MEB Class 5 (2pos) unshielded

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

HISTORY OF CHANGES

Rev.	Description	Originator	Date
A	New document	Wolfgang Balles	2019-10-25
B	Update of chapter shelf life Update of assembly steps, see chapter 4	Wolfgang Balles	2020-02-05
C	Update of appendix and table 3 with new datasheet Coficab FHL2G	Wolfgang Balles	2020-11-26
D	Stripping length 26mm for 70 and 95mm²	Wolfgang Balles	2020-03-01

- **This connector is intended for use in high-voltage applications. Special care must be applied to ensure that the connector functions as intended.**
- **If you suspect that the connector has been modified, damaged, contaminated or otherwise compromised, please discontinue it use immediately.**
- **This connector should only be serviced by a trained and qualified technician.**

1 SCOPE

1.1 Content

This specification covers the requirements for assembly of the unshielded connector acc. class 5.

1.2 Processing notes

The processor is responsible for ensuring the quality of the manufacturing process and the proper function of the system. The warranty and liability is excluded, if quality deficiency or damages occurs by failing compliance to this specification or using not specified, not released tools and not released connector components.

2 APPLICABLE DOCUMENTS

The following mentioned documents are part of this specification. If there is a conflict between the information contained in the documents and this specification or with any other technical documentation supplied, the last valid customer drawings takes preference.

2.1 TE Connectivity Documents

This Application Specification based on the latest valid customer drawings.

2.1.1 Customer drawings

Table 1: Customer drawings

2pos Receptacle housing	
2328809	2POS. PCON21, REC OUTER HSG, KIT
2319933	2POS. PCON21, REC HSG. (Presented on drawing 2328809)
Single Components	
2319940	CONTACT LOCK, ASSY (Presented on drawing 2328809)
2319939	SINGLE WIRE SEAL, SWS (Presented on drawing 2328809)
2319938	STRAIN RELIEF OUTER CABLE SHEATH (Presented on drawing 2328809)
2319937	PROTECTION COVER (Presented on drawing 2328809)
2317680	PCON21 CONTACT 180deg

2.1.2 Specifications

Table 2: TE-Specifications

114-94511	APPLICATION SPECIFICATION CONTACT PCON21

2.2 General Documentation

2.2.1 Cable Specification

The connector is designed to meet cables in accordance with specification LV216-1. Connector covers metric wire sizes from 25 up to 95mm² of table A.1. Connector has been validated with cable suppliers listed in appendix.

Table 3: Cable Specification

LEONI, FHL2G00002	FHL2G 25/0,21/T180/600V AC / 1000V DC, 25mm²
LEONI, FHL2G00003	FHL2G 35/0,21/T180/600V AC / 1000V DC, 35mm²
LEONI, FHL2G00019	FHL2G 50/0,21/T180/600V AC / 1000V DC, 50mm²
LEONI, FHL2G00006	FHL2G 70/0,21/T180/600V AC / 1000V DC, 70mm²
LEONI, FHL2G00022	FHL2G 95/0,21/T180/600V AC / 1000V DC, 95mm²
COFICAB	FHL2G / Wire size 25, 35, 50, 70 & 95mm²

3 REQUIRMENTS

3.1 Safety

Do not stack component packages so high that the shipping containers buckle or deform.

3.2 Shelf Life

Conditions which comply with the environmental conditions of DIN EN 60721-3-1, standard classification IE11, should preferably be observed in the storage area. This applies particularly (though not exclusively) to the climatic conditions described therein (1K2). Furthermore, the products must be protected from rain and intensively corrosive atmospheres. The necessary temperature control of the storage location must be ensured using a suitable temperature control without compulsory humidity control. During transport to the storage location, as well as during the period of storage itself, loads on the packages/stored products (e.g. from throwing/allowing the packaged products to fall, improper stacking height, etc.) are not permitted, in order to prevent damage to the goods.

3.2.1 Contacts

Silver surfaces are provided with a protective layer ex works. This protective layer loses its protective effect after 6 months to 2 years, depending on the respective ambient conditions. This leads to oxidation of the silver and the colour changes from brown to black. This oxide layer is composed of silver sulphide and is permeated during insertion upon final assembly of the contact system, so that the electrical properties generally continue to be comparable with those of a new part.

3.2.2 Seals and plastic parts

The average shelf life of plastic housings is 15 years. In the case of insulators with sealing elements, special attention must be paid to the contamination of the sealing surfaces after extended storage, since excessive contamination can negatively impact the function of the sealing surfaces.
Seals are made from long-term stable components and can generally be stored for 15 years if stored properly in their original packaging.

4 ASSEMBLY PROCEDURES

This specification covers the requirements for assembly. The following procedures show the details of the cable assembly and insertion instructions into the plug subassembly.
The processing is only valid for the specified cable at appendix and only these combinations have been validated by TE. Alternative cables may be used after ensuring performance through validation testing.

