



PROCESS SPECIFICATION  
**HPS40-2 2+2**  
**Female Connector MCC**

EVS-100096



HIRSCHMANN  
AUTOMOTIVE



# TABLE

1	General .....	3
1.1	Introduction .....	3
1.2	Customer releases .....	4
1.2.1	Customer: Miscellaneous .....	4
1.2.2	Customer: BMW .....	4
1.3	Other current documents .....	5
2	Product structure (single components) .....	6
2.1	Sheated cable (see table) .....	6
2.2	HPS40-2 2+2 locking sleeve .....	7
2.3	HPS40-2 2+2 female contact carrier .....	8
2.4	HPS40-2 2+2 shielding sleeve .....	9
2.5	HPS40-2 2+2 stress relief .....	10
2.6	HPS40-2 2+2 wire seal .....	11
2.7	HPS40-2 2+2 cover cap .....	12
2.8	HCT4 2+2 female terminal .....	13
3	Product structure (optional parts) .....	14
3.1	HPS40-2 2+2 CPA housing .....	14
3.2	HPS40-2 2+2 coding clip .....	15
3.3	HPS40-2 2+2 90° angle cap .....	16
3.4	HPS40-2 2+2 protection cap .....	17
4	Processing steps .....	18
4.1	Cut the shielded cable .....	18
4.2	Assembly of the single components .....	19
4.3	Strip off the shielded cable .....	20
4.4	Wire processing I .....	21
4.5	Wire processing II .....	22
4.6	Crimp the HCT4 female terminal .....	23
4.7	Assembly I .....	26
4.8	Assembly II .....	28
4.9	Push shielding sleeve onto contact carrier .....	29
4.10	Press shielding sleeve .....	30
4.10.1	Shield pressing by two half-shells .....	32
4.10.2	Shield pressing by two half-shells .....	36
4.10.3	Pressing contact carrier .....	40
5	Processing steps (Rotative orientation) .....	44
5.1	Cut the shielded cable .....	44
5.2	Assembly of the single components .....	45
5.3	Strip off the shielded cable .....	46
5.4	Wire processing I .....	47

This document is not subject to change service!



5.5	Wire processing II.....	48
5.6	Crimp the HCT4 female terminal .....	49
5.7	Assembly I.....	52
5.8	Assembly II.....	54
5.9	Push shielding sleeve onto contact carrier .....	55
5.10	Rotative orientation .....	56
5.11	Press shielding sleeve.....	57
5.11.1	Shield pressing by two half-shells.....	59
5.11.2	Shield pressing by two half-shells.....	63
5.11.3	Pressing contact carrier.....	67
5.12	Positioning of the female locking device .....	71
5.13	Assemble seal and cover cap.....	73
6	Processing steps (Rotative orientation) .....	75
6.1	Positioning of the CPA Housing.....	75
7	Processing steps (optional parts) .....	77
7.1	Assemble 90° angled cap.....	77
7.2	Assemble coding clip.....	80
7.3	Assemble transport protection cap .....	81
7.4	Stacking of produced harnesses .....	81
8	Technical information .....	82
8.1	General requirements.....	82
8.2	Technical cleanliness .....	82
8.3	Degree of automation.....	83
9	Change of documentation .....	84

This document is not subject to change service!



# 1 General

## 1.1 Introduction

This process specification is valid for all variants and describes the product structure as well as the assembly of the Hirschmann Automotive HPS40-2 2+2 female connector MCC.

System number	Coding	Wire cross section
807-655-501	A	2.5 mm <sup>2</sup> 4.0 mm <sup>2</sup> 6.0 mm <sup>2</sup>
807-655-502	B	
807-655-503	C	
807-655-504	D	
807-655-507	Z	

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.



## 1.2 Customer releases

It is our suggestion that the specified dimensions are observed during processing. Further functional features must be coordinated and defined with the OEM. The adjustments in the processing specification with the status 08/ 2023 must be considered for new applications, but not for existing applications.

### 1.2.1 Customer: Miscellaneous

Customer: Miscellaneous					
L	S	F	Characteristic	Specific Purpose	Place of implementation
L1	-	-	"d" Height of shield-crimping	Strain-relief, electrical shield connection - EMC	Tier 1
L2**	-	-	Retention force of shield crimping	Strain-relief, electrical shield connection - EMC	
-	-	F1	L12 depth of contact carrier	Pluggability	

\*\*No 100% check possible since the specimens are destroyed during testing.  
Proof of capability or continuous testing of all special characteristics must be aligned with OEM directly.

