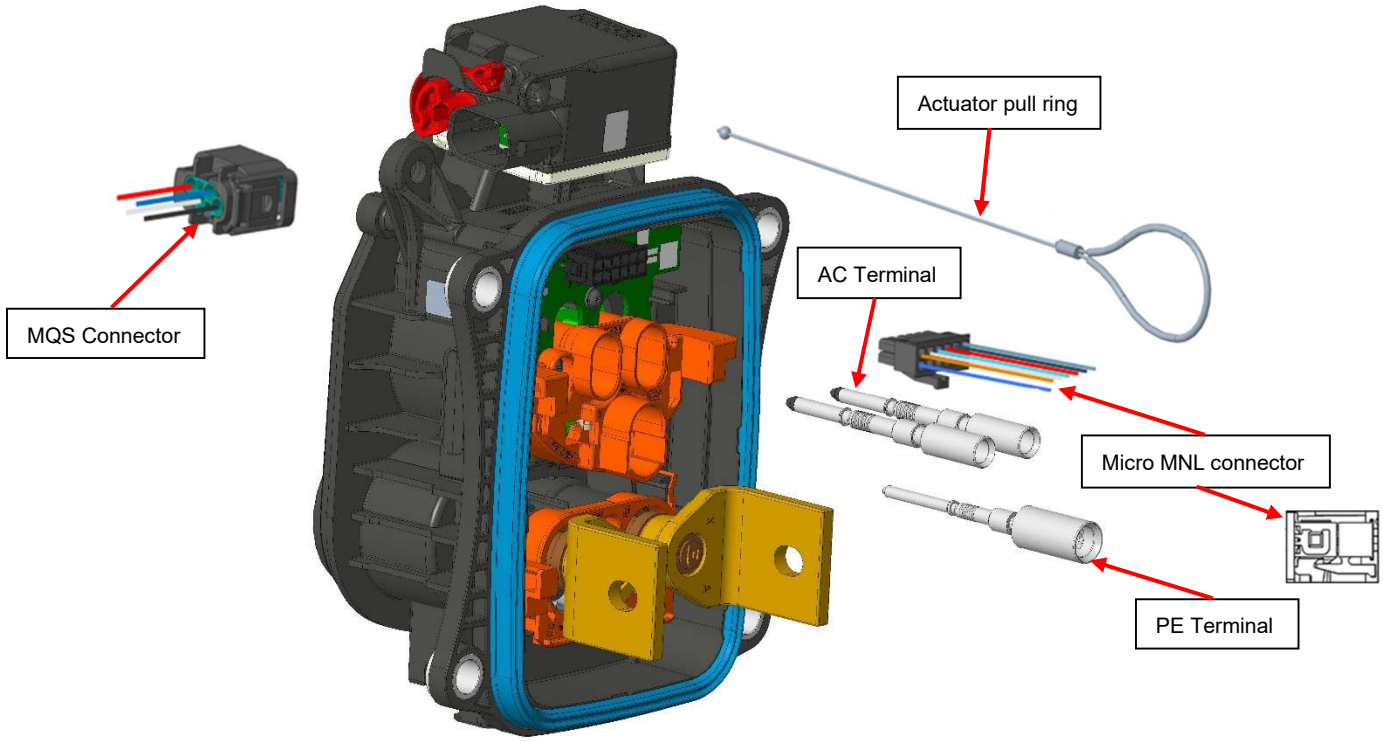


Figure 16

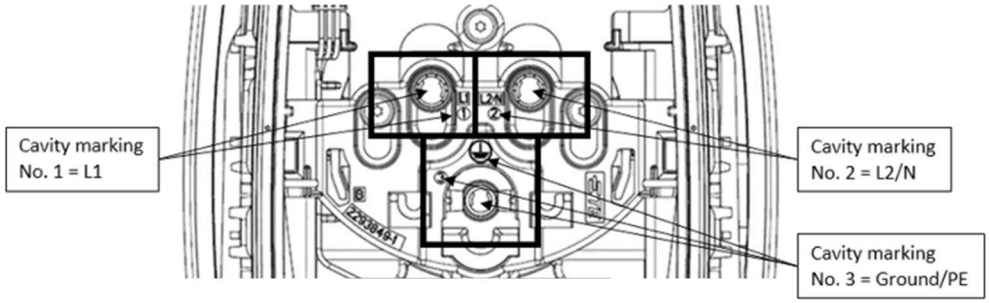


Figure 17

Step 5 - Closing the AC secondary lock

After the contacts have been controlled for correct positioning and locking, AC SECONDARY LOCKS must be pushed upwards, as shown in Figure 19. Ensure that latches are properly engaged with the inlet housing, which must be controlled by the double audible click and by an