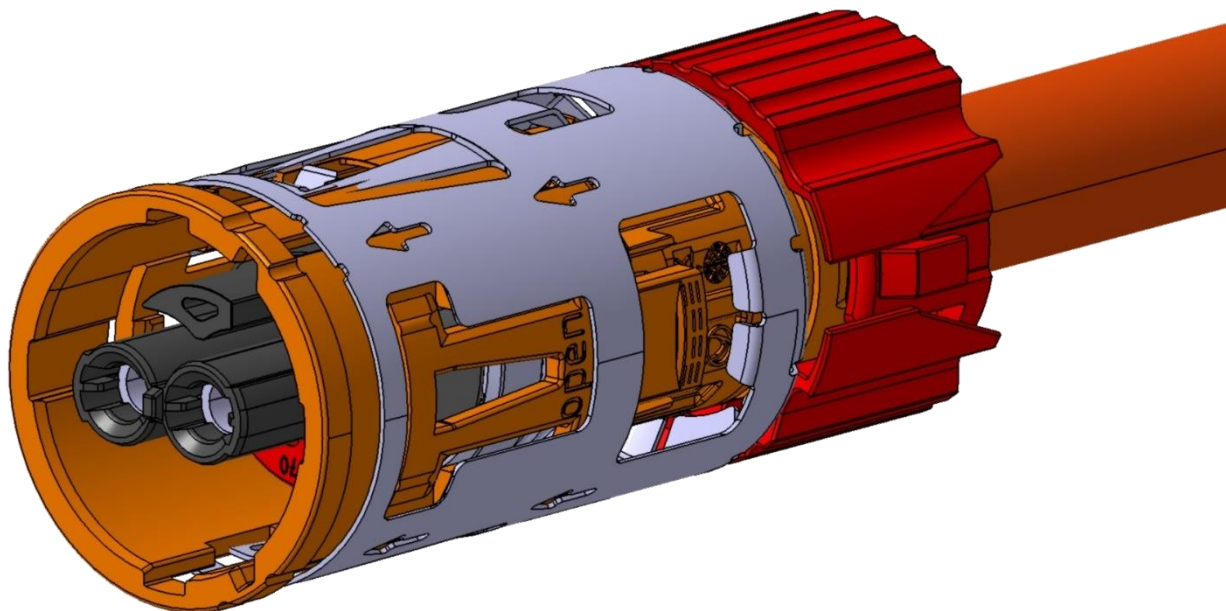


# Process Specification

## HIRSCHMANN AUTOMOTIVE PowerStar 40-2 PLUS 4mm<sup>2</sup> and 6mm<sup>2</sup>



EVS-100137-03  
Version 07



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## **1 General**

### **1.1 General information and requirements**

- a. This process specification describes detailed requirements and guidelines by Hirschmann Automotive on how to assemble the mentioned component(s) in order to achieve compliance with the defined product- and process specification.
- b. The customer/manufacturer processing the Hirschmann Automotive products is responsible for the appropriate processing of the relevant products and also for the compliance of the described process results with this specification.
- c. In case of improper or deviating processing through the customer/manufacturer, any complaints need to be declined.
- d. During the whole assembly process, individual components and assembly units must not be damaged in any way.
- e. Both the named fixture suppliers and equipment in this process specification are not mandatory to use from Hirschmann Automotive point of view. They are only a non-binding reference which supplier and equipment Hirschmann Automotive used for the evaluation, validation and release of this process specification.
- f. The customer can define different fixture suppliers and equipment for the assembly process at any time.
- g. Additionally, the customer/manufacturer shall validate and release the complete assembly process independently of the chosen equipment supplier.
- h. Process parameters (e.g. welding currents, - times etc.) will not be predetermined by Hirschmann Automotive. In fact, the required technical result of this process needs to be specified in the process specification. With this result, the customer will achieve the product specification conformity (e.g. welding knot geometries, min. retention forces, etc.).
- i. All kind of warranty and liability claims of our customers towards Hirschmann Automotive according to the agreed contractual regulations are only valid with reservation of the compliance with the according process specification.
- j. All length data for flexible components or wires are to be taken as stretched length. When recording the dimensions, it must be ensured that the components are not subjected to any loads that could lead to damage or other impairments.



## 1.2 Introduction

This process specification is valid for all variants mentioned in chapter 2.ff and describes the product structure as well as the assembly of the Hirschmann Automotive PowerStar 40-2 PLUS plug connection.

**Table 1: HPS40-2 PLUS**

85E.973.271	810-473-501	A	6mm <sup>2</sup>	HCT4	Europe
85E.973.271.A	810-473-502	B			
85E.973.271.B	810-473-503	C			
85E.973.271.C	810-473-511	A	4mm <sup>2</sup>		
85E.973.271.D	810-473-512	B			
85E.973.271.E	810-473-513	C			
85D.973.271	813-132-501	A	6mm <sup>2</sup>		China
85D.973.271.A	813-132-502	B			
t.b.d.	812-939-001	A	4mm <sup>2</sup>		MAN
t.b.d.	812-939-002	B			
t.b.d.	812-939-003	C			
t.b.d.	812-939-004	D			
<b>VW-No.</b>	<b>Hirschmann Automotive No.</b>	<b>Coding</b>	<b>Cross-Section</b>	<b>Terminal-System</b>	<b>Assignment</b>

The manufacturer of the listed products is responsible for the qualitative processing and the accuracy of the version.

In the case of improper processes or deviation from specification that results in quality issues, the right of complaint is void.



### 1.3 Applicable documents

A	Product drawing	VW-Nr. TAB.010.046.EC 85D.973.271 (China)
B	Product specification	HA-Nr. EPS-100153-03
C	Interface drawing	VW-Nr. 85E.900.962.M
D	HCT4 Process specification (Ag)	EVS-100068
E	Data sheet 2x6mm <sup>2</sup> shielded cable of Coroplast	Coroplast No.: 9-2641 (2x6,0mm <sup>2</sup> )
F	Data sheet 2x4mm <sup>2</sup> shielded cable of Coroplast	Coroplast No.: 9-2641 (2x4,0mm <sup>2</sup> )
G	Data sheet 2x6mm <sup>2</sup> shielded cable of Cablena	Cablana No.: 109.206.001.7 (2x6,0mm <sup>2</sup> )
H	Data sheet 2x4mm <sup>2</sup> shielded cable of Cablena	Cablana No.: 109.204.001.7 (2x4,0mm <sup>2</sup> )
I	Data sheet 2x6mm <sup>2</sup> shielded cable of Hengtong	Hengtong No.: FHLR2GCB2G (2x6,0mm <sup>2</sup> )
J	Data sheet 2x4mm <sup>2</sup> shielded cable of Huber+Suhner	H+S Nr.: 12582308 (2x4mm <sup>2</sup> )
K	Data sheet 2x4mm <sup>2</sup> shielded cable of Huber+Suhner	H+S Nr.: 85149176 (2x4mm <sup>2</sup> )



## 1.4 Characteristics / Customer release

Our suggestion is that the dimensions listed below are monitored during processing. Further functional characteristics must be coordinated and defined with the OEM.

**Table 2: Special Characteristics**

Special Characteristics					
S	F	Characteristic	Specific Purpose	Place of implementation	Page
-	F1	Embossing height d	Stress-Relief, elec. shield contacting - EMC	Tier 1	44
-	F2**	Pull-out force of shield pressing	Stress-Relief, elec. shield contacting - EMC	Tier 1	46
-	F3	L12 Assembly position of the Plastic-Housing	Pluggability	Tier 1	52

Legend:

S - Safety

F - Function

\*\*100% testing is not possible, as the test specimens are destroyed during testing.

Proof of capability or continuous testing of all special features must be coordinated directly with the OEM.



## 2 Product structure (single components)

### 2.1 “Europe” Configuration

**Table 3: Hirschmann Automotive PowerStar 40-2 PLUS Europe**

Part Information		Quantity per Version (per connector)					
		Coding A 6mm <sup>2</sup>	Coding B 6mm <sup>2</sup>	Coding C 6mm <sup>2</sup>	Coding A 4mm <sup>2</sup>	Coding B 4mm <sup>2</sup>	Coding C 4mm <sup>2</sup>
		85E.973.271	85E.973.271.A	85E.973.271.B	85E.973.271.C	85E.973.271.D	85E.973.271.E
Description/Naming	HA-Order-No.	810-473-501	810-473-502	810-473-503	810-473-511	810-473-512	810-473-513
ASSY Plastic-Housing	807-656-531/ 807-656-532	1	1	1	1	1	1
ASSY Contact-Holder PLUS Coding A	810-474-501	1	-	-	1	-	-
ASSY Contact-Holder PLUS Coding B	810-474-502	-	1	-	-	1	-
ASSY Contact-Holder PLUS Coding C	810-474-503	-	-	1	-	-	1
ASSY Contact-Holder PLUS Coding D	810-474-504	-	-	-	-	-	-
Shield-Sleeve	709-840-501 / 709-840-504	1	1	1	1	1	1
Stress-Relief 6mm <sup>2</sup>	709-841-503	1	1	1	-	-	-
Stress-Relief 4mm <sup>2</sup>	709-841-502	-	-	-	1	1	1
Wire-Seal 6mm <sup>2</sup>	709-113-506	1	1	1	-	-	-
Wire-Seal 4mm <sup>2</sup>	709-113-505	-	-	-	1	1	1
Cover-Cap PLUS 6mm <sup>2</sup>	707-208-513	1	1	1	-	-	-
Cover-Cap PLUS 4mm <sup>2</sup>	707-208-512	-	-	-	1	1	1
HCT4 Female- Terminal 6mm <sup>2</sup>	709-427-505	2	2	2	-	-	-
HCT4 Female- Terminal 4mm <sup>2</sup>	709-427-504	-	-	-	2	2	2





## 2.2 “China” Configuration

**Table 4: Hirschmann Automotive PowerStar 40-2 PLUS China**

Part Information		Quantity per Version (per connector)	
		Coding A 6mm <sup>2</sup>	Coding B 6mm <sup>2</sup>
		85D.973.271	85D.973.271.A
Description/Naming	HA-Order-No.	813-132-501	813-132-502
ASSY Plastic-Housing	807-656-531 / 807-656-532	1	1
ASSY Contact-Holder PLUS Coding A	810-474-501	1	-
ASSY Contact-Holder PLUS Coding B	810-474-502	-	1
ASSY Contact-Holder PLUS Coding C	810-474-503	-	-
ASSY Contact-Holder PLUS Coding D	810-474-504	-	-
Shield-Sleeve	709-840-501 / 709-840-504	1	1
Ferrule crimp 6mm <sup>2</sup>	710-741-501	1	1
Ferrule crimp 4mm <sup>2</sup>	710-741-502	-	-
Wire-Seal 6mm <sup>2</sup>	709-113-506	1	1
Wire-Seal 4mm <sup>2</sup>	709-113-505	-	-
Cover-Cap PLUS 6mm <sup>2</sup>	707-208-553	1	1
Cover-Cap PLUS 4mm <sup>2</sup>	707-208-552	-	-
HCT4 Female- Terminal 6mm <sup>2</sup>	709-427-505	2	2
HCT4 Female- Terminal 4mm <sup>2</sup>	709-427-504	-	-



## 2.3 „MAN“ Configuration

**Table 5: Hirschmann Automotive PowerStar 40-2 PLUS MAN with H&S Cable**

Bauteil Information		Quantity per Version (per connector)			
		Coding A 4mm² H+S	Coding B 4mm² H+S	Coding C 4mm² H+S	Coding D 4mm² H+S
		t.b.d.	t.b.d.	t.b.d.	t.b.d.
Description/Naming	HA-Order-No.	812-939-001	812-939-002	812-939-003	812-939-004
ASSY Plastic-Housing	807-656-531 / 807-656-532	1	1	1	1
ASSY Contact-Holder PLUS Coding A	810-474-501	1	-	-	-
ASSY Contact-Holder PLUS Coding B	810-474-502	-	1	-	-
ASSY Contact-Holder PLUS Coding C	810-474-503	-	-	1	-
ASSY Contact-Holder PLUS Coding D	810-474-504	-	-	-	1
Shield-Sleeve	709-840-514	1	1	1	1
Stress-Relief 4mm² (H&S)	709-841-522	1	1	1	1
Wire-Seal 4mm²	709-113-522	1	1	1	1
Cover-Cap PLUS 4mm²	707-208-512	1	1	1	1
HCT4 Female- Terminal 4mm²	709-427-504	2	2	2	2



## 2.4 Shielded-Cable 6mm<sup>2</sup> and 4mm<sup>2</sup>



**Figure 1: Cable 6mm<sup>2</sup>**



**Figure 2: Cable 4mm<sup>2</sup>**

**Table 6: Shielded-Cable 6mm<sup>2</sup> und 4mm<sup>2</sup>**

<b>Coroflex (Coroplast)</b>	FHLR2GCB2G 600/1000V T180	FHLR2GCB2G 600/1000V T180
	9-2641 (2x6mm <sup>2</sup> )	9-2641 (2x4mm <sup>2</sup> )
<b>Cablana (Condumex)</b>	FHLR2GCB2G 600/1000V T180	FHLR2G2GCB2G 600/1000V T180
	109.206.001.7 (2x6mm <sup>2</sup> )	109.204.001.7 (2x4mm <sup>2</sup> )
<b>Hengtong</b>	FHLR2GCB2G 600/1000V T180	FHLR2GCB2G 600/1000V T180
	8003110576 (2x6mm <sup>2</sup> )	8003110575 (2x4mm <sup>2</sup> )
<b>Huber + Suhner</b>	-	FHLR91XC13X-2x4 T150
	-	12582308 (2x4mm <sup>2</sup> )
<b>Huber + Suhner</b>	-	FHLR91XC13X-2x4 T150
	-	85149176 (2x4mm <sup>2</sup> )
<b>Wire manufacturer</b>	<b>6mm<sup>2</sup></b>	<b>4mm<sup>2</sup></b>
	<b>Wire cross section (construction of conductor)</b>	

Only Cables which are listed here and released by the respective OEM for the product are allowed to be used.