### 1.2.2 Customer: BMW

Customer: BMW			NAEL: N OU53 B – October 2022		
BMW-Number.: 5 A88 290					
Special characteristics according to GS 91011:2019-8					
L	S	F	Characteristic	Specific Purpose	Place of implementation
L1	-	-	"d" Height of shield-crimping	Strain-relief, electrical shield connection - EMC	Tier 1
L2**	-	-	Retention force of shield crimping	Strain-relief, electrical shield connection - EMC	
-	-	F1	L12 depth of contact carrier	Pluggability	

\*\*No 100% check possible since the specimens are destroyed during testing.  
Proof of capability or continuous testing of all special characteristics must be aligned with BMW directly.

Legend: L = Legal, S = Safety, F = Function

This document is not subject to change service!



## 1.3 Other current documents

A	HCT4 Process specification (Ag)	EVS-100068
B	Data sheet 2x 2.5 mm <sup>2</sup> shielded cable (T180) of Kroschu	Kroschu No. 64996918
C	Data sheet 2x 4.0 mm <sup>2</sup> shielded cable (T180) of Kroschu	Kroschu No. 64997293
D	Data sheet 2x 6.0 mm <sup>2</sup> shielded cable (T180) of Kroschu	Kroschu No. 64995979 Kroschu No. 64997213
E	Data sheet 2x 2.5 mm <sup>2</sup> shielded cable of Coroplast	Coroplast No.: 9-2641 (2x 2.5 mm <sup>2</sup> )
F	Data sheet 2x 4.0 mm <sup>2</sup> shielded cable of Coroplast	Coroplast No.: 9-2641 (2x 4.0 mm <sup>2</sup> )
G	Data sheet 2x 6.0 mm <sup>2</sup> shielded cable of Coroplast	Coroplast No.: 9-2641 (2x 6.0 mm <sup>2</sup> )
H	Data sheet 2x 2.5 mm <sup>2</sup> shielded cable of Leoni	Leoni No.: FHLR2G2GCB2G 00001
I	Data sheet 2x 4.0 mm <sup>2</sup> shielded cable of Leoni	Leoni No.: FHLR2G2GCB2G 00002
J	Data sheet 2x 6.0 mm <sup>2</sup> shielded cable of Leoni	Leoni No.: FHLR2G2GCB2G 00003
K	Data sheet 2x 2.5 mm <sup>2</sup> shielded cable of Coficab	Coficab No.: LGCBG225H
L	Data sheet 2x 4.0 mm <sup>2</sup> shielded cable of Coficab	Coficab No.: LGCBG240H
M	Data sheet 2x 6.0 mm <sup>2</sup> shielded cable of Coficab	Coficab No.: LGCBG260H
N	Data sheet 2x 6.0 mm <sup>2</sup> shielded cable of NBKBE	NBKBE No.: 818-00011 (2x 6.0 mm <sup>2</sup> )
O	Data sheet 2x 4.0 mm <sup>2</sup> shielded cable of NBKBE	NBKBE No.: 818-00001 (2x 4.0 mm <sup>2</sup> )
P	Data sheet 2x 6.0 mm <sup>2</sup> Radox shielded cable from H+S	H+S No.: 12584915
Q	Data sheet 2x 4.0 mm <sup>2</sup> shielded cable from Coficab	Coficab No.: V4XXCBX240Hxx
R	Data sheet 2x 4.0 mm <sup>2</sup> shielded cable from Coficab (not validated yet)	Coficab No.: H3XXCBX240Hxx
S	Data sheet 2x 6.0 mm <sup>2</sup> shielded cable from Coficab (not validated yet)	Coficab No.: H3XXCBX260Hxx
T	Data sheet 2x 4.0 mm <sup>2</sup> / 2x 6.0 mm <sup>2</sup> shielded cable from Aptiv (under development)	Aptiv No.:M9098 (Data sheet no. M90982212 Rev. A)

This document is not subject to change service!