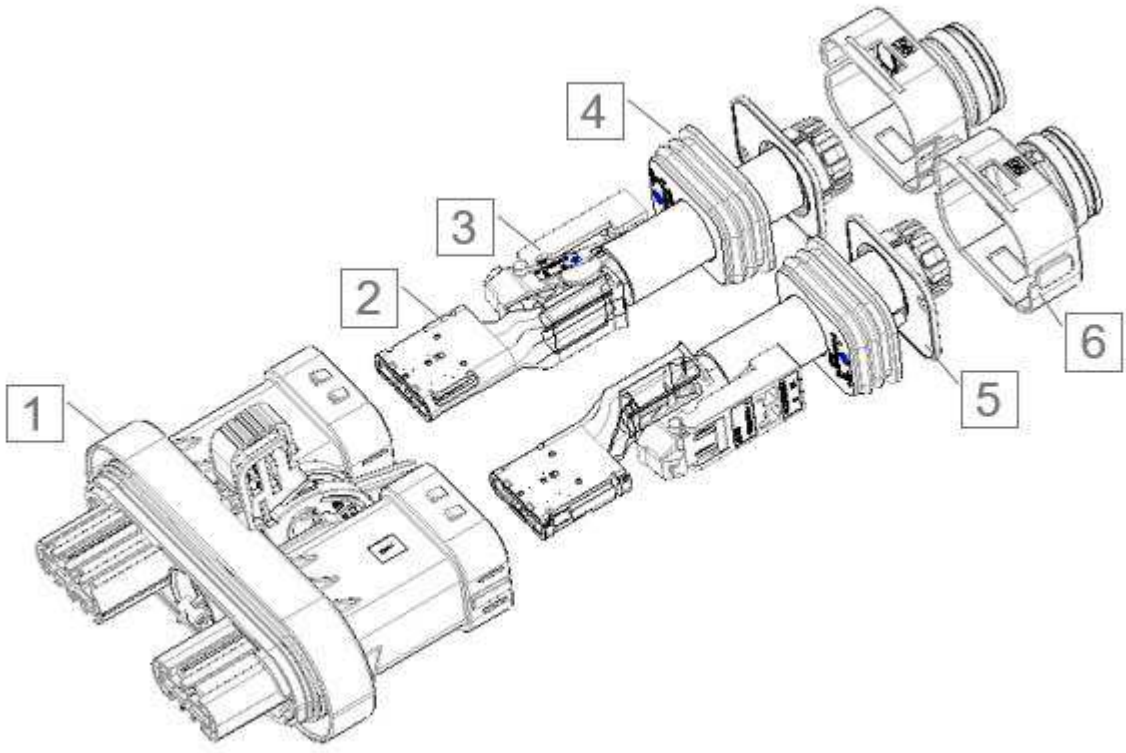

Figure 1: Exploded view of class 5 connector

Table 4: Bill of material

(ID)	TE-PN *TE-PN*	Description *Beschreibung*
-	2328809	2POS. PCON21, REC OUTER HSG, KIT
1	2319933	2POS. PCON21, REC HSG.
2	2317680	PCON21 CONTACT 180deg
3	2319940*	CONTACT LOCK, ASSY
4	2319939*	SINGLE WIRE SEAL
5	2319938*	STRAIN RELIEF OUTER CABLE SHEATH
6	2319937	PROTECTION COVER, SWS

*Color Coding for identification of wire specified components
25mm² = Nature
35mm² = Black similar to RAL9005
50mm² = Dusty grey similar to RAL7037
70mm² = Grass green similar to RAL6010
95mm² = Blue similar to RAL5012

4.1 Cable and terminal assembly

The procedure of processing PCON21 contact is provided by TE-Specification 114-94511. For wire size 70, 95mm² see table for crimp parameters of “lifted wire”. The following steps shows the assembly without detailed contact processing. Please note, insertion forces are measured with a test speed from 50mm/min. Deviated installation speed may cause to different values of forces.

4.2 Assembly Instruction of Receptacle Housing

From the plug end of the cable slide the protection cover, single wire seal and strain relief in the order and orientation as shown in Figure 2. Before crimping of terminal and cable processing.

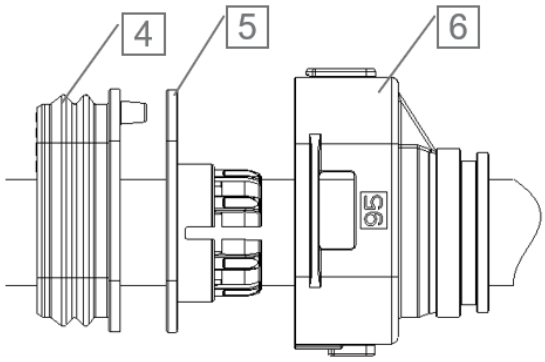

Figure 2: Slide components onto cable sheath

Guideline for contact processing is stated on the TE-Specification 114-94511. Inspection dimensioning of crimp height shown in table and figure below. Deviating to Specification 114-94511 stripping tolerance +/- 2mm and stripping length 26mm for 70 and 95mm².

Table 5: Crimpdata for PCON21

Wire size range	Crimp Height Ch1 (mm)	Application tool TE-PN:
25	6.4 ± 0.15	541923-2
35	6.9 ± 0.15	
50	7.7 ± 0.15	
70	8.6 ± 0.15	541944-2
95	9.6 ± 0.15	