## 2.5 HCT4 Female terminal (Hirschmann Automotive)



Figure 3: HCT4 6mm<sup>2</sup>



Figure 4: HCT4 4mm<sup>2</sup>

**Table 7: Hirschmann Automotive female terminal HCT4**

N.108.763.01	709-427-505	6mm <sup>2</sup>	Female terminal HCT4
N.108.944.01	709-427-504	4mm <sup>2</sup>	Female terminal HCT4
<b>VW-No.</b>	<b>Hirschmann Automotive No.</b>	<b>Wire cross section (construction of conductor)</b>	<b>Product description</b>

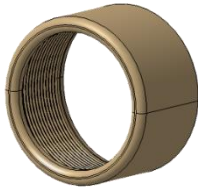
The released terminals can be found in the product drawing.

VW/Audi - No.: N.108.944.01  
N.108.763.01

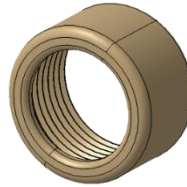
The female terminals are delivered at terminal strip on a spool.



**2.6 Stress-Relief (Hirschmann Automotive)**



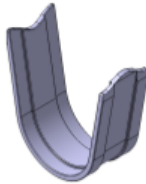
**Figure 5: Stress-relief 6mm<sup>2</sup>  
 709-841-503**



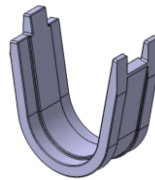
**Figure 6: Stress-relief 4mm<sup>2</sup>  
 709-841-502**



**Figure 7: Stress-relief 4mm<sup>2</sup>  
 709-841-522**



**Figure 8: Ferrule crimp 6mm<sup>2</sup>  
 710-741-501**



**Figure 9: Ferrule crimp 4mm<sup>2</sup>  
 710-741-502**

**Table 8: Hirschmann Automotive stress relief**

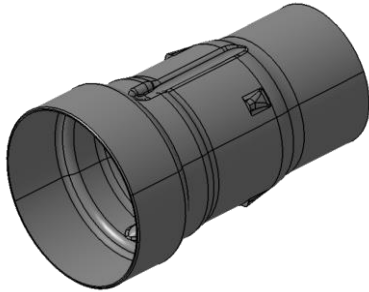
709-841-503	6mm <sup>2</sup>	Stress-relief HPS40-2	Europe Configuration
709-841-502	4mm <sup>2</sup>	Stress-relief HPS40-2	
710-741-501	6mm <sup>2</sup>	Ferrule crimp	China Configuration
710-741-502	4mm <sup>2</sup>	Ferrule crimp	
709-841-522	4mm <sup>2</sup>	Stress-relief HPS40-2 (H+S)	MAN Configuration
<b>Hirschmann Automotive No.</b>	<b>Wire cross section (construction of conductor)</b>	<b>Product description</b>	<b>Assignment</b>

The released Stress-Relief per approved wire can be found in the product drawing.

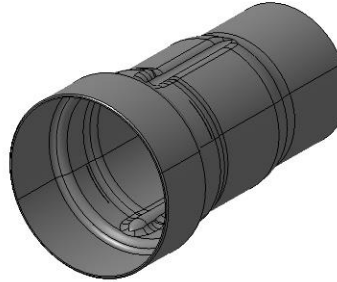
VW/Audi - No.: TAB.010.046.EC (Europa)  
 85D.973.271 (China)  
 812-939-...00 (MAN)

The stress reliefs are delivered as bulk goods.

**2.7 Shield-Sleeve (Hirschmann Automotive)**



**Figure 10: Shield-sleeve index 501**



**Figure 11: Shield sleeve index 504 / 514**

**Table 9: Hirschmann Automotive shield sleeve**

709-840-514	Shield-sleeve (Heat-treatment)	with H+S Cable for MAN
709-840-504	Shield-sleeve	Replacing 709-840-501
709-840-501	Shield sleeve	Expiring (Stock may be used up)
<b>Hirschmann Automotive No.</b>	<b>Product description</b>	<b>Assignment</b>

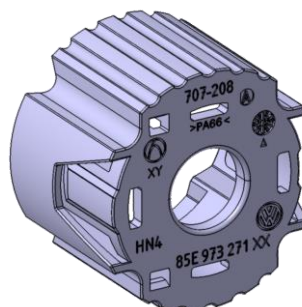
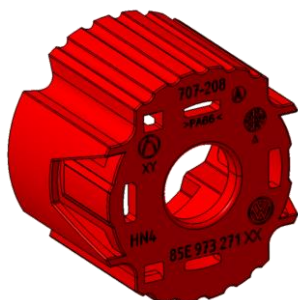
The released Shield-Sleeves can be found in the product drawing.

VW/Audi - No.: TAB.010.046.EC (Europa)  
 85D.973.271 (China)  
 812-939-...00 (MAN)

The Shield-Sleeves are delivered as bulk goods.



## 2.8 Cover-Cap PLUS (Hirschmann Automotive)



**Figure 12: Cover-Cap PLUS 6mm<sup>2</sup>**

**Figure 13: Cover-Cap PLUS 4mm<sup>2</sup>**

**Table 10: Hirschmann Automotive Cover-Cap PLUS**

707-208-513	6mm <sup>2</sup>	red	Cover-Cap PLUS 6mm <sup>2</sup>
707-208-512	4mm <sup>2</sup>	grey	Cover-Cap PLUS 4mm <sup>2</sup>
<b>Hirschmann Automotive No.</b>	<b>Wire cross section (construction of conductor)</b>	<b>Color</b>	<b>Product description</b>

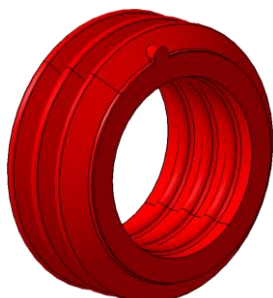
The released Cover-Cap PLUS per approved wire can be found in the product drawing.

VW/Audi - No.: TAB.010.046.EC (Europa)  
 85D.973.271 (China)  
 812-939-...00 (MAN)

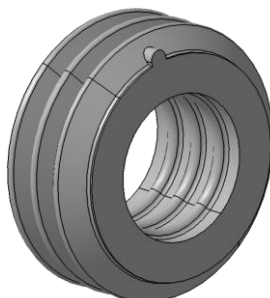
The cover cap is delivered as bulk goods.



## 2.9 Wire-Seal (Hirschmann Automotive)



**Figure 14: Wire-Seal 6mm<sup>2</sup>**



**Figure 15: Wire-Seal 4mm<sup>2</sup>**



**Figure 16: Wire-Seal 4mm<sup>2</sup>  
 Huber+Suhner**

**Table 11: Hirschmann Automotive Wire-Seal**

709-113-522	4mm <sup>2</sup>	purple	Wire-Seal 4mm <sup>2</sup> for H+S Cable
709-113-506	6mm <sup>2</sup>	red	Wire-Seal 6mm <sup>2</sup>
709-113-505	4mm <sup>2</sup>	grey	Wire-Seal 4mm <sup>2</sup>
<b>Hirschmann              Automotive No.</b>	<b>Wire cross section              (construction of conductor)</b>	<b>Color</b>	<b>Product description</b>

The released Wire-Seal per approved wire can be found in the product drawing.

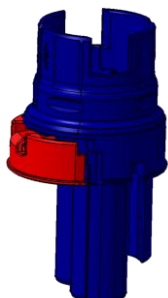
VW/Audi - No.: TAB.010.046.EC (Europa)  
 85D.973.271 (China)  
 812-939-...00 (MAN)

The seals are delivered as bulk goods.

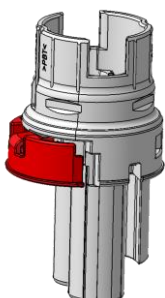




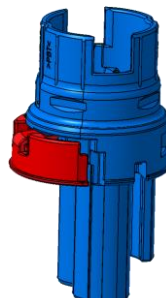
**2.10 ASSY Contact-Holder PLUS (Hirschmann Automotive)**



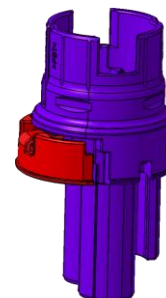
**Figure 17:**  
**ASSY Contact-Holder PLUS Cod. A**



**Figure 18:**  
**ASSY Contact-Holder PLUS Cod. B**



**Figure 19:**  
**ASSY Contact-Holder PLUS Cod. C**



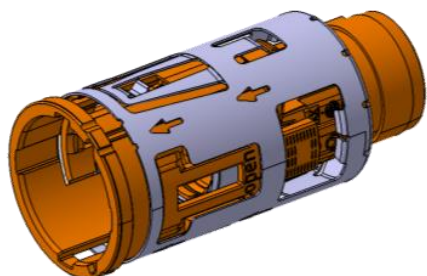
**Figure 20:**  
**ASSY Contact-Holder PLUS Cod. D**

**Table 12: Hirschmann Automotive ASSY Contact-Holder PLUS**

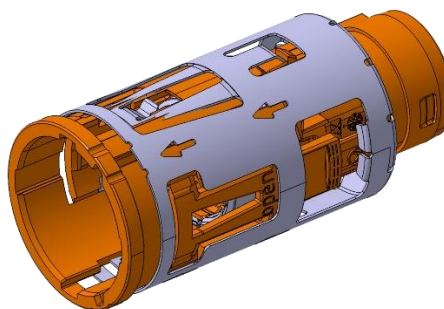
810-474-501	A	black	ASSY Contact-Holder PLUS Cod. A
810-474-502	B	nature/white	ASSY Contact-Holder PLUS Cod. B
810-474-503	C	blue	ASSY Contact-Holder PLUS Cod. C
810-474-504	D	purple	ASSY Contact-Holder PLUS Cod. D
<b>Hirschmann Automotive No.</b>	<b>Cod.</b>	<b>Color</b>	<b>Product description</b>

The ASSY Contact-Holder PLUS are delivered as bulk goods.

## 2.11 ASSY Plastic-Housing (Hirschmann Automotive)



**Figure 21: ASSY Plastic-Housing**  
 Index 531



**Figure 22: ASSY Plastic-Housing**  
 Index 532

**Table 13: Hirschmann Automotive ASSY Plastic-Housing**

807-656-532	ASSY Plastic-Housing	VW – Logo und HA-DMC	Replacing 807-656-531
807-656-531	ASSY Plastic-Housing	VW – Logo und HA-DMC	Expiring (Stock may be used up)
<b>Hirschmann Automotive No.</b>	<b>Product description</b>	<b>Labeling</b>	<b>Assignment</b>

The ASSY Plastic-Housing are delivered as bulk goods.

### 3 Processing steps

Use the following described processing steps for the wire cross sections 6mm<sup>2</sup> and 4mm<sup>2</sup>.

As a reference sample, the ASSY Contact-Holder PLUS Cod. A and a 6mm<sup>2</sup> cable are used.