## 2 Product structure (single components)

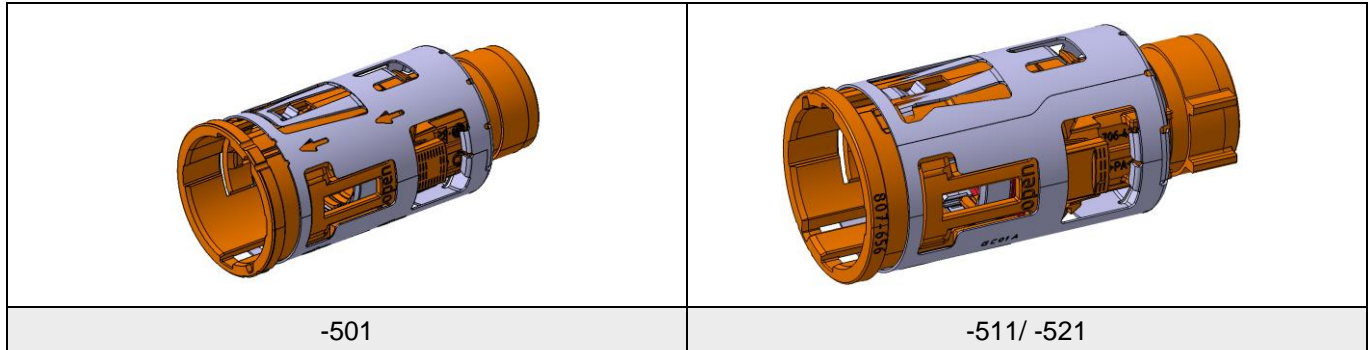
### 2.1 Sheated cable (see table)

Wire manufacturer	Wire cross section		
	2.5 mm <sup>2</sup>	4.0 mm <sup>2</sup>	6.0 mm <sup>2</sup>
Kroschu	FHRL2G2GCB2G 600/1000V T180 Supplier production site: Germany, 46414 Rhede		
	64996918	64997293	64995979 64997213
Coroplast	FHRL2G2GCB2G 600/1000V T180 Supplier production site: Germany, 42279 Wuppertal		
	9-2641 2x 2.5 mm <sup>2</sup>	9-2641 2x 4.0 mm <sup>2</sup>	9-2641 2x 6.0 mm <sup>2</sup>
Leoni	FHRL2G2GCB2G 600/900V T180 Supplier production site: Italy, 29010 Monticelli		
	00001	00002	00003
NBKBE	FHRL2G2GCB2G 600/1000V T180 Supplier production site: China		
	-	818-00001 (2x 4.0 mm <sup>2</sup> )	818-00011 (2x 6.0 mm <sup>2</sup> )-
Coficab	FHRL2G2GCB2G 600/1000V T180		
	Supplier production site: Portugal, 6300 Guarda		Supplier production site: Portugal, 6300 Guarda China, 301800 Tianjin
	LGCBG225	LGCBG240	LGCBG260
	FHRL91X91XCB91X T4 Supplier production site: Tunisia, 1004 Tunis		
	-	V4XXCBX240Hxx	-
	FHRL91X91XCB91X T3 (not validated yet) Supplier production site: t.b.d.		
-	H3XXCBX240Hxx	H3XXCBX260Hxx	
H + S	FHRL91XC13X-2x6 T150 Supplier production site: Switzerland, 8330 Pfäffikon		
	-	-	12584915
Aptiv	FHRL91X91XC91X-B -40°C / +150°C Supplier production site: t.b.d. (under development)		
	-	M9098	M9098

Only wires which are listed here and released by the respective OEM are allowed to use.

This document is not subject to change service!

## 2.2 HPS40-2 2+2 locking sleeve



Hirschmann Automotive No.	Wire cross section
807-656-521	2.5 mm <sup>2</sup>
807-656-511	4.0 mm <sup>2</sup>
807-656-501	6.0 mm <sup>2</sup>

Information: Different DMC/logo laser marking on the locking sleeve, depending on the OEM/ customer.

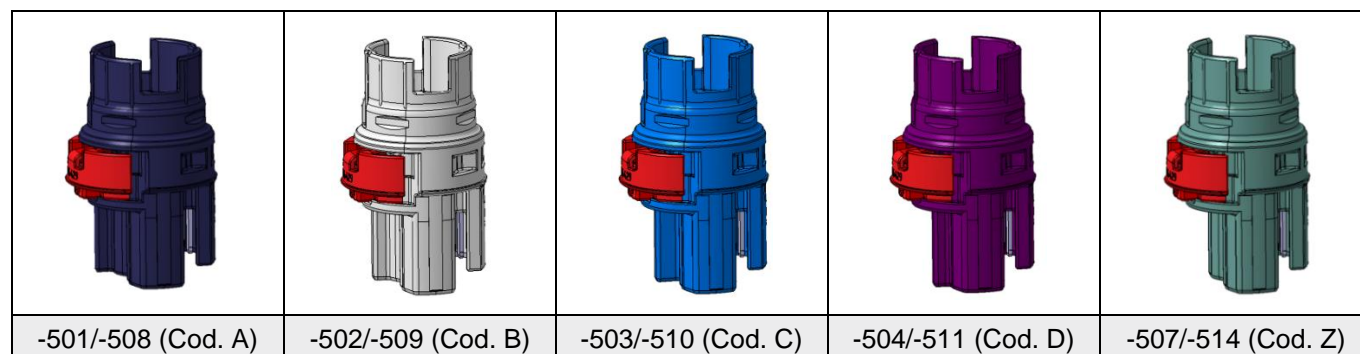
Delivery condition: The locking sleeves are delivered as bulk good.