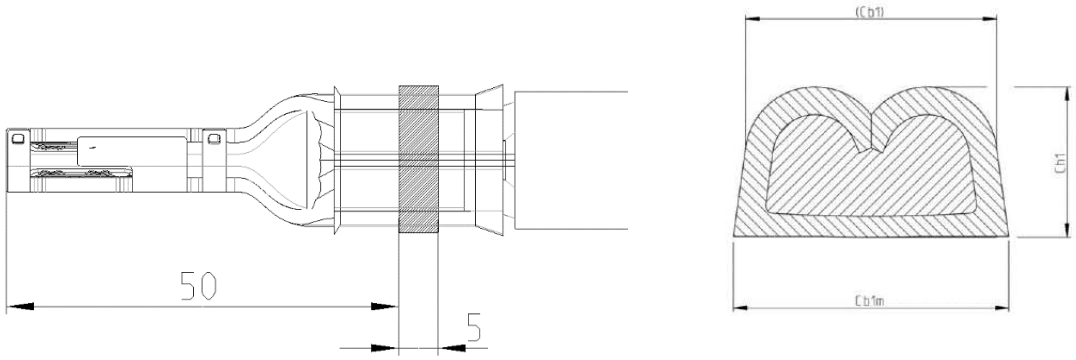

Figure 3: Inspection dimensioning of crimp height

Insert aligned the cable assembly into the receptacle subassembly until it stops against the inside of the housing. Approx. insertion force 50N.

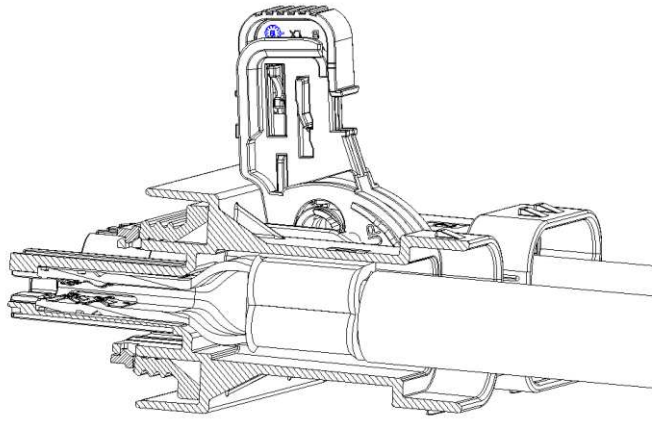

Figure 4: Install the cable assembly into the plug housing

Protection against misplacement by the ribs and polarization of contact cavity in the housing shown in figure below.

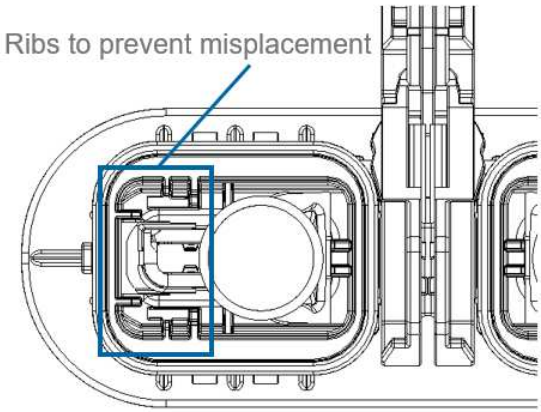

Figure 5: Protection against misplacement of cable harness

Orientation of contact lock to housing.

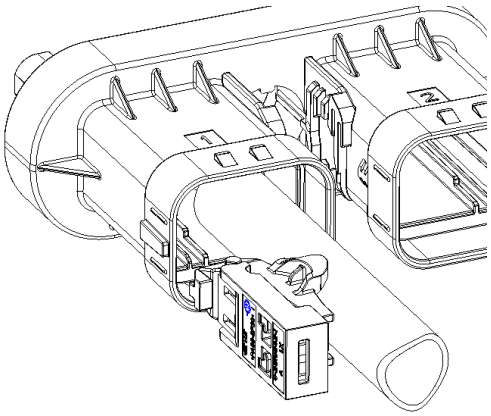

Figure 6: Orientation of contact locking parts

Install contact locking parts by guidance of ribs into the housing until is fully locked.

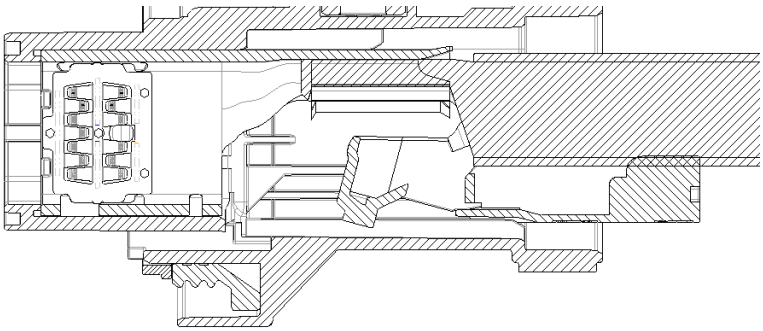

Figure 7: Install contact locking by guidance of housing ribs

Final Position of contact lock, reference dimensioning see figure 9.

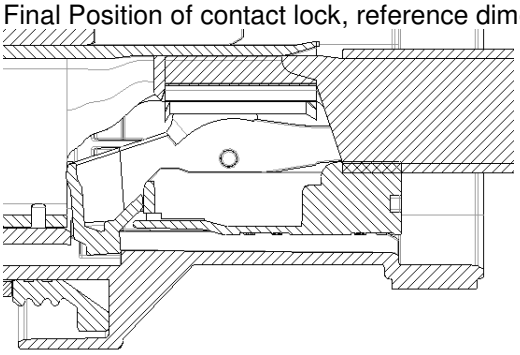

Figure 8: Final locked position of contact locking parts

Dimensioning to close Contact locking parts.