appropriate inspection. The correct end position of the AC secondary locks is shown in Figure 20.

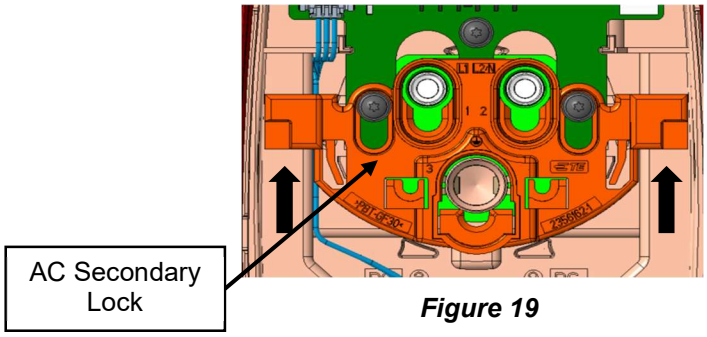


Figure 19

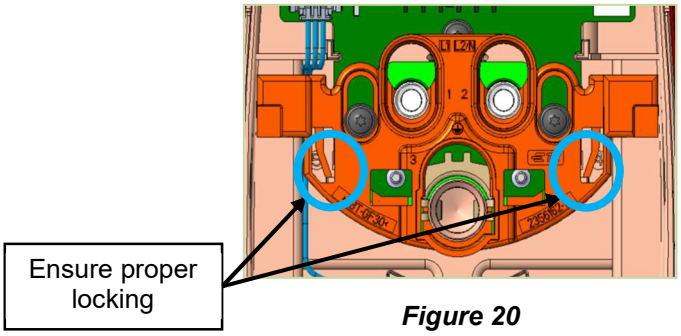


Figure 20

Step 6 - Assemble of Facial Seal.

Facial seal to be assembled to the inlet housing as shown in figure 23 & 24.

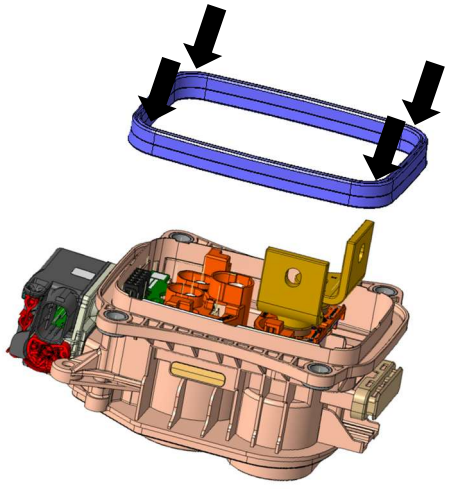


Figure 23

M6 Nut & bolt used for fastening the customer busbar.