This document is not subject to change service!





## 2.3 HPS40-2 2+2 female contact carrier



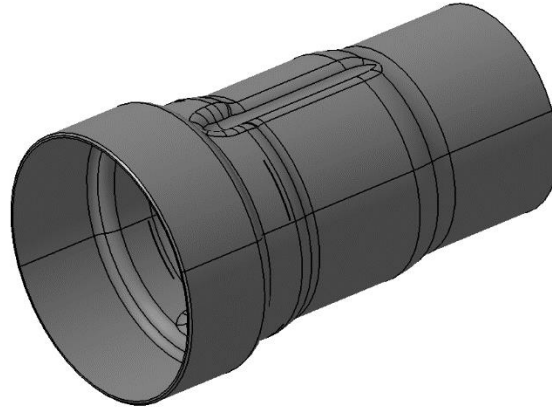
Hirschmann Automotive No.	Coding	Colour	HVIL bridge	Wire cross section
807-657-501	A	Black	Yes	2.5 mm <sup>2</sup> 4.0 mm <sup>2</sup> 6.0 mm <sup>2</sup>
807-657-502	B	Natural/ white	Yes	
807-657-503	C	Blue	Yes	
807-657-504	D	Purple	Yes	
807-657-507	Z	Water/ blue	Yes	
807-657-508	A	Black	No	
807-657-509	B	Natural/ white	No	
807-657-510	C	Blue	No	
807-657-511	D	Purple	No	
807-657-514	Z	Water/ blue	No	

Delivery condition: The contact carriers are delivered as bulk good.

This document is not subject to change service!



## 2.4 HPS40-2 2+2 shielding sleeve

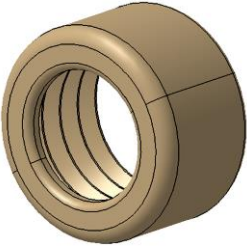
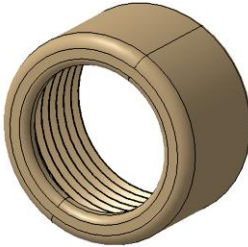
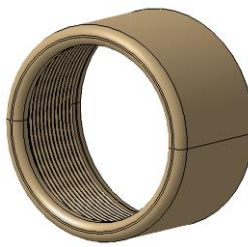
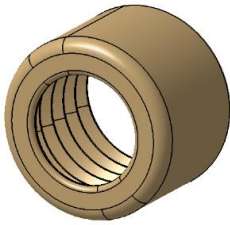
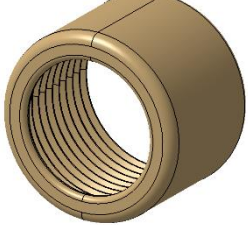



-504/ -514

Hirschmann Automotive No.	Wire cross section
709-840-504	2.5 mm <sup>2</sup> 4.0 mm <sup>2</sup> 6.0 mm <sup>2</sup>
709-840-514 (hot annealed)	2.5 mm <sup>2</sup> 4.0 mm <sup>2</sup> 6.0 mm <sup>2</sup>

Delivery condition: The shield sleeves are delivered as bulk good.

## 2.5 HPS40-2 2+2 stress relief

		
-501 (2.5 mm <sup>2</sup> )	-502 (4.0 mm <sup>2</sup> )	-503 (6.0 mm <sup>2</sup> )
		
-511 (2.5 mm <sup>2</sup> extended)	-512 (4.0 mm <sup>2</sup> extended)	-513 (6.0 mm <sup>2</sup> extended)

Hirschmann Automotive No.	Wire cross section
709-841-501	2.5 mm <sup>2</sup>
709-841-502	4.0 mm <sup>2</sup>
709-841-503	6.0 mm <sup>2</sup>
709-841-511	2.5 mm <sup>2</sup>
709-841-512	4.0 mm <sup>2</sup>
709-841-513	6.0 mm <sup>2</sup>

Wire manufacturer: On the product drawing (HA No. 807-655-...xx), you can find the released cables for each stress relief.