#### 3.1 Cut the shielded cable



Figure 23: Symbolic representation of the shielded cable

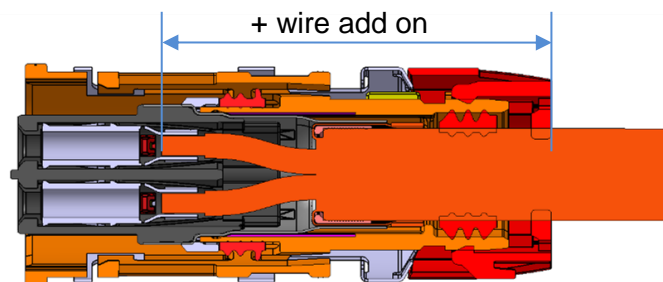


Figure 24: Wire add-on inside the HPS40-2 PLUS (pre-locking position)

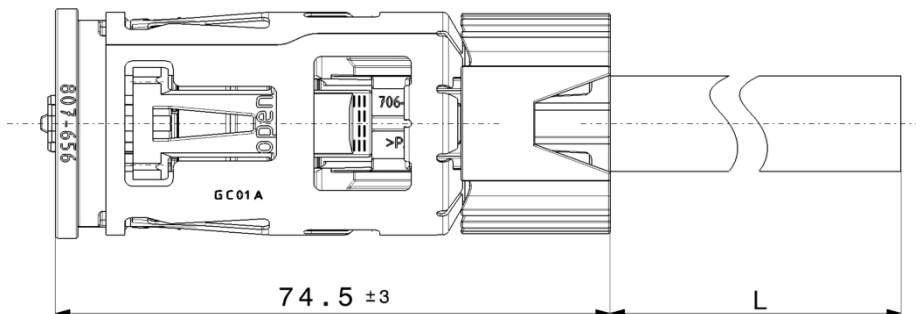
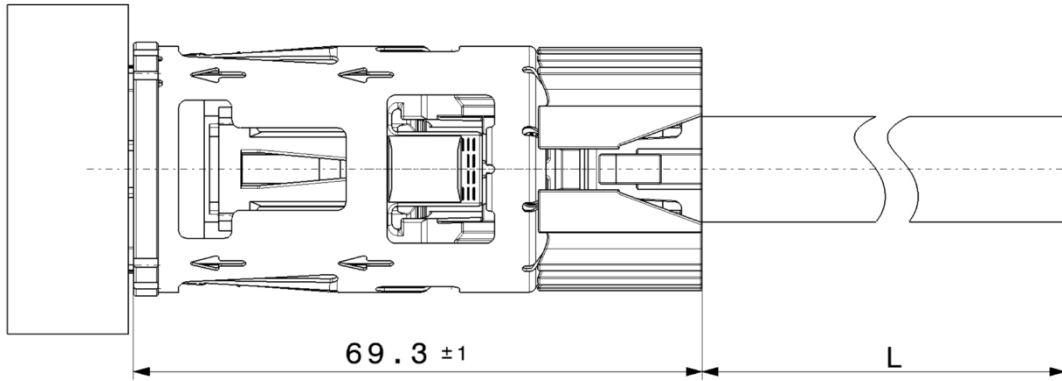
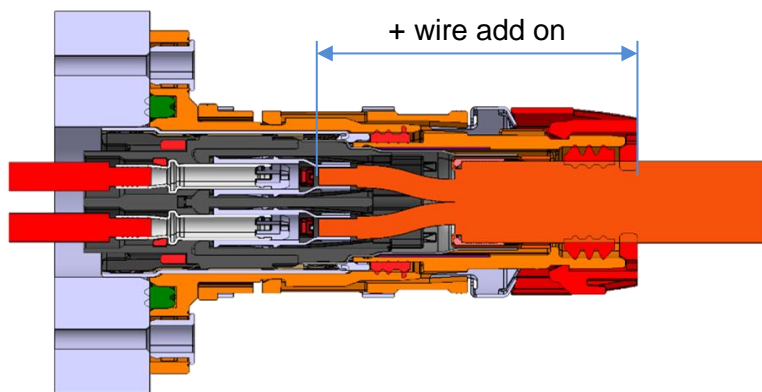


Figure 25: Wire-length add-on (pre-locking position)



**Figure 26: Wire-length add-on (end position)**



**Figure 27: Wire add-on inside the HPS40-2 PLUS (end position)**

Add the following lengths for the Hirschmann Automotive HPS40-2 female connector:

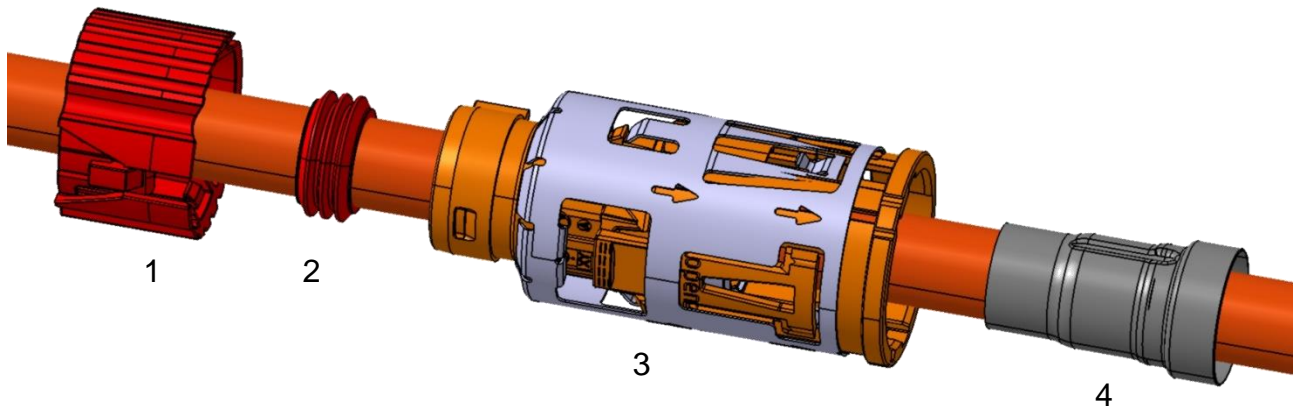
**Table 14: additional wire length**

6mm <sup>2</sup> 4mm <sup>2</sup>	L + 50	L + 54	Cover cap PLUS in end-position (plugged, installed in the vehicle)
6mm <sup>2</sup> 4mm <sup>2</sup>	L + 54	L + 58	Cover cap PLUS in pre-locking position (unplugged, delivery condition)
<b>Wire cross section</b>	<b>Dimension L after zero-cut (mm)</b>	<b>Dimension L for the HCT4 terminal incl. zero-cut (mm)</b>	<b>Position cover cap</b>

This dimension must be added to the planned length at cutting process of the wire for each female connector.

### 3.2 Assembly

Slide the Cover-Cap (1), the Wire-Seal (2), the ASSY Plastic-Housing (3) and the Shield-Sleeve (4) onto the shielded cable.



**Figure 28: Assembly components**

### 3.3 Strip off the shielded cable



**Figure 29: Strip off shielded cable**

Stripping length:



**Figure 30: Stripping length L1**

**Table 15: Stripping length L1**

6mm <sup>2</sup>	24,5 ± 1	28,5 ± 1
4mm <sup>2</sup>	24,5 ± 1	28,5 ± 1
<b>Wire (cross section)</b>	<b>Dimension L1 after zero-cut (mm)</b>	<b>Dimension L1 for the Hirschmann Automotive HCT4 terminal incl. zero-cut (mm)</b>

Do not damage the shielding during the processing operation.

### **3.4 Assemble the Stress-relief, remove the foil and shorten the shielding**

#### **3.4.1 Stress-relief (Europe configuration acc. TAB.010.046.EC)**



**Figure 31: Assemble the  
Stress-relief**



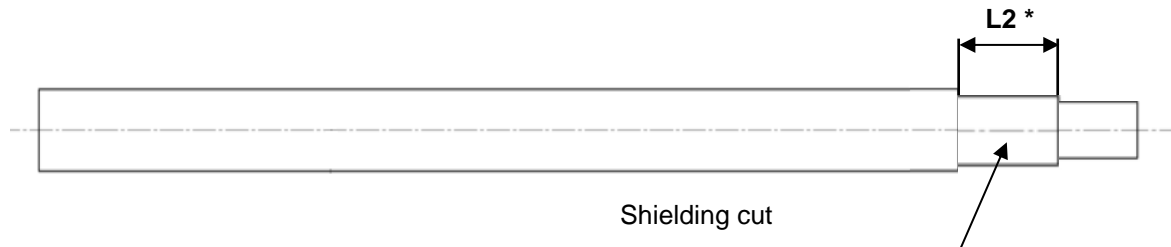
**Figure 32: remove the foil**



**Figure 33: shorten the  
shielding**

- The following process steps must be done, but the manufacturer can choose the sequence:
  - Assemble the Stress-relief (709-841-...) see Table 8.
  - Remove the foil.
  - Shorten the shielding.
- An overlap of the foil around the Stress-Relief is allowed circulating up to max. 1,5mm. An overlap of the foil around the Stress-Relief, like small edges is allowed up to max. 4mm.

- Length of the remaining shielding:



**Figure 34: Dimension of the shielding**

*\*Depending on the production method of each manufacturer, the dimension L2 can vary.*

- After cutting the shielding, there are no wire residues or parts of the shielding allowed on the cable. This must be ensured with some actions like the following:
  - can be avoided by removing the residues of the shielding
  - can be avoided by blowing out or by suction of the residues of the shielding
- In the next process step, make sure that the shielding is rising over the Stress-Relief at 100%

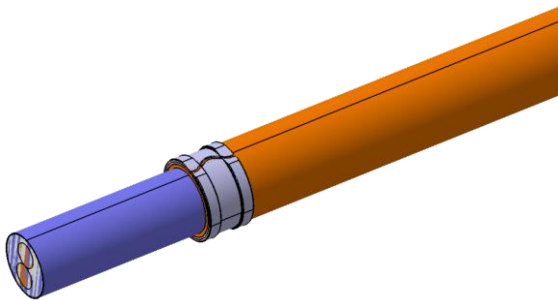


### **3.4.2 Assemble and crimp ferrule crimp (China configuration acc. 85D.973.271)**

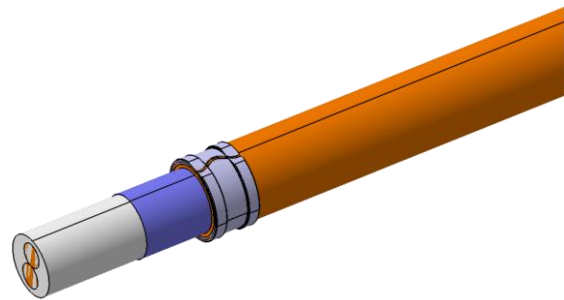
It is in the decision of the confectioner which device/machine is used. The crimp and assembly information contained in this chapter must be met.

The commissioning of the crimping device must be done by the confectioner.

The machine used by Hirschmann Automotive is described in chapter 4.

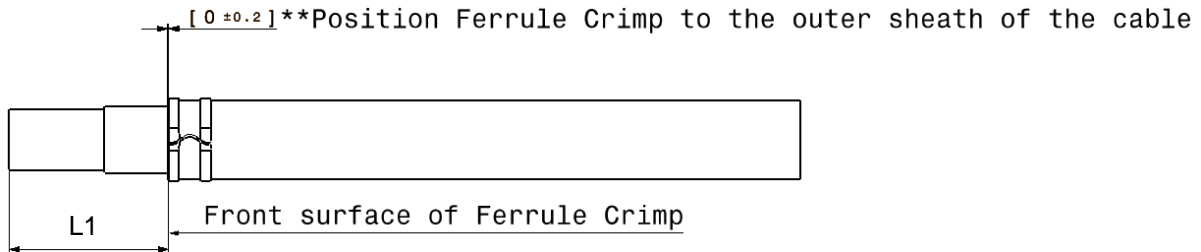


**Figure 35: Crimp Ferrule**



**Figure 36: Removal of the foil**

- The following process steps have to be done, whereby the sequence is left to the processor.:
  - Place the Ferrule-Crimp (see Table 8) and crimp the Ferrule-Crimp onto cable
  - Remove the foil
  - Shorten the wire-shielding



**Figure 37: Position Ferrule-Crimp**

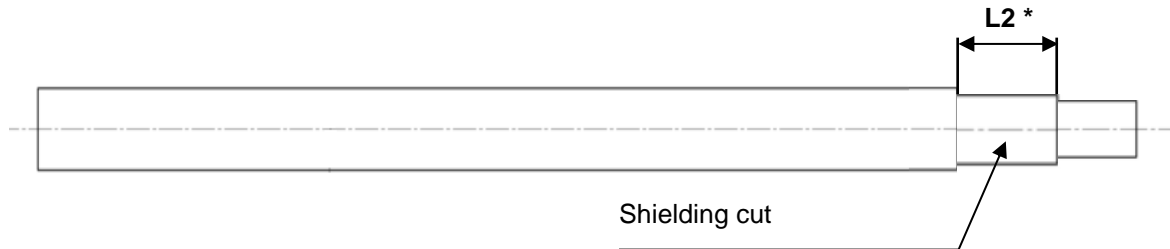
- The Ferrule-Crimp has to be positioned in relation to the outer sheath of the wire. The dimension of  $[0 \pm 0,2]**$  has to be maintained. When the Ferrule-Crimp is crimped on the wire, the insulation can be pushed forward and the dimension can no longer be fulfilled. Therefore, dimension L1 should be used as a checking item.

\*\*An adjustment of the tolerance for positioning of the Ferrule-Crimp to  $[0 +0.2/-0.5]$  is permissible, if the condition is given that the stripping length has been adjusted accordingly. (see process step 3.3)

Also, therefore dimension L4 should be used as a checking item.

- An overlap of the foil in the area of the Ferrule-Crimp is allowed circulating up to max. 1,5mm. An overlap of the foil, in the form of small edges, in the area of the ferrule crimp/strain relief is allowed up to max. 4mm.