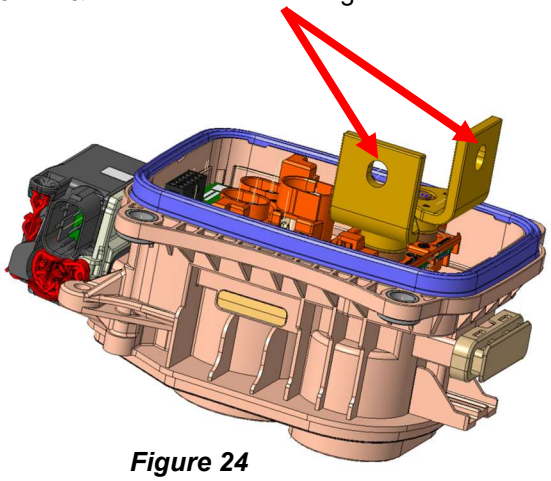
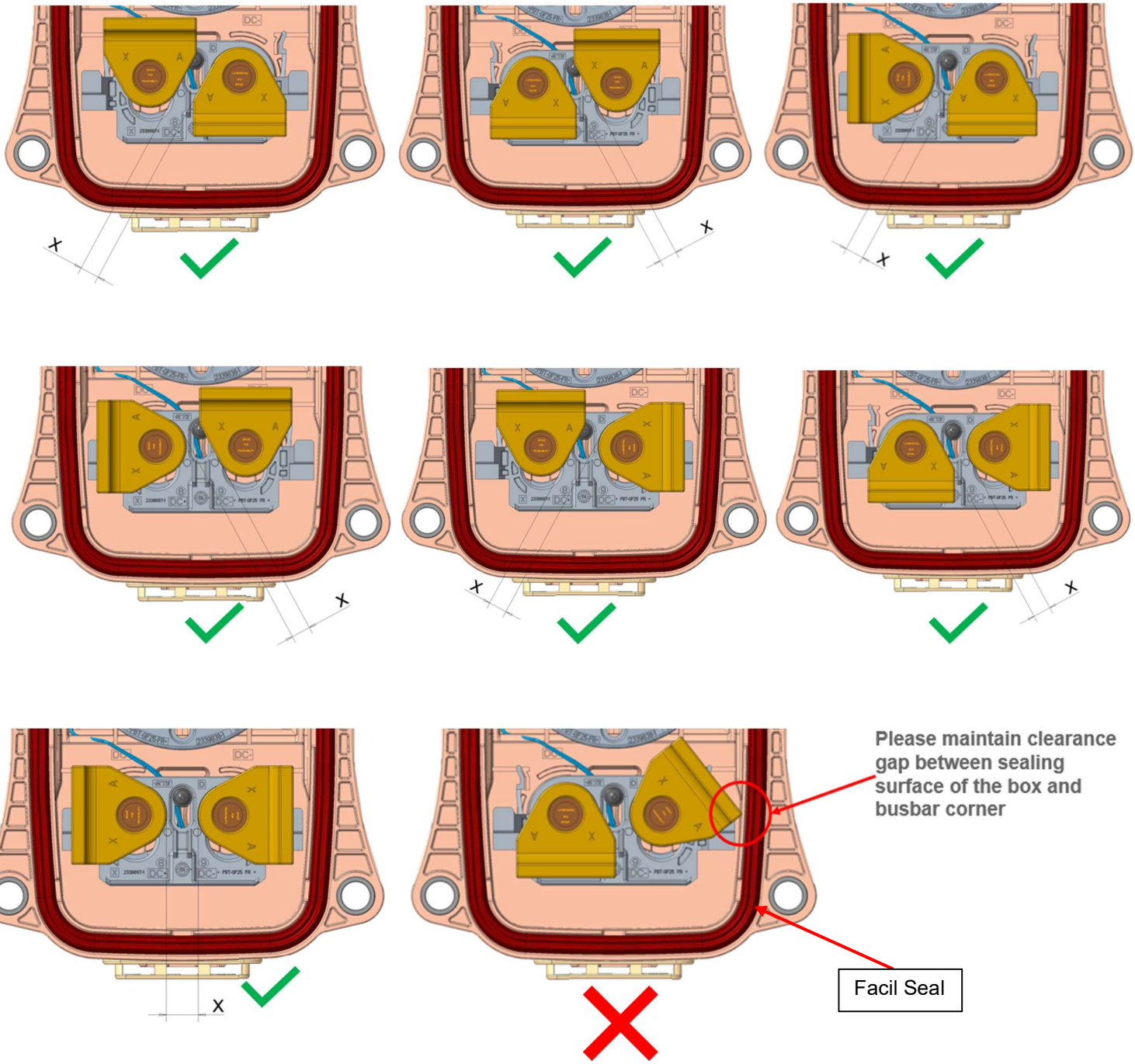