Delivery condition: The stress reliefs are delivered as bulk good.

This document is not subject to change service!

## 2.6 HPS40-2 2+2 wire seal

		
-504 (2.5 mm <sup>2</sup> )	-505 (4.0 mm <sup>2</sup> )	-506 (6.0 mm <sup>2</sup> )

Hirschmann Automotive No.	Colour	Wire cross section
709-113-504	Beige	2.5 mm <sup>2</sup>
709-113-505	Grey	4.0 mm <sup>2</sup>
709-113-506	Red	6.0 mm <sup>2</sup>

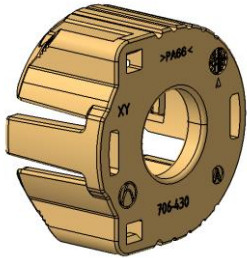
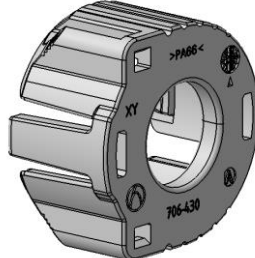
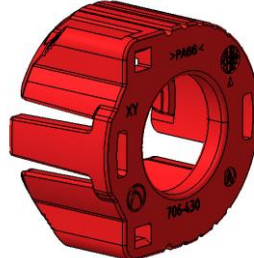
Wire manufacturer: On the product drawing (HA No. 807-655-...XX), you can find the released cables for each seal.

Delivery condition: The seals are delivered as bulk good

This document is not subject to change service!



## 2.7 HPS40-2 2+2 cover cap

		
-501 (2.5 mm <sup>2</sup> )	-502 (4.0 mm <sup>2</sup> )	-503 (6.0 mm <sup>2</sup> )

Hirschmann Automotive No.	Colour	Wier cross section
706-430-501	Beige	2.5 mm <sup>2</sup>
706-430-502	Grey	4.0 mm <sup>2</sup>
706-430-503	Red	6.0 mm <sup>2</sup>

Wire manufacturer: On the product drawing (HA No. 807-655-...XX), you can find the released cables for each cover cap.

Delivery condition: The cover caps are delivered as bulk good.

This document is not subject to change service!



## 2.8 HCT4 2+2 female terminal

		
-502 (1.5 – 2.5 mm <sup>2</sup> )	-504 (4.0 mm <sup>2</sup> )	-505 (6.0 mm <sup>2</sup> )

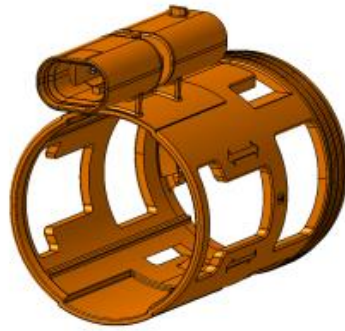
Hirschmann Automotive No.	Wire cross section
709-427-502	1.5 – 2.5 mm <sup>2</sup>
709-427-504	4.0 mm <sup>2</sup>
709-427-505	6.0 mm <sup>2</sup>

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

This document is not subject to change service!

## 3 Product structure (optional parts)

### 3.1 HPS40-2 2+2 CPA housing



-501

Hirschmann Automotive No.	Wire cross section
810-287-501	2.5 mm <sup>2</sup> 4.0 mm <sup>2</sup> 6.0 mm <sup>2</sup>

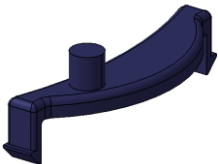
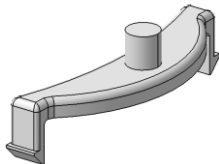
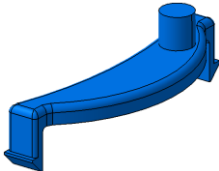
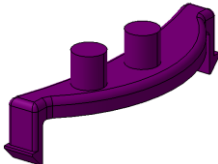
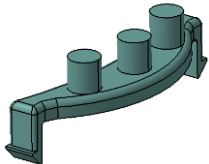
Information: The CPA Housing will be used for the In-Line Connector with HVIL.

Delivery condition: The CPA-housings are delivered as bulk good.

This document is not subject to change service!