- Length of the remaining cable shielding:



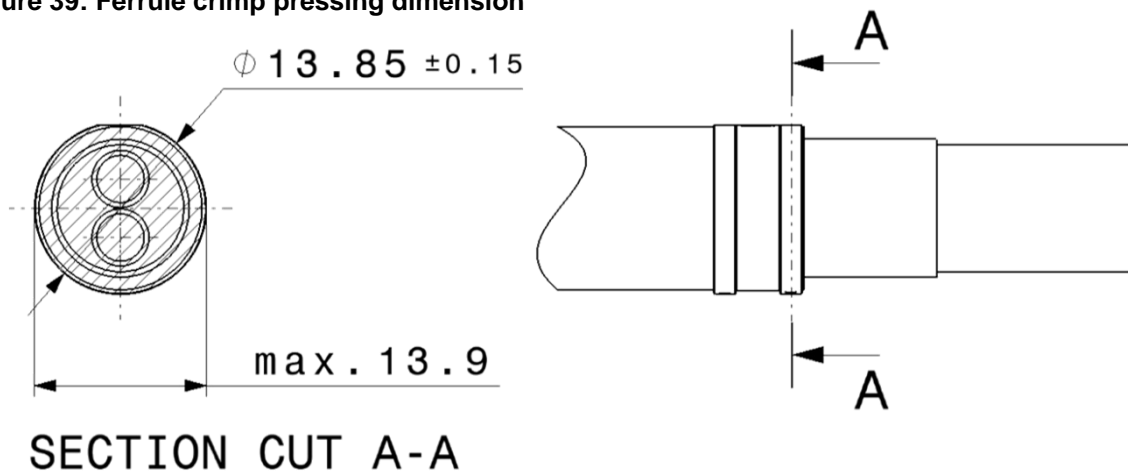
**Figure 38: Dimension of the shielding**

**Ferrule-Crimp pressing dimension:**

When crimping the ferrule crimp, the dimension  $\varnothing 13.85 \pm 0.15$  is obtained on both shoulders of the ferrule crimp (see section A-A).

Because of the tool separation between the stamp and the sprue a slight ovality may result in the crimp width. In the crimp width, the dimension is permitted up to max. 13,90mm.

**Figure 39: Ferrule crimp pressing dimension**



**Note:**

During the crimping process of the Ferrule-crimp, a bead may be formed in the open direction of the Ferrule-crimp. When closing the crimp, this may result in a cutting (see Figure 40) due to pinching of the two flanks together.

To reduce bead formation during the crimping process, an additional measure such as a hold-down device for the jacket of the cable can be installed in consultation with the machine manufacturer.

Any cuttings that occur during the crimping process must be removed.

The cutting of the wire-jacket itself in the area of the ferrule crimp is not problematic, if the wire-jacket is not completely cut through to the shield strands.

The sheath has no insulating function in the area where it is scraped off by the sheath crimp.

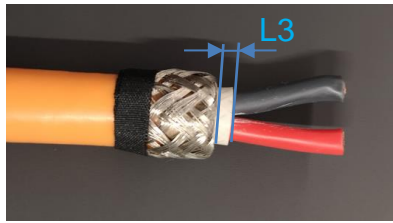


**Figure 40: Scraping during cimp-process**

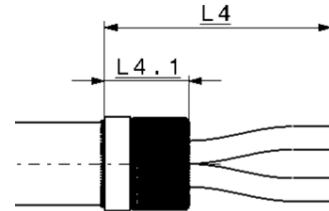
### 3.5 Reverse the shield backwards, fix the shield with tape and remove filling



**Figure 41: Fold over and fix the shielding**



**Figure 42: protrude filling material max. L3 = 3mm**



**Figure 43: Position fixing band**

- 100% of the shield has to be turned over the Stress-Relief. The braiding of the shield should remain as visible at Figure 41. It is not permissible to comb out the braided shield. By turning over the shield, a process related unbraiding is possible.

After this the shield has to be fixed with a fixing device after the Stress-Relief. (for example: tape)

- The fixing tape needs to stay on, until the pressing procedure is done and can be left inside the connector. The max. width of the tape is **5mm**.

The fixing tape has to be positioned immediately after the Stress-Relief and must not reach the Stress-Relief.

No shielding allowed outside the fixing tape.

The max. position of the tape is showed with the dimension L4.

L4 = max. 37,5mm after zero-cut (measurement in straightened length)  
max. 41,5mm incl. zero-cut (measurement in straightened length)

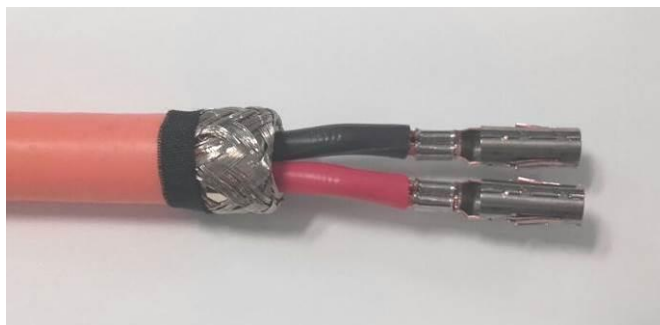
L4.1 = max. 16,7

- In this specification the PET- fabric tape 837X (838X) 5mm of the company Coroplast is used.

It is possible to use another product to fix the shield. The max. outer diameter after assembling is  $\varnothing$  14,3mm and the Shield-Sleeve must be able to be mounted easily. The product must have min. 150°C thermal resistance.

- The filling material can protrude max. 3mm towards the outer sheath. In the area between the two single cores the filling material can be bigger than L3.
- Single strands of the shield-braid which are not fixed with the tape and stick out must be removed before further process steps.
- Do not damage the single wires during the complete processing operation.

### **3.6 Crimp the HCT4 female terminal**



**Figure 44: Crimp the HCT4 female terminal**

It is up to the manufacturer which device/machine is used. The crimping and positioning data described on the following pages must be observed during the crimping process.

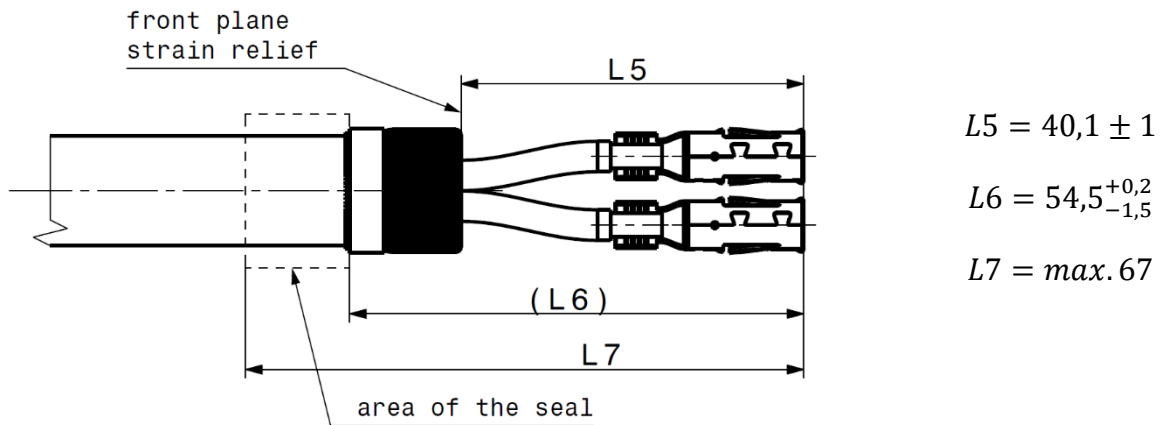
The order of a crimping device is the responsibility of the assembler.

The test equipment used by Hirschmann Automotive can be found in chapter 4.

**Process data**

The crimp data can be seen in the „Process specification HCT4 female terminal EVS-100068“.

The HCT4 female terminals need to be crimped in relation to the single wires. For a smooth assembly into the contact holder, the terminals need to be crimped in the correct position. The dimensions on the following figure need to be adhered to.



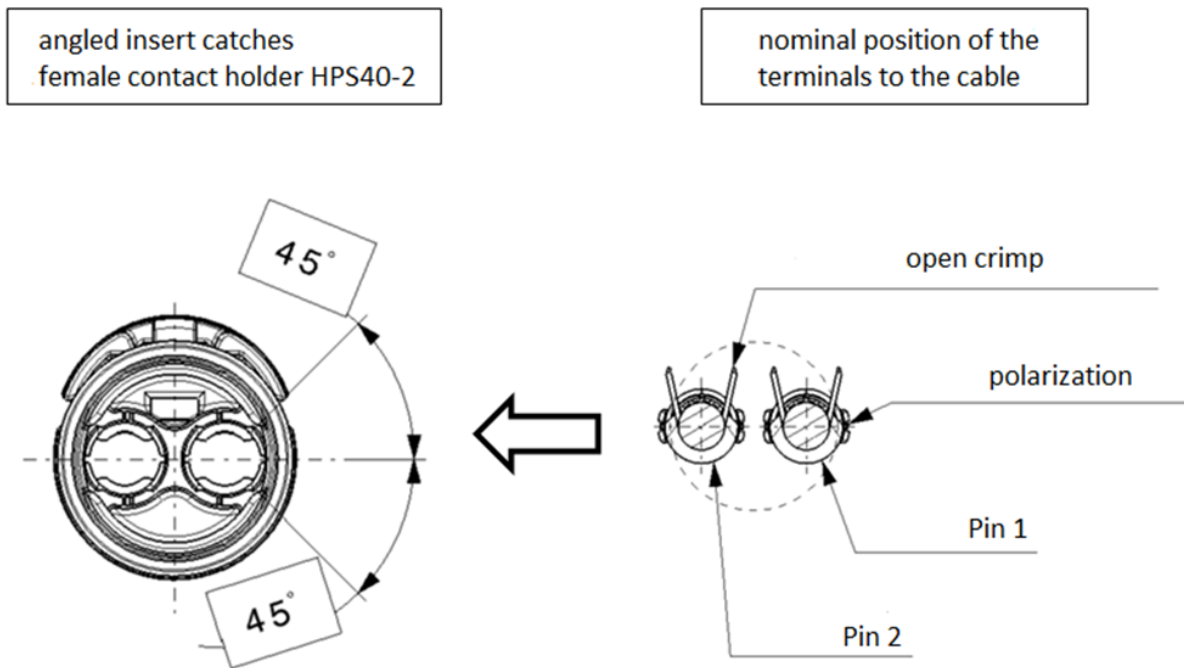
**Figure 45: Compliance with dimensions after crimping**

The dimension L5 is decisive for the position of Stress-Relief. As alternative to L5 it is allowed to prove dimension 5.1 (see point 3.7), but one of the two combinations from L4.1 and L5.1 or L4 and L5 has to be chosen. L6 is only for information and is built from L4.1 and L5. The dimensions are caused from L1, L4 and the EVS-100068. The difference of the length between the female terminals of max. 0,5mm is allowed.

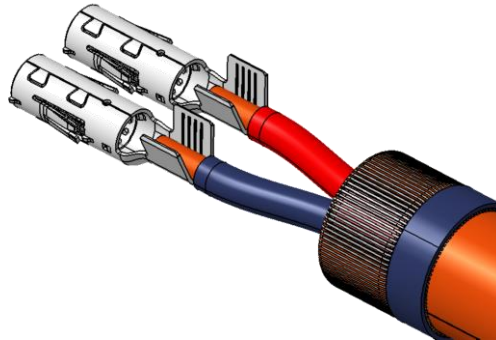


A mark on the insulation of the single wires or on the outer sheath which is caused due to fixing the wire at the crimping process is allowed. It must be ensured that the insulation will not be damaged because this will lead to an insulation resistance failure.

At the area of the Wire-Seal, it is not allowed to deform or damage the outer sheath which has negative influence on the sealing function. (see L7)



**Figure 46: Geometry of the inlet bevels on the ASSY Contact-Holder PLUS**



**Figure 47: Symbolic representation of crimped HCT4 terminals**

To do an orderly assembling / to ensure the primary locking and the secondary locking, the correct position of the terminals and the wire is very important and needs to be ensured.

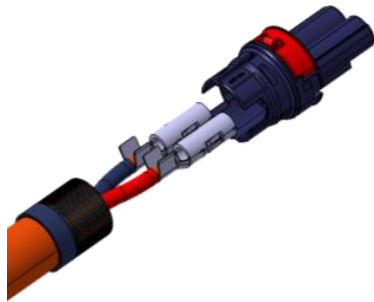
Usually, the horizontal version is intended.

The allowed angle deviation results from the geometry of the angled insert catches on the ASSY Contact-Holder PLUS and the max. assembling force of the cable with the terminals into the ASSY Contact-Holder PLUS.

This can be checked during the assembling process. (See chapter 3.7 Assembly of female terminals into the ASSY Contact-Holder PLUS)

### 3.7 Assembly

#### Assemble female terminals into the ASSY Contact-Holder PLUS (1)



2	- / may vary
1	+ / red
<b>Pin</b>	<b>Polarity / Color</b>

**Figure 48: Assembly the female terminals into the ASSY Contact-Holder PLUS**

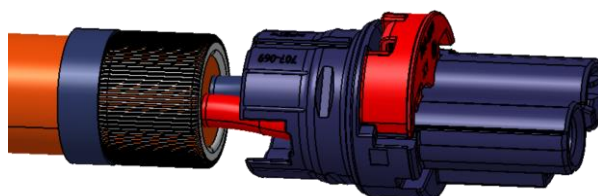
While assembling the HCT4 female terminals, the latching lance of the HCT4 female terminals will be deflected. Once the end position is reached, the latching lance will audibly engage, and female terminals will be primary locked. (Female terminals must be crimped.)