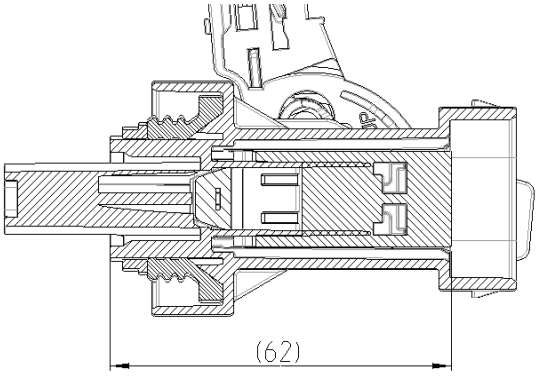

Figure 9: Dimensioning after insertion process of contact lock

Approximated Insertion forces for closing contact locking parts.

Table 6: Insertion forces of contact lock

Wire size range	Insertion force [N]
25	300N
35	230N
50	230N
70	230N
95	200N

Slide the Sealing forward on the cable into the housing until it stops inside the housing. Slide strain relief until it stops on the outside collar of housing.
Please note, sealing and strain relief can be assembled together.

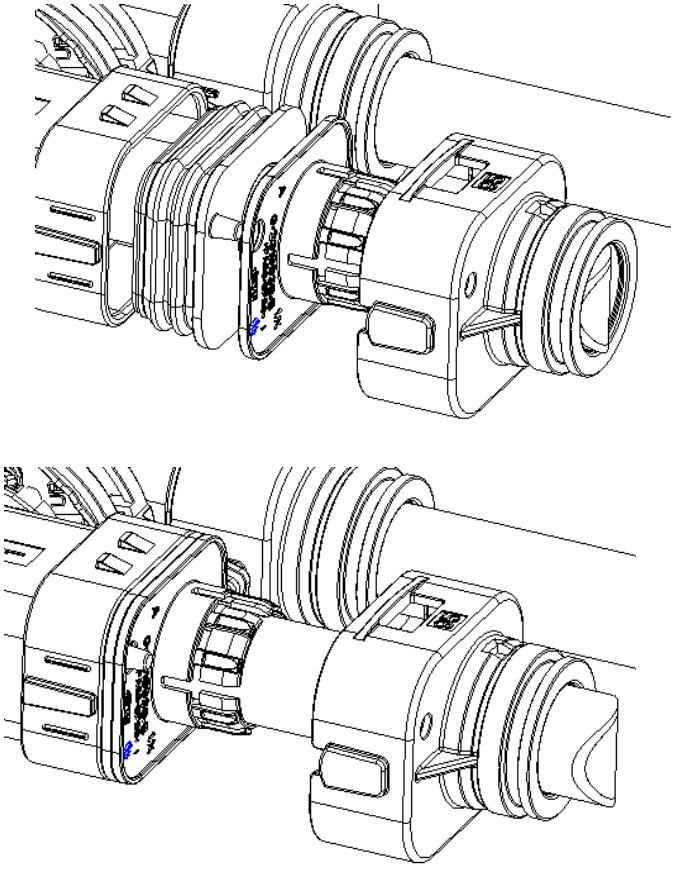

Figure 10: Slide Sealing and Strain relief into the housing

Slide the protection cover forward on the cable and latch to the plug housing as shown in Figure 11. Verify that both cover latches are fully locked, approximated insertion force 350N.

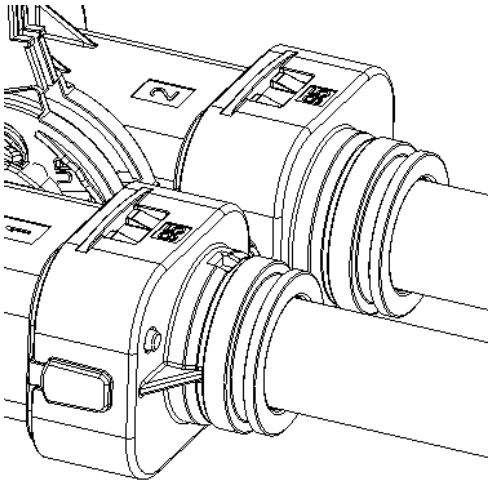

Figure 11: Lock cover on housing

5 FINAL EXAMINATION

5.1 Visual Examination

After processing the connector assembly must be checked of completeness, correctness acc. customer drawings and free of damage. All parts must be fully locked.

5.2 Electrical Tests

Electrical characteristic values according product specification TE-108-94682 and VW80303. The test parameter should be not exceeding the rated impulse withstand voltage from VW80303.

5.3 Detections of components

Presence of components checked by EOL-Adapter acc. to module Z02155A00 / Z03483A00 from Adaptronic. See technical data sheet below.