### 3.2 HPS40-2 2+2 coding clip

				
Cod. A	Cod. B	Cod. C	Cod. D	Cod. Z

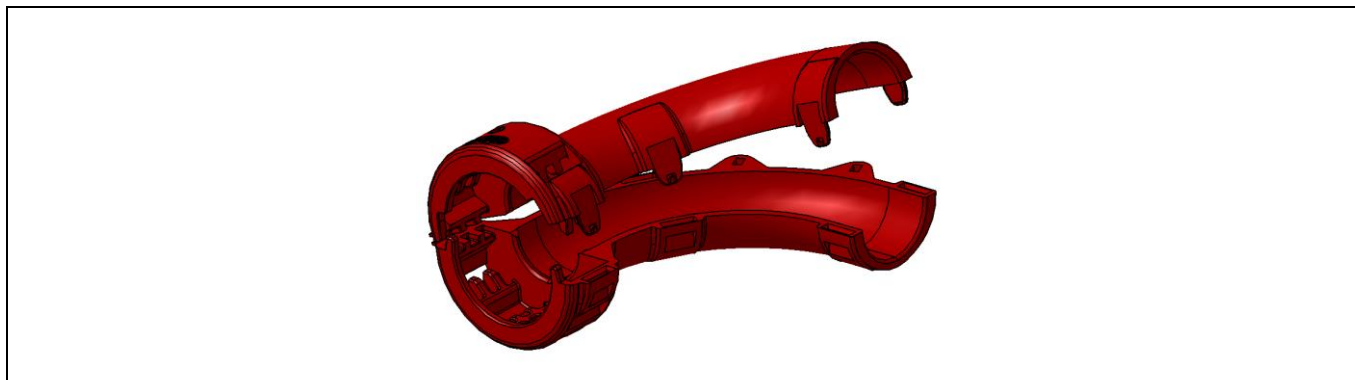
Hirschmann Automotive No.	Coding	Colour	Wire cross section
706-505-501	A	Black	2.5 mm <sup>2</sup> 4.0 mm <sup>2</sup> 6.0 mm <sup>2</sup>
706-505-502	B	Natural/ White	
706-505-503	C	Blue	
706-505-504	D	Purple	
706-505-507	Z	Water blue	

Delivery condition: The coding clips are delivered as bulk good.

This document is not subject to change service!



### 3.3 HPS40-2 2+2 90° angle cap



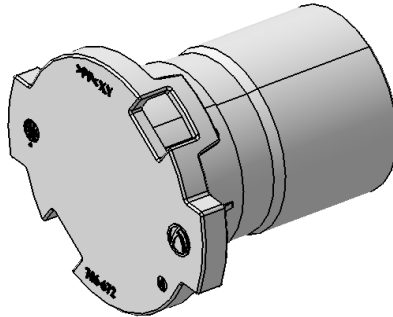
Hirschmann Automotive No.	Wire cross section
706-506-503	2.5 mm <sup>2</sup> 4.0 mm <sup>2</sup> 6.0 mm <sup>2</sup>

Information: The 90° angled cap can be used as an optional part instead of the cover cap.

Delivery condition: The 90° angled caps are delivered as bulk good.

This document is not subject to change service!

### 3.4 HPS40-2 2+2 protection cap



**Hirschmann  
Automotive No.**

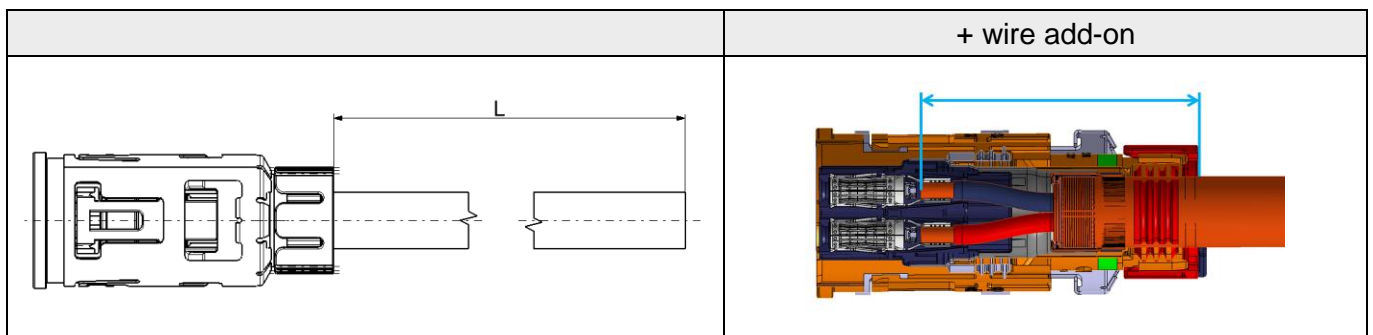
706-672-501

Delivery condition: The transport protection caps are delivered as bulk good.