The mounting force of the female terminals into the ASSY Contact-Holder PLUS have to be proven if the crimping machine is not used or if the terminals are mounted fully automated inside the ASSY Contact-Holder PLUS.



**Table 16: Terminal insertion force**

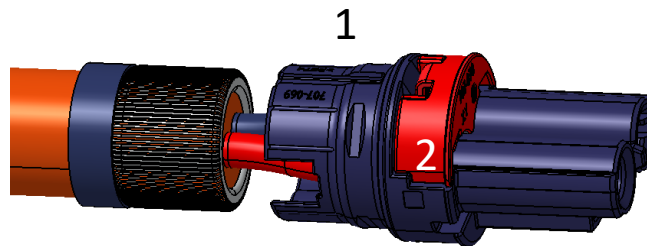
<b>Coroflex (Coroplast)</b>	FHLR2GCB2G 600/1000V T180	FHLR2GCB2G 600/1000V T180
	9-2641 (2 x 6mm <sup>2</sup> )	9-2641 (2 x 4mm <sup>2</sup> )
<b>Insertion-Force</b>	36N	30N
<b>Cablana (Condumex)</b>	FHLR2GCB2G 600/1000V T180	FHLR2G2GCB2G 600/1000V T180
	109.206.001.7 (2x6mm <sup>2</sup> )	109.204.001.7 (2x4mm <sup>2</sup> )
<b>Insertion-Force</b>	36N	30N
<b>Hengtong</b>	FHLR2GCB2G 600/1000V T180	FHLR2GCB2G 600/1000V T180
	8003110576 (2x6mm <sup>2</sup> )	8003110575 (2x4mm <sup>2</sup> )
<b>Insertion-Force</b>	36N	30N
<b>Huber + Suhner</b>	-	FHLR91XC13X-2x4 T150
	-	12582308 (2x4mm <sup>2</sup> )
<b>Insertion-Force</b>	36N	30N
<b>Huber + Suhner</b>	-	FHLR91XC13X-2x4 T150
	-	85149176 (2x4mm <sup>2</sup> )
<b>Insertion-Force</b>	36N	30N
<b>Wire manufacturer</b>	<b>6mm<sup>2</sup></b>	<b>4mm<sup>2</sup></b>
	<b>Wire cross section</b>	



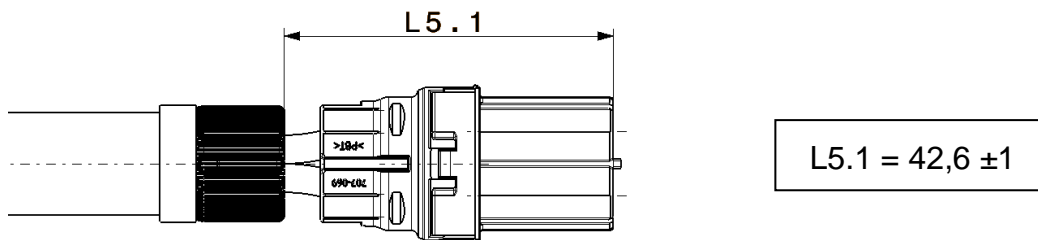
**Figure 49: Sec. lock pre-locking / HV terminals primary locked**

## Assemble secondary locking (2)

The secondary locking can only be assembled if the terminals are in the end position. A visible difference of the terminals to each other can be possible in the terminal cavity. Because of the position of the terminals on the wire, and the play of the terminal in the terminal cavity it is possible and acceptable.



**Figure 50: Secondary lock end position**



**Figure 51: Secondary lock end position**

L5.1 can be used for checking as alternative to L5 as it is described in chapter 3.6.

### 3.8 Push Shield-Sleeve onto ASSY Contact-Holder PLUS

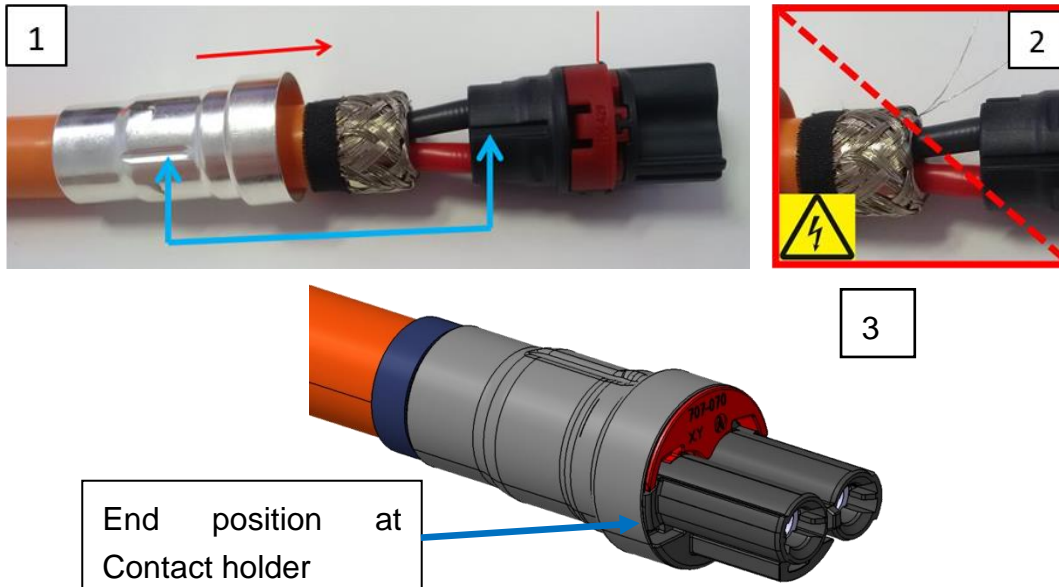


Figure 52: (1) Assembly of Shield-Sleeve, (2) Warning notice, (3) Shield-Sleeve in end position

- Before the Shield-Sleeve gets assembled a rotation of max.  $\pm 10^\circ$  of the ASSY Contact-Holder PLUS relative to the cable is allowed.
- The Shield-Sleeve needs to be assembled onto the ASSY Contact-Holder PLUS in the correct position. The Shield Sleeve can be placed in 2 positions turned by  $180^\circ$ .
- Do not damage the Shield-Sleeve during the assembly.
- The Shield-Sleeve has to be assembled until the end position is reached.
- The fixing tape has to come out of the Shield-Sleeve completely after assembling.
- It must be ensured that no single strands of the shield stick out before the Shield-Sleeve is mounted. Demand-oriented, protruding single strands can be removed. This rework has to be clarified with each OEM.



### Risk of insulation failure

### 3.9 Press Shield-Sleeve

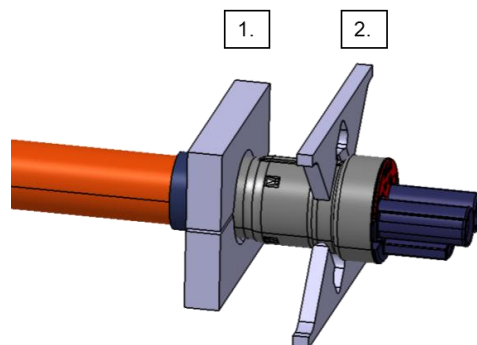
It is up to the manufacturer which device/machine is used. The pressing and positioning data described on the following pages must be observed during the pressing process.

The order of a crimping device is the responsibility of the manufacturer.

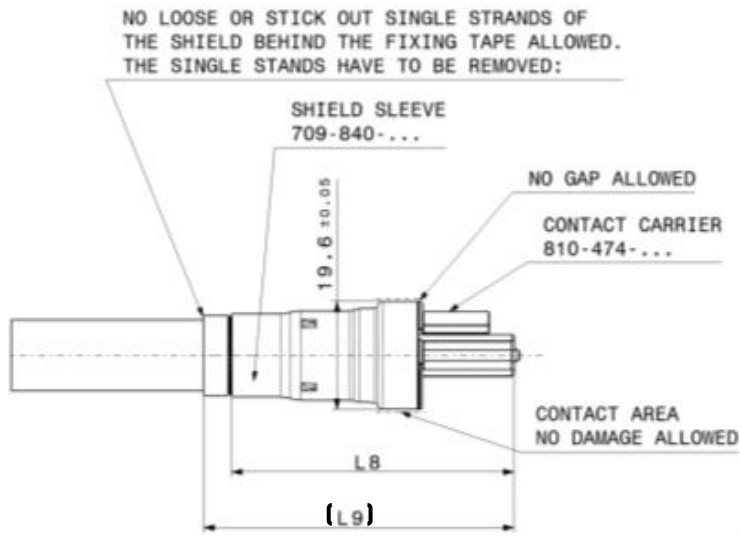
The test equipment used by Hirschmann Automotive can be found in chapter 4.

#### Pressing data

- a) The ASSY Contact-Holder PLUS incl. the female terminals have to be put into the device in the correct position.
- b) Make sure that the Shield-Sleeve is on the end position of the ASSY Contact-Holder PLUS. The tape has to stick out of the end of the Shield-Sleeve.
- c) The circularity of the Shield-Sleeve in the contact area has to be ensured.
- d) The measurements on the following drawing, have to be adhered to, before and after pressing.
- e) Two pressing actions will be done in one step
  1. Shield pressing (Shield-Sleeve, shielding, Stress-Relief and Cable)
  2. Pressing of the ASSY Contact-Holder PLUS (Shield-Sleeve and ASSY Contact-Holder PLUS)



**Figure 53: Symbolic representation of the pressing**



$$L8 = 51,4 \pm 0,3$$

$$L9 = 57,7^{+0,2}_{-1,5}$$

Figure 54: Embossing position from the cable

The dimension L8 and L9 are just for information to check the process.

The dimensions are resulting from the dimension L1, L4 and the EVS-100068.

Do not damage the following parts during the pressing process:

- Insulation of the wire
- Insulation of the single wires
- Stress relief
- Shield sleeve
- Shield strands of the wire





### 3.9.1 Shield pressing by two half-shells

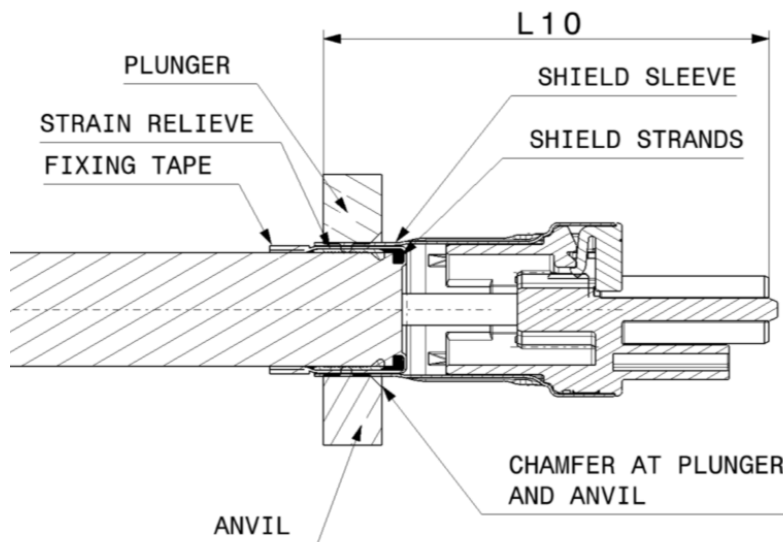
#### Embossing position:

The exact geometry of the plunger and anvil is given.

The position of the plunger and the anvil has to be reversed to the front plane of the ASSY Contact-Holder PLUS.

The chamfer at the plunger and the anvil has to be on the side to the ASSY Contact-Holder PLUS.