Figure 24

Possible DC terminal orientation combinations (✓)

Minimum distance (X = 3mm) between (DC +) to (DC –) considered based on clearance calculation for maximum over voltage of 2500volts. If customer or end user wants different orientations of terminals other than below mentioned, then minimum distance (3mm) must be ensured by them.
Considering: -
Pollution Degree 2
Altitude correction factor: 5000m



7.2 End of Line Test

ATTENTION: The assembled Charge Inlet must be tested electrically and mechanically to applicable requirements, including High Voltage test.

As a minimum, following tests have to be performed:

- Isolation Resistance:
  Test Voltage: 500VDC
  Inspection Duration: 1s
  min. Riso: 200MOhm
  pin-to-pin, excluding CP-to-Proxi and CP/Proxi-to-Ground
  a) L1 versus N
  b) L1+N versus Ground
  c) L1+N versus AC multicore shield
  d) DC+ versus DC-

- Dielectric withstand voltage:
  Test Voltage: 2000VAC
  Inspection Duration: 1s
  max. Leakage current: 10mA
  pin-to-pin, excluding CP-to-Proxi and CP/Proxi-to-Ground
  a) L1 versus N
  b) L1+N versus Ground
  c) L1+N versus AC multicore shield
  d) DC+ versus DC-

- Correct Pinning of all Contacts
- Functionality checks of actuator. Drive (first) in lock and (second) in unlock position. During this operation, the actuator pull ring / pull cable becomes pulled back in end position.
- Functional check of temperature sensor as per the testing parameter PCB table provided in the customer drawing.

8 TORQUE VALUE FOR M6 SCREWS

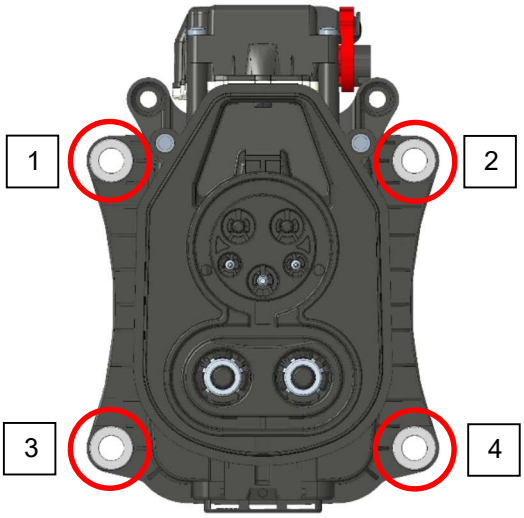


Figure 25

In the above Figure 25 shows the necessary torque 6Nm±0.9 NM for M6 screws required to maintain in all 4 mounting hole positions.