## 4 Processing steps

Use the following described processing steps as necessary for the wire cross sections 2.5 mm<sup>2</sup>/ 4.0 mm<sup>2</sup> and 6.0 mm<sup>2</sup>. As a reference sample, a terminal holder coding A and a 6.0 mm<sup>2</sup> wire was used.

### 4.1 Cut the shielded cable



Add following lengths for the HPS40-2 2+2 female connector:

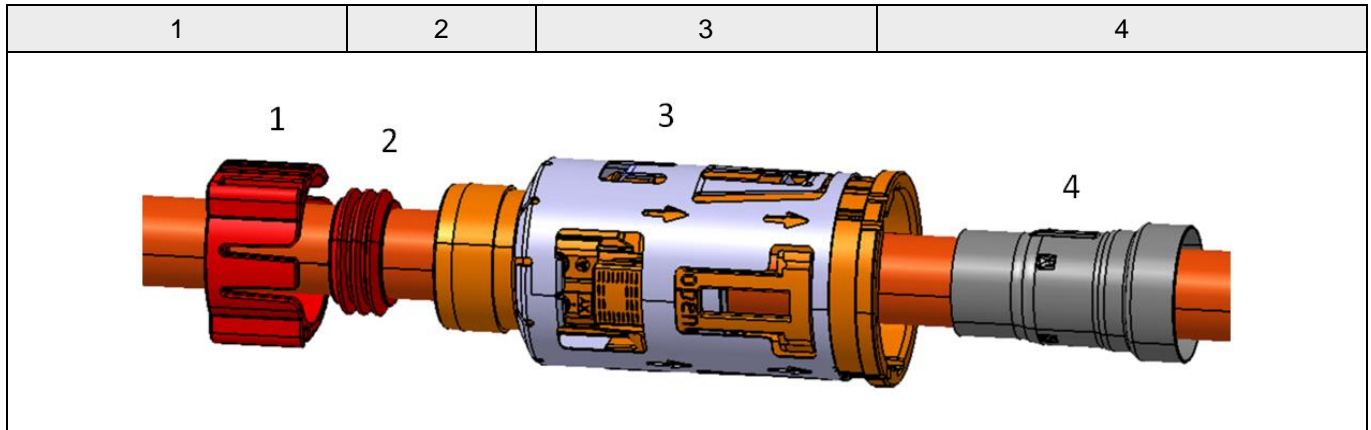
Wire cross section	Dimension L after zero-cut (mm)	Dimension L for the HCT4 terminal incl. zero-cut (mm)	Dimension L after zero-cut with 90° angled cap (mm)	Dimension L for the HCT4 terminal incl. zero-cut and 90° angled cap (mm)
2.5 mm <sup>2</sup>	L + 50	L + 54	L + 112	L + 116
4.0 mm <sup>2</sup>	L + 50	L + 54	L + 112	L + 116
6.0 mm <sup>2</sup>	L + 50	L + 54	L + 112	L + 116

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

This document is not subject to change service!

## 4.2 Assembly of the single components

Slide the cover cap (1), the seal (2), the female locking device (3) and the shielding sleeve (4) onto the shielded cable. If the 90° angled cap is used, the cover cap (1) is omitted.



This document is not subject to change service!



### 4.3 Strip off the shielded cable



Stripping length:



Wire cross section	Dimension L1 after zero-cut (mm)	Dimension L1 for the HCT4 terminal incl. zero-cut (mm)
2.5 mm <sup>2</sup>	24.5 ± 1	28.5 ± 1
4.0 mm <sup>2</sup>	24.5 ± 1	28.5 ± 1
6.0 mm <sup>2</sup>	24.5 ± 1	28.5 ± 1

Do not damage the shielding during the processing operation.

This document is not subject to change service!