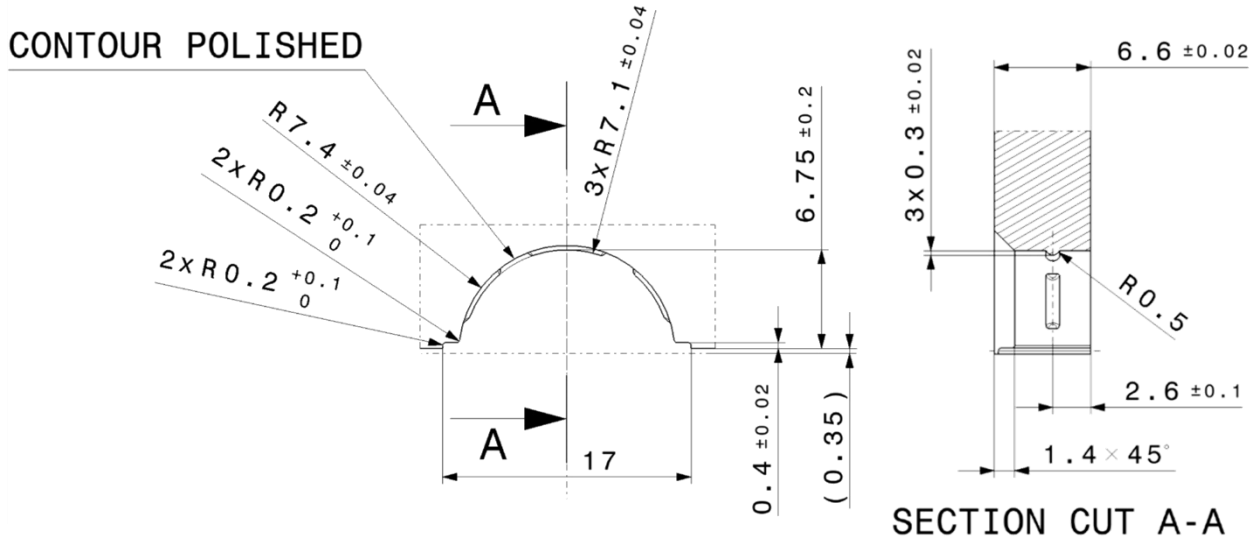
The dimension L10 is defining the position of the plunger and the anvil. The dimension L10 is considered as tool dimension and must be ensured in the tool.



$$L10 = 50,4 \pm 0,1$$

**Figure 55: Embossing position**

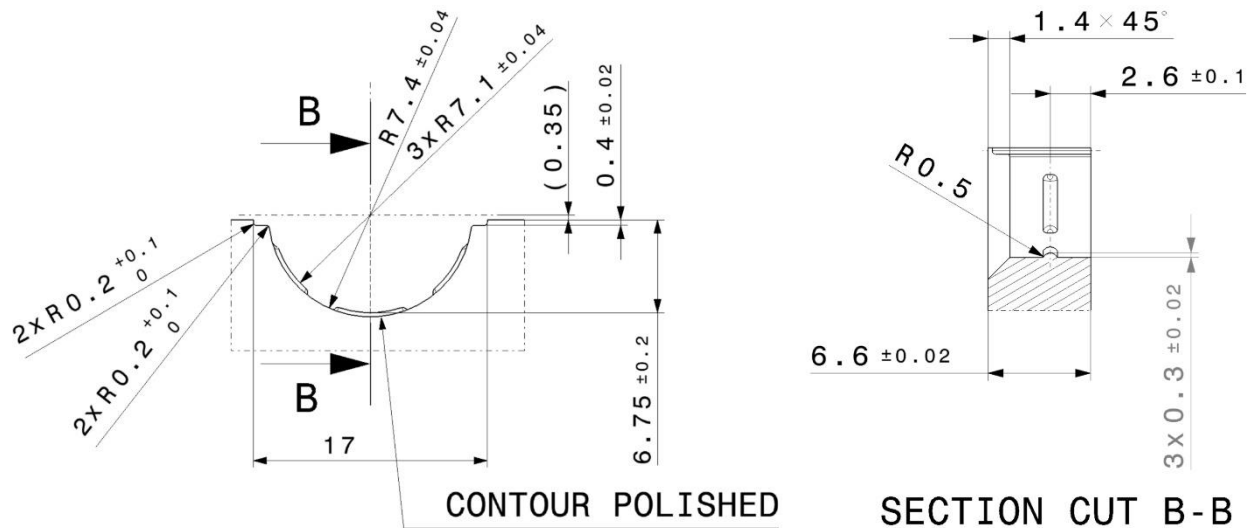
**Plunger and anvil geometry of the wire shield pressing**



**Figure 56: Plunger geometry of the wire shield pressing**

Plunger geometry of the wire shield pressing

Material: 1.2721 vacuum hardened 58hrc



**Figure 57: Anvil geometry of the wire shield pressing**

Anvil geometry of the wire shield pressing

Material: 1.2721 vacuum hardened 58hrc

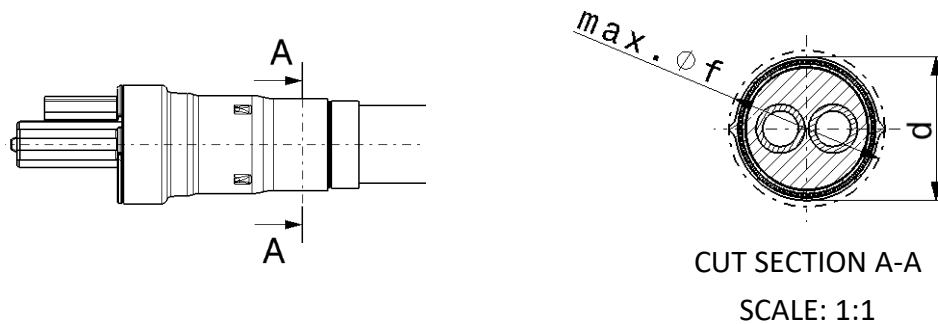
**Note:**

For 6mm<sup>2</sup> Configuration it is allowed to use the plunger and anvil geometry as described in EVS100137-03 Version 04 until the new anvil and plunger geometries acc. Figure 56 and Figure 57 are procured.

In order to fulfil the requirement for pulling force acc. Table 18 at the cable for 4mm<sup>2</sup> configuration the new anvil and plunger geometries acc. Figure 56 and Figure 57 have to be used.

**Embossing height d:**

The plunger and anvil are pressed together until block. Due to this the dimension **d** will be given. See table of each cross section.



**Figure 58: Drawing specification of dimension d**

**Table 17: press height d**

	Dimension d in mm <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">F1</span>	
<b>Coroflex (Coroplast)</b>	14,57 ± 0,15	14,57 ± 0,15
<b>Cablana (Condumex)</b>		
<b>Hengtong</b>		
<b>Huber + Suhner</b>	-	
<b>Wire manufacturer</b>	6mm <sup>2</sup>	4mm <sup>2</sup>
	<b>Wire cross section (structure of conductor)</b>	

During the pressing process a fold appears on two sides.

This fold is not allowed to be bigger than the diameter **f = Ø16,4mm** refer to the centerline of the cable.

In the area of the fold the material of the Shield-Sleeve is not allowed to be cracked.

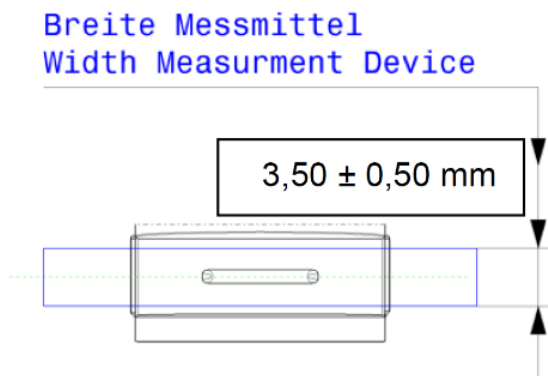
**Check measurement of the embossing height  $d$  and the max. diameter  $f$ :**

To check the dimension  $f$ , a gauge with an inner diameter of 16,4mm has to be used.

To check the dimension  $d$ , the height needs to be measured acc. to the drawing.

All of the dimensions have to be within the given tolerance. (see Table 17, page 44).

The measuring of the embossing height “ $d$ ” must be done with a suitable measuring device. (e.g. Micrometer or caliper, measuring range: 0-25 mm) The gauge for the measurement must have a width of  $3.50 \pm 0.50\text{mm}$ . The measurement must be taken symmetrically to the embossing position.



**Figure 59: width of measuring device**

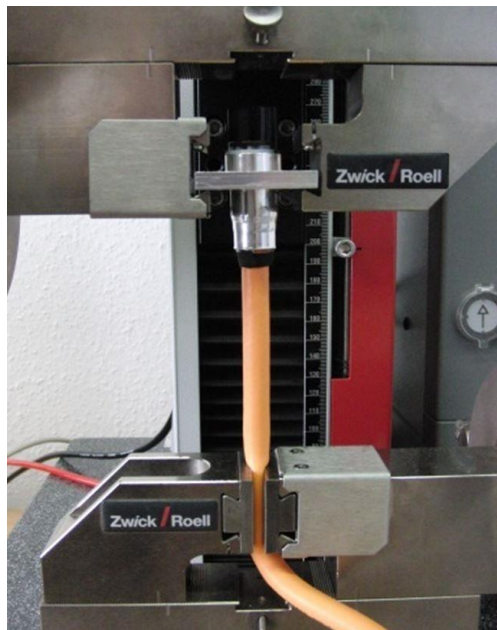


**Figure 60: schematic representation of the pressing height measurement**



### **Pulling force of the Cable**

To measure the pull-out force, the wire must be clamped firmly into a clamping device. The distance between the clamping position of the wire and the fixing tape is about 70mm. The connector must be fixed on the Shield-Sleeve at the transition between the largest and the second largest diameter.



**Figure 61: Test setup pulling force of shield pressing**

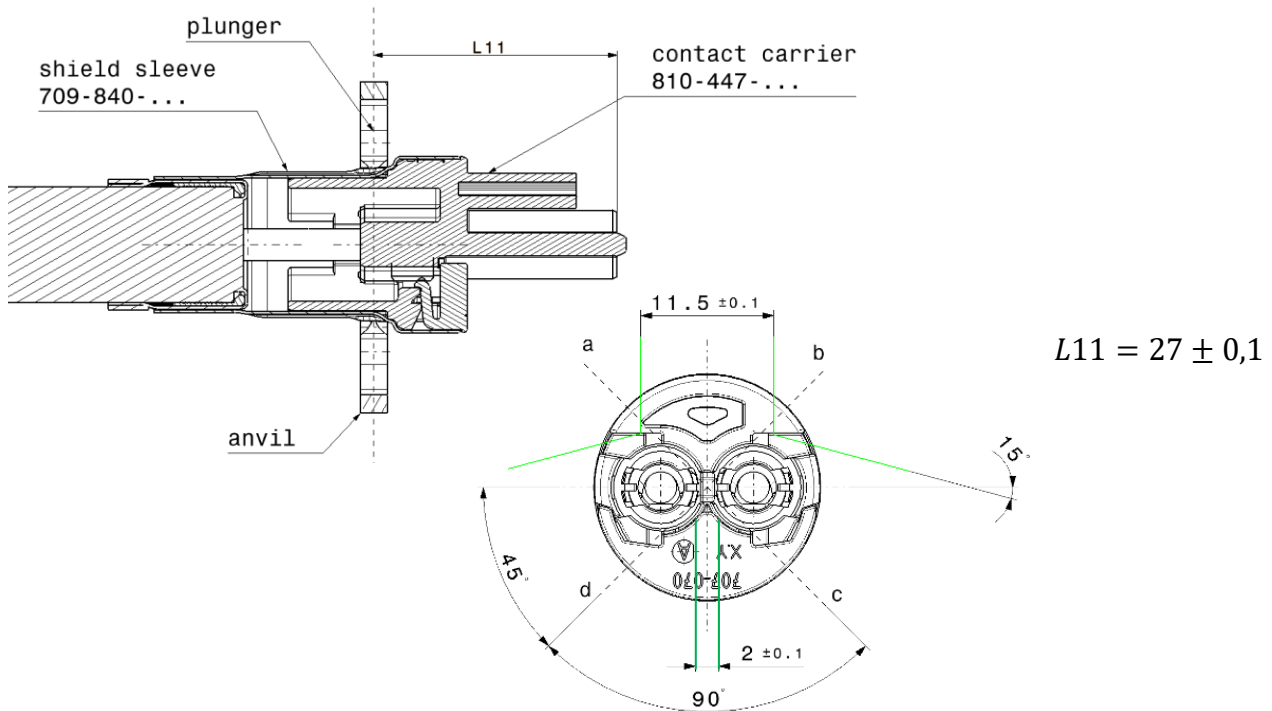
HCT4 terminals must not be installed in the test specimens, in order to test the shield pressing only. In this state, the value in the Table 18 must be reached.

**Table 18: Pulling force for the several wire cross section (see VW 80332 PG10)**

4mm <sup>2</sup>	≥ 300N
6mm <sup>2</sup>	≥ 300N
<b>Wire cross section (structure of conductor)</b>	<b>Pulling force</b> (F2)

### 3.9.2 Pressing contact holder PLUS

#### Embossing position:



**Figure 62: Embossing position on the contact holder**

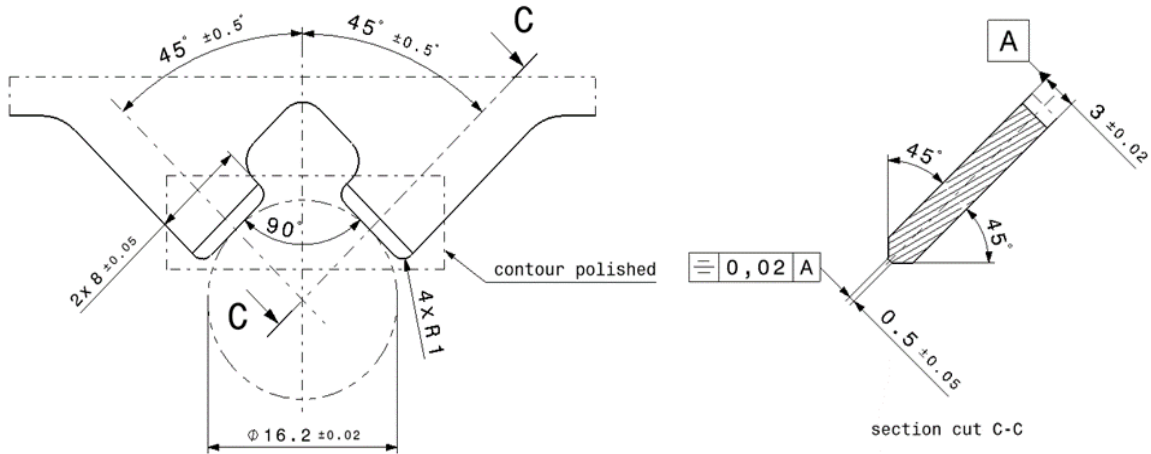
The dimension L11 describes the position of the pressing. The dimension L11 is considered as tool dimension and must be ensured in the tool.