Z02155A00 / Z03483A00 (new Version)
Adapter AT4000, VW MEB, Class 5, f, 2-p

UUT

Customer data:	VW MEB Class 5, 2way, Female
Manufacturer naming:	flat contact housing MEB HV Cl. 5
Manufacturer:	TE

Basic data

Article name:	Adapter AT4000
Class:	E (special / ZE)
Adapter dimension:	150 x 150
spec. test voltage customer:	2100 VAC
Mixed matrix:	yes

Test points

	Wiring option	Quantity	Contact location
High voltage:	K2	2	Terminal 1, 2

Detections

#	Type	Kind	Quantity
1	Lever CPA (red) *(1) (open and presence)	SKS vertical	1
2	Seal Retainer (presence)	SKS vertical	1
3	Sec. Lock *(2), Terminal 1 (closed and presence)	Laser sensor	1
4	Sec. Lock *(2), Terminal 2 (closed and presence)	Laser sensor	1
5	Cover *(3), Terminal 1 (closed and presence)	SKS pneumatical	2
6	Cover *(3), Terminal 2 (closed and presence)	SKS pneumatical	2
7	Coding A, B	SKS vertical	2
8	Lever Release *(4) (presence)	SKS vertical	1
9	Lever Variant *(5)	SKS horizontal	1

Adapter control

		Programming test point
AC basic component:	AC03	applied to

	Quantity/Evaluationtype	Quantity	Description
Impermeability AC03 / AC04:	Negative pressure - Evaluation detection	1	

Other requirements

- Direction of adaption: vertical
- Testpositon Lever: open
- Orientation of mounted lever: as shown on TE-Drawing Partno. TAB.016.006.DE / 22.02.18

*(1) Lever CPA (red) = Lever TPA (TE)
*(2) Sec. Lock = Inner Housing TPA = "Spannstueck"
*(3) Cover = Rear Cap
*(4) Lever Release = "Pleuel"
*(5) Lever variants: BATTERY / PWR (short / long version of lever)

6 CONNECTOR MATING AND UNMATING

6.1 Connector mating

Lever is locked in delivery condition shown on picture below. Don't close lever before connector reach the mating position shown in figure 13.

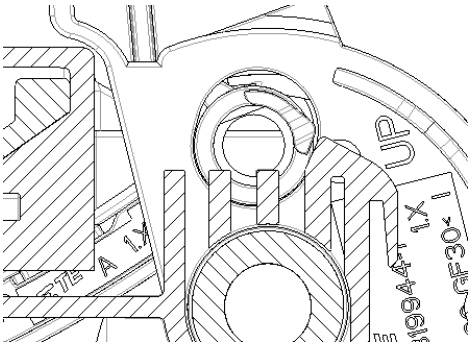

Figure 12: Pre-Lock position of lever

Push the connector halfes together until lever reaches the unlock position shown in right picture.

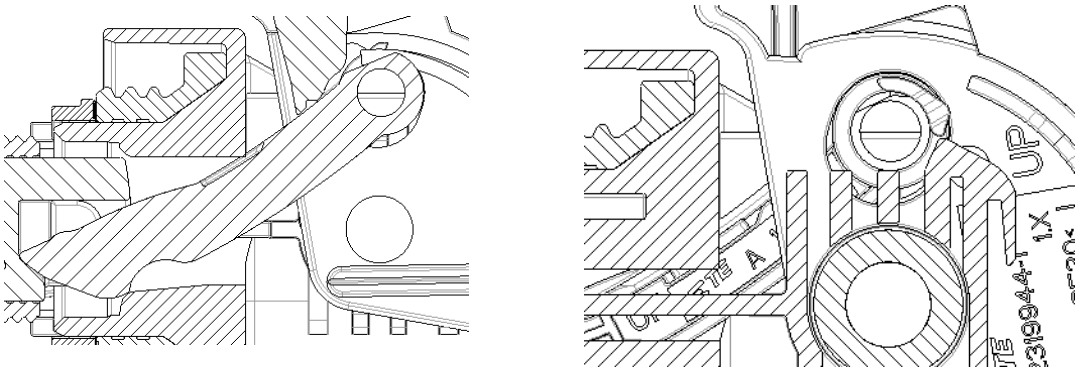

Figure 13: Unlock lever by insertion of connector

Close connector by using the lever.