9 MINIMUM LENGTH FOR CABLE FIXATION

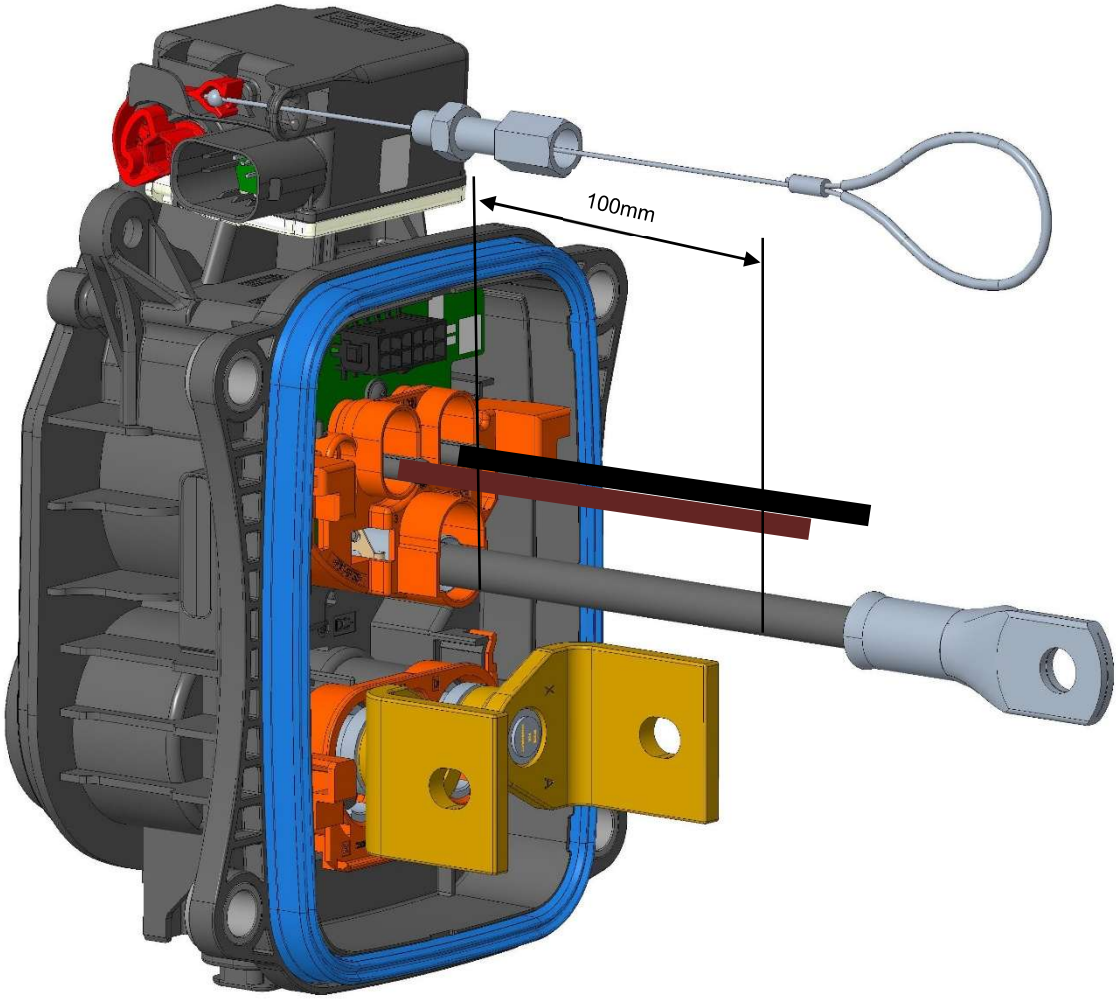


Figure 26

Fix the AC and PE cables at a distance of 100mm from the terminal crimp as shown in Figure 26, to prevent terminal misalignment at the front side.

LTR	REVISION RECORD	DWN	APVD	DATE
A	INITIAL DOCUMENT	SUBHAS H	KASHYAP P B	04 JUN 2026

DWN SUBHAS H	TE CONNECTIVITY GERMANY GMBH AMPÈRESTRAßE 12-14 D-64625 BENSHEIM CHK GERMANY		
CHK KASHYAP P B			
APVD KASHYAP P B	NO 114-97879	REV A	LOC AI
TITLE	Application Specification Vehicle Charge Inlet Type CCS1 Box Mount acc. IEC62196-3		