The position of the plunger and the anvil has to be aligned in relation to the front plane of the ASSY Contact-Holder PLUS.

The four embossing positions (a-d) must be aligned in relation to the ASSY Contact-Holder PLUS. Therefore the ASSY Contact-Holder PLUS must be secured against rotation. The green areas can be used as a jack for the contact holder. Ensure that any coding version of the ASSY Contact-Holder PLUS can be inserted into the jack.

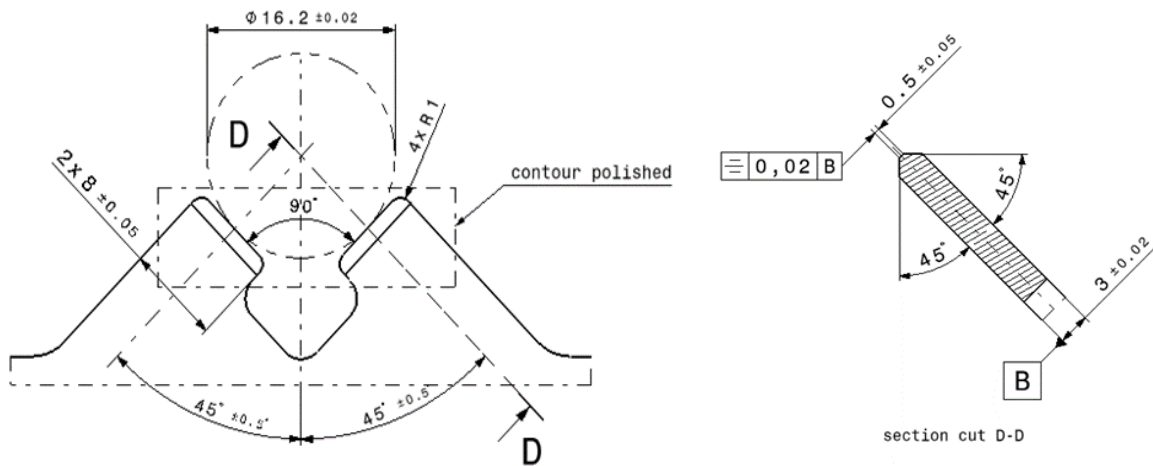
The exact geometry of the plunger and anvil is given.

**Geometry of the plunger and the anvil pressing on the ASSY Contact-Holder PLUS**



**Figure 63: Geometry of the plunger and the anvil pressing on the ASSY Contact-Holder PLUS**

Anvil geometry of the ASSY Contact-Holder PLUS pressing  
 Material: 1.2721 vacuum hardened 58hrc

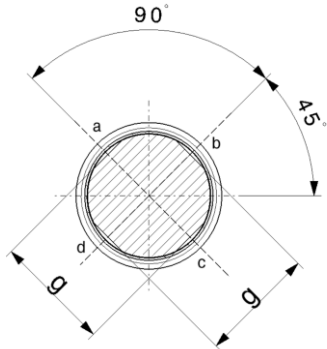


**Figure 64: Geometry of the plunger and the anvil pressing on the ASSY Contact-Holder PLUS**

Anvil geometry of the ASSY Contact-Holder PLUS pressing  
 Material: 1.2721 vacuum hardened 58hrc



**Embossing height g:**



The dimension g results from the embossing in between a-c and b-d.

The embossing has to be done at the same time.

**Figure 65: Drawing specification of dimension g**

The dimension g is defined as following:

(g = 16.40 mm ± 0,1 – valid for applications already in series production)

g = 16.50 mm ± 0,1 – valid for all new applications

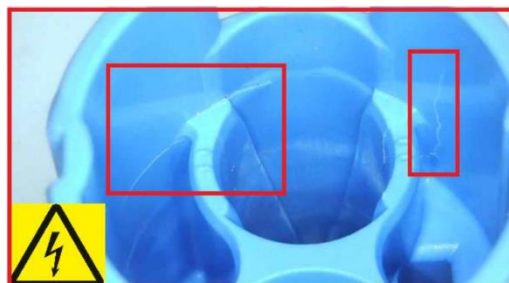
For every new application of the HPS40-2 female connector it must be used a embossing height of 16.5mm ± 0,1mm for the dimension “g”.



**Risk of insulation failure!**

The embossing of the shield sleeve must not cause any damage to the supporting terminal holder part.

It's not allowed to go below the min. limit of the dimension “g”.



**Figure 66: Possible error image for over pressing (stress marks at the plastic part)**

**Check the measurement of the embossing height g:**

To check the dimension g, the height needs to be measured acc. to the drawing. All of the dimensions have to be within the given tolerance.

The measuring of the embossing height has to be done with a suitable measuring device. (Micrometer, measuring range: 0-25mm) The thickness of the measuring blades must be lower than 0,3mm.



**Figure 67: schematic representation of the measuring device**



**Figure 68: schematic representation of the measurement of the pressing height**

### **3.10 Positioning of the female locking device unit**

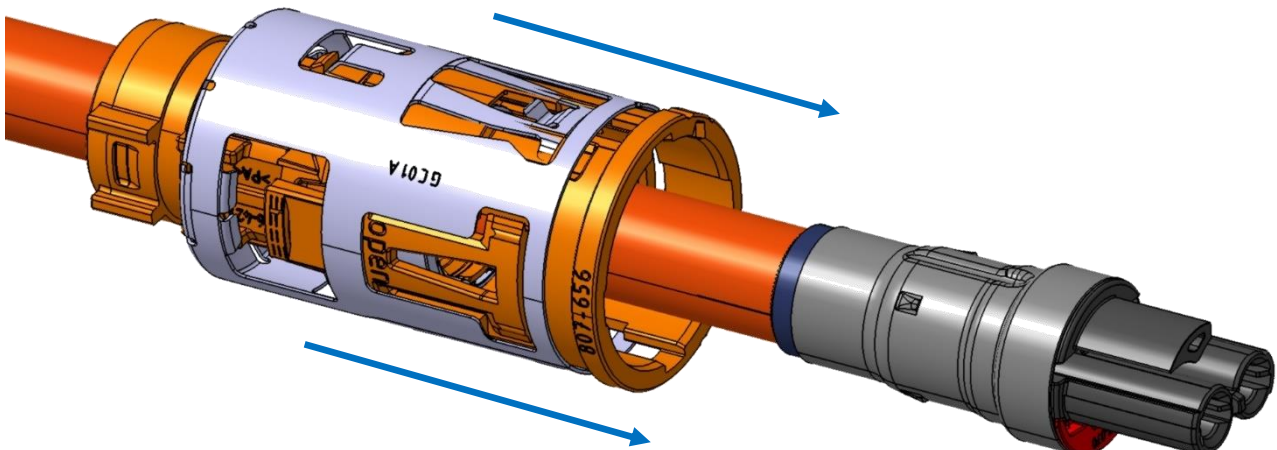
An assembly device (hand lever press) can be used for the positioning and assembly process of the ASSY Plastic-Housing to the cable assembly.

The manufacturer is free to choose which device/machine is used. The assembly data described on the following pages must be observed during the assembly process.

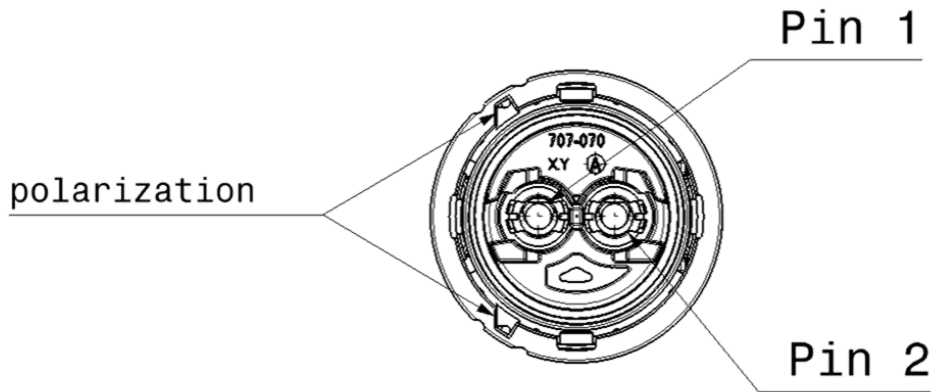
The order of an assembly device is the responsibility of the manufacturer.

The test equipment used by Hirschmann Automotive can be found in chapter 4.

The ASSY Plastic-Housing has to be assembled power assisted, and in the correct position.



**Figure 69: Mounting direction of the ASSY Plastic-Housing**

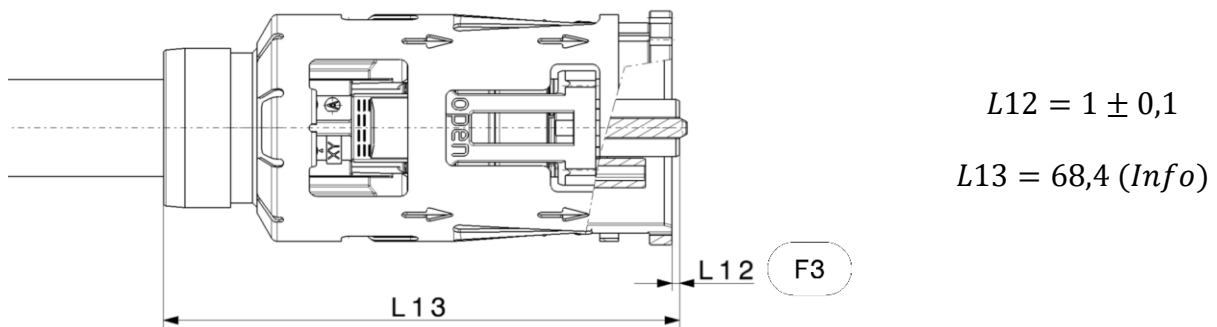


**Figure 70: Position of the polarization of the ASSY Plastic-Housing**

- The ASSY Contact-Holder PLUS incl. the Shield-Sleeve needs to be assembled into the ASSY Plastic-Housing in the correct position.

Both polarizations need to be symmetric to the axis in between of the center of Pin 1 and Pin 2.

Also, the polarization has to be on the side of Pin 1.



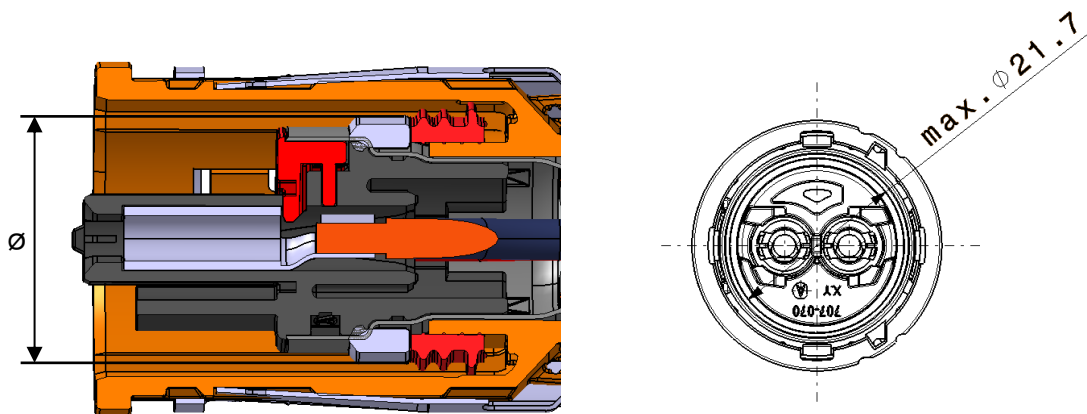
**Figure 71: Assembly position of the ASSY Plastic-Housing**

- The locking sleeve must be assembled onto the Shield-Sleeve force-assisted until the dimension L12 is reached.

The dimension L12 can be checked with a testing gauge.

The dimension L13 is only for checking purposes.

- During the assembling process, there are no damages allowed on the Shield-Sleeve, the ASSY Contact Holder PLUS, or the wire.
- Pull forces via the cable should be avoided when installing the pin housing. High pull force via the cable can damage the shield transition.
- The maximum diameter 21,7mm of the safety ring (grey Ring) may not be exceeded after mounting process.



**Figure 72: Maximum diameter of the safety ring after mounting process**

**Note:**

For the assembly device or checking device of dimension L12, it should be noted that a possible ridge/burr on the front face of the Plastic-Housing is taken into account and does not affect the end position L12 of the Contact-Holder to the Plastic-Housing or the measurement of the checking process.