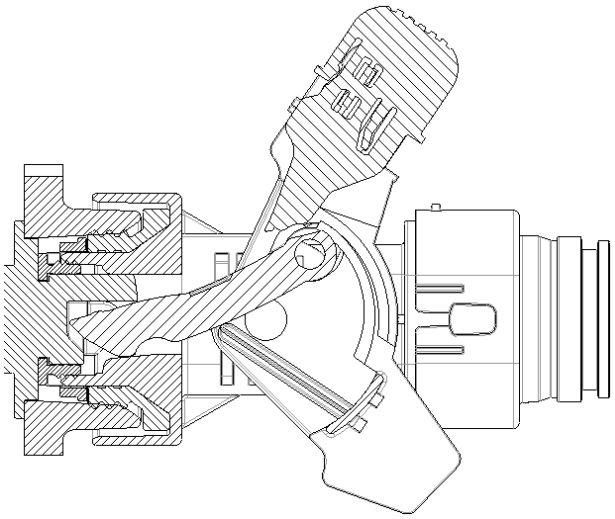

Figure 14: Lever in unlocked position to close connector

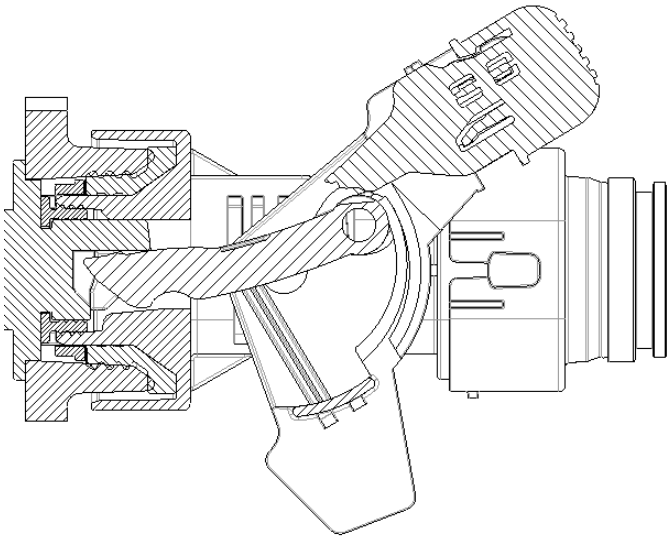

Figure 15: Close connector by using of lever

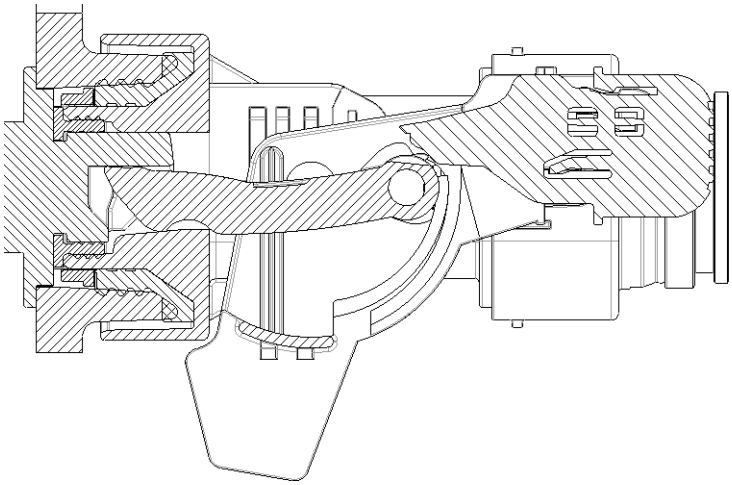

Figure 16: Final position of fully locked connector.

Push the red Connector Position Assurance (CPA) forward from the position shown left picture until it stops as shown in right picture. Closing CPA in direction of arrow!

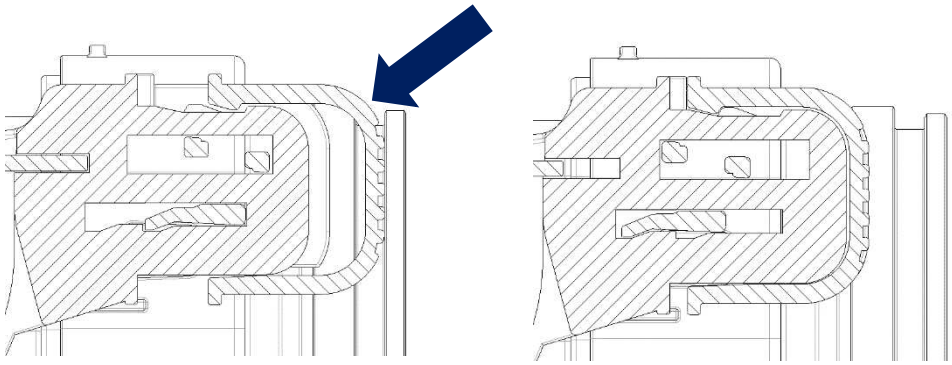

Figure 17: Push CPA forward in locking position

6.2 Connector unmating

Insert and twist screwdriver to unlock the CPA (right picture).

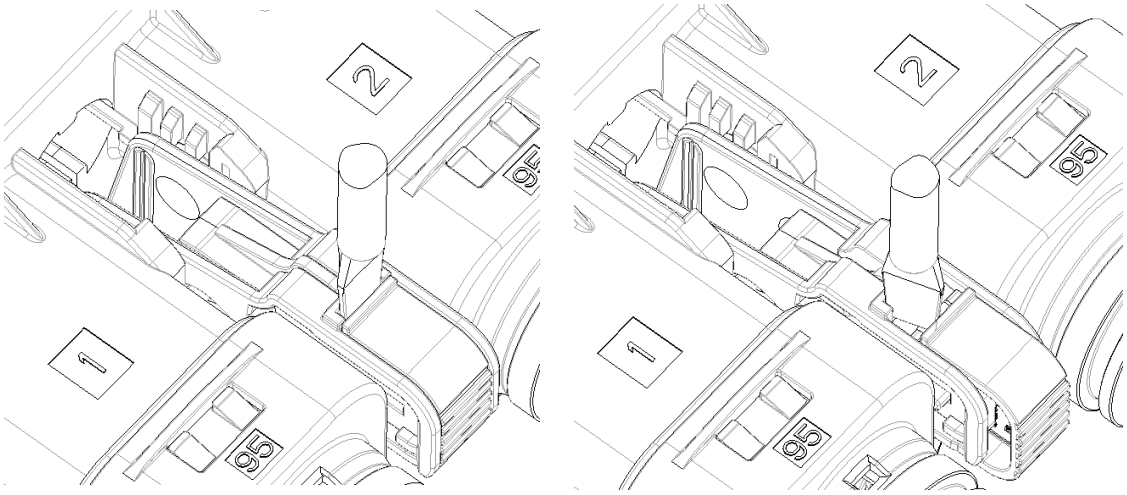

Figure 18: Unlock CPA by using screwdriver

An alternative unmating process is shown in picture below.

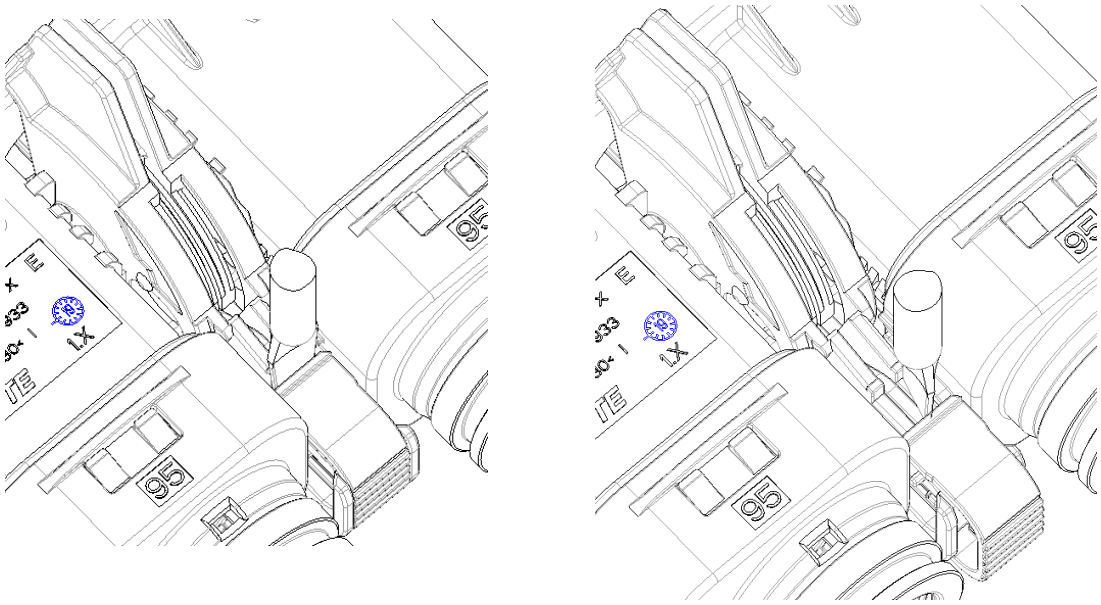

Figure 19: Alternative unmating process of CPA

7 APPENDIX

7.1 Data sheets

7.1.1 Leoni Silitherm wire size 25mm²

LEONI Italy srl
Divisione **SILITHERM**
S.S. 10 – via Breda, 134
I – 29010 Monticelli d´Ongina
info@silitherm.com

LEONI

Technisches Datenblatt – Technical Data Sheet – Technisches Datenblatt – Technical Data Sheet – Technisches Datenblatt

LEONI Part No.: **FHL2G00002**

Ungeschirmte Silikon isolierte HV Leitung für automobile Anwendungen
Unshielded silicone insulated HV cable for automotive applications

FHL2G 25/0,21/T180/600V AC / 1000V DC

Technisches Datenblatt – Technical Data Sheet – Technisches Datenblatt – Technical Data Sheet – Technisches Datenblatt

Erstellt *Creator*	Geprüft *Released*	Erzeugnisnr. *Part No.*	Änderungsindex *Version*	Ausgabedatum *Date of issue*	Beschreibung *Description*
S. Ramer	M. Guindani	FHL2G00002	0.1 VW	09.05.2017	Erstausgabe / *First edition*

7.1.2 Leoni Silitherm wire size 35mm²

LEONI Italy srl
Divisione **SILITHERM**
S.S. 10 – via Breda, 134
I – 29010 Monticelli d´Ongina
info@silitherm.com

LEONI

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LEONI Part No.: **FHL2G00003**

Ungeschirmte Silikon isolierte HV Leitung für automobile Anwendungen
Unshielded silicone insulated HV cable for automotive applications

FHL2G 35/0,21/T180/600V AC / 1000V DC

Technisches Datenblatt – Technical Data Sheet – Technisches Datenblatt – Technical Data Sheet – Technisches Datenblatt

Erstellt *Creator*	Geprüft *Released*	Erzeugnisnr. *Part No.*	Änderungsindex *Version*	Ausgabedatum *Date of issue*	Beschreibung *Description*
S. Ramer	M. Guindani	FHL2G00003	0.1 VW	09.05.2017	Erstausgabe / *First edition*

7.1.3 Leoni Silitherm wire size 50mm²

LEONI Italy srl
Divisione **SILITHERM**
S.S. 10 – via Breda, 134
I – 29010 Monticelli d´Ongina
info@silitherm.com

LEONI

Technisches Datenblatt – Technical Data Sheet – Technisches Datenblatt – Technical Data Sheet – Technisches Datenblatt

LEONI Part No.: **FHL2G00019**

Ungeschirmte Silikon isolierte HV Leitung für automobile Anwendungen
Unshielded silicone insulated HV cable for automotive applications

FHL2G 50/0,21/T180/600V AC / 1000V DC

Technisches Datenblatt – Technical Data Sheet – Technisches Datenblatt – Technical Data Sheet – Technisches Datenblatt

Erstellt *Creator*	Geprüft *Released*	Erzeugnisnr. *Part No.*	Änderungsindex *Version*	Ausgabedatum *Date of issue*	Beschreibung *Description*
S. Ramer	M. Guindani	FHL2G00019	0.1 VW	09.05.2017	Erstausgabe / *First edition*

7.1.4 Leoni Silitherm wire size 70mm²

LEONI Italy srl
Divisione **SILITHERM**
S.S. 10 – via Breda, 134
I – 29010 Monticelli d´Ongina
info@silitherm.com