### 3.11 Assembly Wire-Seal and Cover-Cap PLUS

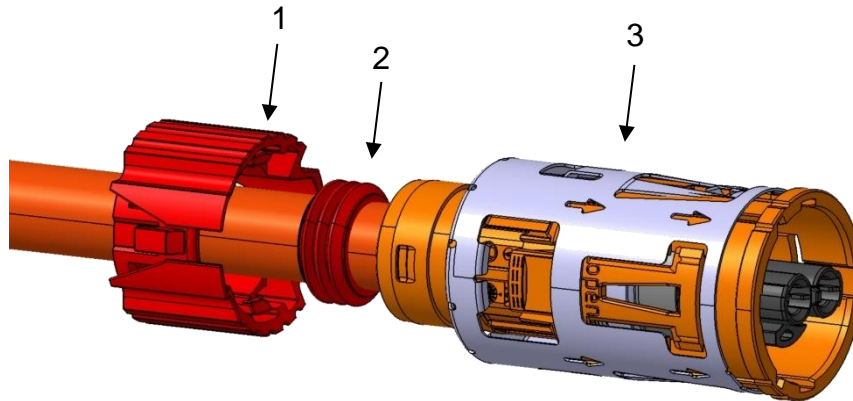


Figure 73: Assemble seal and cover cap

- Push the Wire-Seal [2] into the ASSY Plastic-Housing [3]

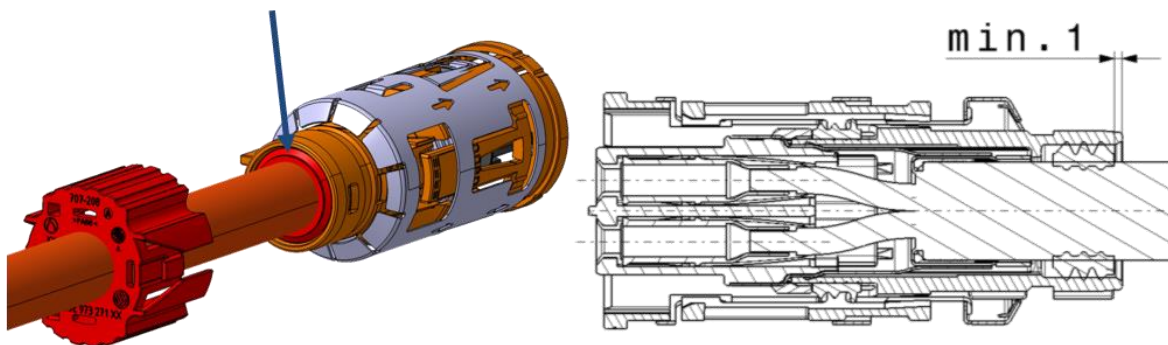
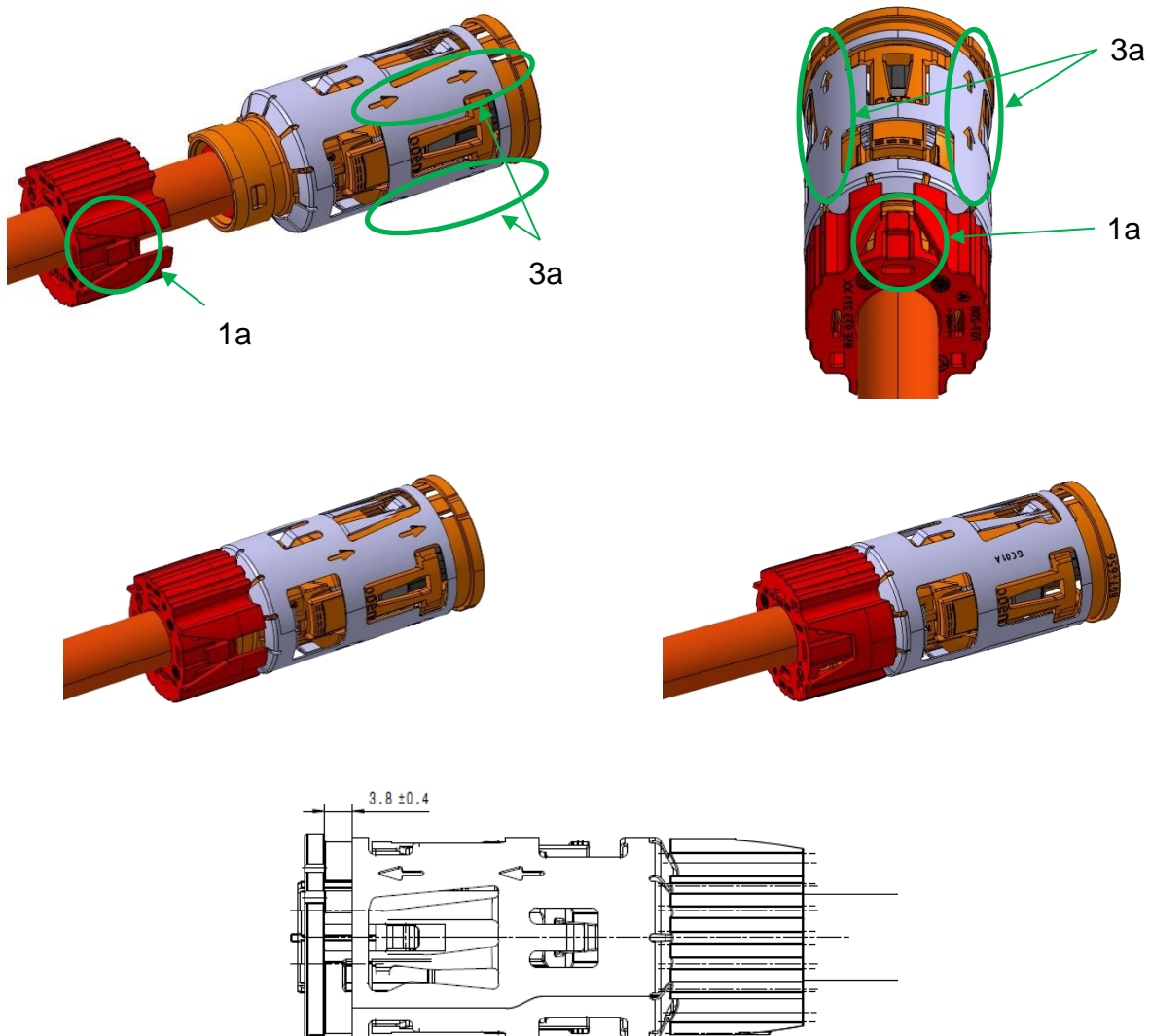


Figure 74: Symbolic representation of the seal one end position

The Wire-Seal can be slightly widened during assembly.

- It is possible to move the Wire-Seal [2] with the Cover Cap PLUS [1] on the wire, but care must be taken that the seal does not twist and is not pinched or damaged.
- It has to be ensured that Wire-Seal [2] is positioned at least 1mm inside the ASSY Plastic-Housing [3] in end-position (see Figure 74).

- Snap the Cover-Cap [1] into the peripheral groove of the ASSY Plastic-Housing [3], considering the polarization, the detachable snap hook [1a] must be located by the arrows of the CPA [3a]. In the delivery condition or unmated state, the metal CPA has to have a distance of  $3,8\pm0,4\text{mm}$  to the board of the ASSY Plastic-Housing, as visible in the last picture of Figure 75.
- It must be ensured that the Cover-Cap PLUS [1] and Wire-Seal [2] do not get damaged during the processing.



**Figure 75: Cover-Cap PLUS and CPA in pre-position**

### **3.12 Technical cleanliness**

In general, pay attention to the cleanliness on the connector and inside of the connector.

Metallic particles generated during the assembly process, have to be removed with a suitable device. Inside the connector and on the connector, there are no metallic particles > 1000 µm allowed.

For metallic particle at each connector: CCC = N (J4/K0) acc. to VDA Volume 19

For all other particle at each connector: CCC = N (J10/K0) acc. to VDA Volume 19

It is also important to protect the component from further contamination during transport. Suitable packaging must be considered.





## **4 Appendix**

The machines and devices described in this chapter were used by Hirschmann Automotive for the production of numerous experimental- and validation parts. The selection, design and commissioning of these devices lies within the responsibility of the manufacturer.

### **4.1 Double stroke crimping machine (see chapter 3.6)**

**Name of the device:** HPS40-2 Double stroke crimping machine  
**Article number:** 185/16  
**Name of the device:** Interchangeable crimping unit  
**Article number:** Shown in the process specification HCT4 female terminal „EVS-100068“  
**Contact:** Schäfer Werkzeug- und Sondermaschinenbau GmbH  
Dr.-Alfred-Weckesser-Str. 6  
76669 Bad Schönborn-La, Deutschland  
Tel: +49 7253 9421-0  
Fax: +49 7253 9421-94  
[www.schaefer.biz](http://www.schaefer.biz)

### **4.2 Pressing device (see chapter 3.4.2)**

**Name of the device:** HPS40-2 MCC Ferrule Crimp  
**Article number:** EPS3000-PHS40-2-ZE  
**Contact:** Schäfer Werkzeug- und Sondermaschinenbau GmbH  
Dr.-Alfred-Weckesser-Str. 6  
76669 Bad Schönborn-La, Deutschland  
Tel: +49 7253 9421-0  
Fax: +49 7253 9421-94  
[www.schaefer.biz](http://www.schaefer.biz)



#### **4.3 Pressing device (see chapter 3.9)**

**Name of the device:** Pressing device HPS40-2

**Article number:** 188/16

**Contact:** Schäfer Werkzeug- und Sondermaschinenbau GmbH  
Dr.-Alfred-Weckesser-Str. 6  
76669 Bad Schönborn-La, Deutschland  
Tel: +49 7253 9421-0  
Fax: +49 7253 9421-94  
[www.schaefer.biz](http://www.schaefer.biz)

#### **4.4 Assembling device (see chapter 3.10)**

**Name:** Assembling device HPS40-2

**Article number:** HPS40-2

**Contact:** WKM - Maschinenbau GmbH  
Oberes Ried 15  
A-6833 Klaus  
Tel. +43 5523 / 54907

#### **4.5 Degree of automation**

There is a concept developed by the company Komax in which the process steps as shown in this process specification can be produced fully automatic in various stage of expansion.

This concept was developed together with the company Hirschmann Automotive.

Each manufacturer is responsible of the commi

ssioning of the pressing device and can be requested direct at the company Komax.

##### **KOMAX AG**

**Industriestraße 6**

**CH-6036 Dierikon**

**Phone: +41 41 455 04 55**

[www.komaxwire.com](http://www.komaxwire.com)



## 5 Change History

Version	Description of change	Editor	Status	Date
00	First release	Rümmele M.	released	18.06.2021
01	Chapter 2.7: Table 8 adapted; Chapter 3.1: Table 10 adapted; Chapter 3.4: Definition of foil overhang added; Chapter 3.5: Dimension L4 - added "Measurement in stretched length"; Chapter 3.7: Table 12 adapted; Chapter 3.9.1: Dimension L10 - addition/definition as tool dimension; Chapter 3.9.2: Dimension L11 - addition/definition as tool dimension; embossing height g - max. Width of measuring tips changed to 0.3mm; Chapter 3.11: Assembly of Wire-Seal adapted; Added orientation of the Cover-Cap;	Rümmele M.	released	24.02.2022
02	Chapter 3.1: Figure 18,19 and Table 10 adapted	Rümmele M.	released	07.03.2022
03	General: part description adapted; Chapter 2: table 2 added; Chapter 2.5: part number adapted; Chapter 3.5: Dimension L4.1 added + Figure 31 adapted; Chapter 3.6: L6 set as Information only; Chapter 3.7: dimension L5.1 added; Chapter 3.9: L9 set as Information only;	Rümmele M.	released	30.06.2022
04	Chapter 3.8: max. allowed rotation of $\pm 10^\circ$ added; Chapter 3.9: text of not allowed damages added;	Rümmele M.	released	18.07.2022



05	Chapter 1.1: Item J added; Chapter 1.2: table 1 adapted; Chapter 2.1: added new shield sleeve; Chapter 2.2: added; Chapter 2.5: added ferrule crimp; Chapter 2.6: added new shield sleeve; Chapter 3.4.1: added; Chapter 3.4.2 added; Chapter 3.5: Shield braid structure adjusted; Figure 29 and Figure 30 adapted; Chapter 3.8: description of rotation angle adapted Chapter 3.9.1: Figure 52 Figure 53 & Figure 54 adapted; Extraction force adjusted to 300N Chapter 4.2 added (Ferrule Crimp-Press)	Rümmele M.	released	27.06.2023
06	Chapter 2.3: Information's of Hengtong Cable completed Chapter 3.7: Table 14 completed; Chapter 3.10: Note added;	Rümmele M.	released	07.07.2023
07	Chapter 1.2: Table 1 extended; Chapter 1.3: 2x4mm <sup>2</sup> Huber+Suhner cable added; Chapter 1.4: Characteristics / Customer release added; Chapter 2.3: MAN configuration added; Chapter 2.4: Table 6 extended; Chapter 2.6: Stress Relief H+S 709-841-022 added; Chapter 2.10: Index 532 added; Chapter 3.5: Picture 38, 39 and 40 adapted; Chapter 3.7: Table 16 extended; Chapter 3.9.1: Text adapted and Picture 59 added; Picture 56 of Version 06 removed; Chapter 3.9.2: Embossing height "g" adapted;	Rümmele M.	released	14.12.2023
08	Chapter 2.2: Table 4: Cover Cap article no. changed;	Schwendinger	released	21.03.2024