LEONI

Technisches Datenblatt – Technical Data Sheet – Technisches Datenblatt – Technical Data Sheet – Technisches Datenblatt

LEONI Part No.: **FHL2G00006**

Ungeschirmte Silikon isolierte HV Leitung für automobile Anwendungen
Unshielded silicone insulated HV cable for automotive applications

FHL2G 70/0,21/T180/600V AC / 1000V DC

Technisches Datenblatt – Technical Data Sheet – Technisches Datenblatt – Technical Data Sheet – Technisches Datenblatt

Erstellt *Creator*	Geprüft *Released*	Erzeugnisnr. *Part No.*	Änderungsindex *Version*	Ausgabedatum *Date of issue*	Beschreibung *Description*
S. Ramer	M. Guindani	FHL2G00006	0.1 VW	09.05.2017	Erstausgabe / *First edition*

7.1.5 Leoni Silitherm wire size 95mm²

LEONI Italy srl
Divisione **SILITHERM**
S.S. 10 – via Breda, 134
I – 29010 Monticelli d´Ongina
info@silitherm.com

LEONI

Technisches Datenblatt – Technical Data Sheet – Technisches Datenblatt – Technical Data Sheet – Technisches Datenblatt

LEONI Part No.: **FHL2G00022**

Ungeschirmte Silikon isolierte HV Leitung für automobile Anwendungen
Unshielded silicone insulated HV cable for automotive applications

FHL2G 95/0,21/T180/600V AC / 1000V DC

Technisches Datenblatt – Technical Data Sheet – Technisches Datenblatt – Technical Data Sheet – Technisches Datenblatt

Erstellt *Creator*	Geprüft *Released*	Erzeugnisnr. *Part No.*	Änderungsindex *Version*	Ausgabedatum *Date of issue*	Beschreibung *Description*
S. Ramer	M. Guindani	FHL2G00022	0.1 VW	09.05.2017	Erstausgabe / *First edition*

7.1.6 Coficab wire size 25, 35, 50, 70 & 95mm²

Only wire production in China has been validated.

COFICAB e-COF

HIGH VOLTAGE AUTOMOTIVE CABLES

HOCHSPANNUNGSLEITUNGEN FÜR FAHRZEUGE

FHL2G

-40°C ... 200°C

COFICAB

DESIGN

Conductor:	CU ETP1 EN 13602, bare copper
Insulation material:	Silicon rubber, high temperature
Covering:	Thick wall insulation

TECHNICAL DATA

Voltage level:	1000 V ac / 1500 V dc (*) (*) acc. to ISO 19642 standard
Test voltage:	eff. 8.0 kV spark test
Temperature range:	-40°C ... 200°C/3000h
Min. bending radius:	3xD (static)

APPLICATION

Excellent flexibility

Very good performance at high temperature

Material related limited resistance to sulfuric acid (according ISO 6722-1:2011 §5.17)

ACCORDING TO THE STANDARD

1. LV 216-1 Class F (200°C)
2. ISO 6722-1 Class F (200°C)
3. According Client Specification
4. VW N 108 557
5. VW N 108 174
6. VW N 108 558
7. VW N 108 559
8. VW N 108 560
9. ISO 19642-5

DESIGN

Leiter:	CU ETP1 EN 13602, Kupfer blank
Isoliermaterial:	Silikon, hochtemperaturbeständig
Isolation:	Hohe Wanddicke

TECHNISCHE DATEN

Nennspannung:	1000 V ac / 1500 V dc (*) (*) gemäß Standard ISO 19642
Prüfspannung:	eff. 8.0 kV Sparktester
Temperaturbereich:	-40°C ... 200°C/3000h
Min. Biegeradius:	3xD (statisch)

ANWENDUNG

Ausgezeichnete Flexibilität

Sehr gute Performance mit hoher Temperatur

Materialbedingte Unverträglichkeit gegen Schwefelsäure (nach ISO 6722-1:2011§5.17)

GEMÄß NORM

1. LV 216-1 Klasse F (200°C)
2. ISO 6722-1 Klasse F (200°C)
3. Gemäß Kundenspezifikation
4. VW N 108 557
5. VW N 108 174
6. VW N 108 558
7. VW N 108 559
8. VW N 108 560
9. ISO 19642-5

COFICAB e-COF

Cable type / Leitungstyp						Standard Reel / Standardspule	
Order No. Bestellnr.	Type Typ	Cross-section Querschnitt	Colour Farbe	Construction Aufbau	Weight Gewicht approx./ca.	Make-Up Aufmachung	Content Füllmenge approx./ca.
Bare/Blank		[mm²]		N° x Ømax. [mm]	[g/m]		[m/Reel]
HL2GB25004500 HL2GF25004500	FHL2G	25,00	OR	196 x 0,41 790 x 0,21	263	D800	1 300
HL2GB35004500 HL2GF35004500	FHL2G	35,00	OR	276 x 0,41 1070 x 0,21	356	D800	1 000
HL2GB50004500 HL2GF50004500	FHL2G	50,00	OR	396 x 0,41 1600 x 0,21	510	D800	750
HL2GB70004500 HL2GF70004500	FHL2G	70,00	OR	360 x 0,51 2175 x 0,21	700	D800	700
HL2GB95004500 HL2GF95004500	FHL2G	95,00	OR	475 x 0,51 3000 x 0,21	933	D800	450