## 4.4 Wire processing I

**Assemble the stress relief, remove the foil and shorten the shielding.**

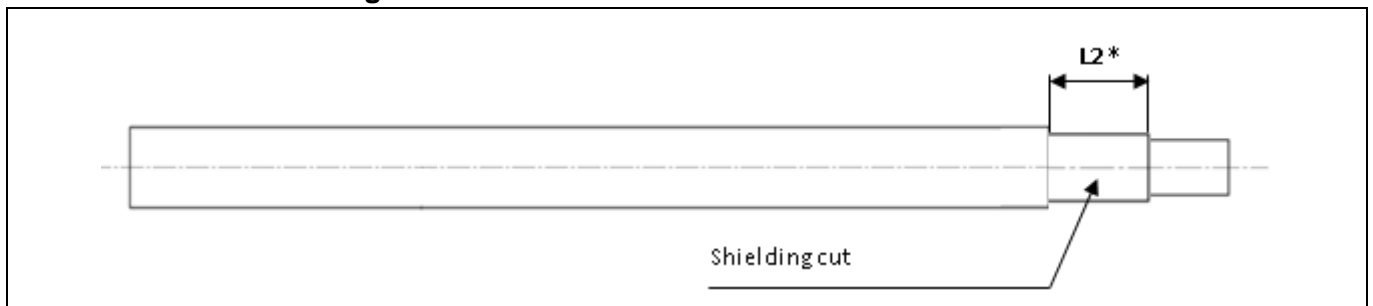


The following process steps must be done, but the manufacturer can choose the sequence:

- Assemble the stress relief.  
Depending on the cross section 709-841-501 or -502 or -503 must be used.
- Remove the foil.
- Shorten the shielding.

An overlap of the foil around the strain relief is allowed circulating up to max. 1.5 mm. An overlap of the foil around the ferrule crimp/ strain relief, like small edges is allowed up to max. 4.0 mm.

### 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.

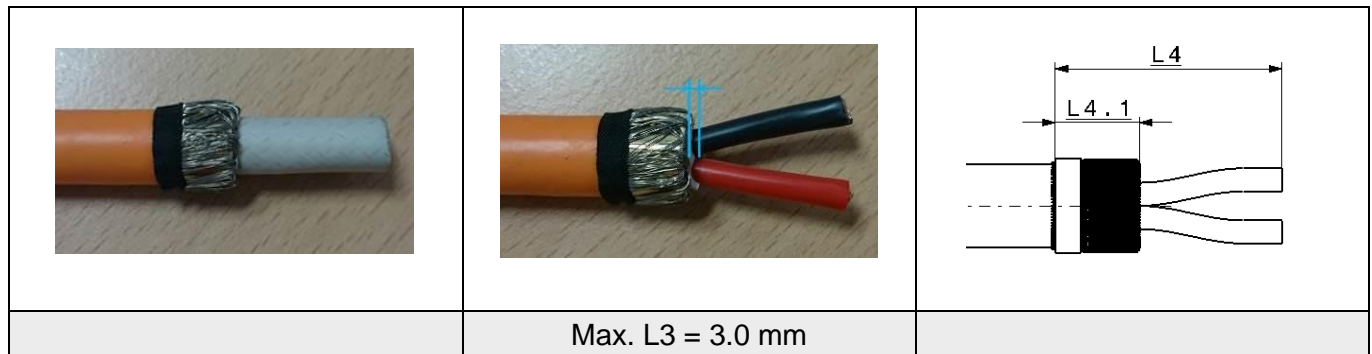
In the next process step, make sure that the shielding is rising over the stress relief at 100%.

This document is not subject to change service!



## 4.5 Wire processing II

Fold the shield backwards, hold the shield with tape and remove the filling.



100% of the shield must be turned over the stress relief. A targeted unbraiding of the shield is not necessary. By turning over the shield, a process related unbraiding is possible. After this the shield must 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 **5.0 mm**. The fixing tape must 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 or L4.1.

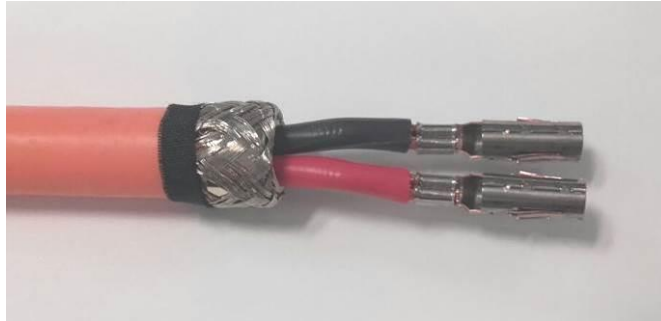
- L4 = max. 37.5 mm after zero-cut (measurement in straightened length)
- = max. 41.5 mm incl. zero-cut (measurement in straightened length)
- L4.1 = max. 16.7 mm

In this specification the PET- fabric tape 837X (838X) 5.0 mm of the company Coroplast is used. It is possible to use another product to fix the shield. The max. outer diameter after assembling is  $\varnothing$  14.3 mm 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. 3.0 mm towards the outer sheath. In the area between the two single cores the filling material is allowed to be bigger than L3. Single strands of the shield 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.

This document is not subject to change service!

## 4.6 Crimp the HCT4 female terminal



- **Double stroke crimping machine**

For the positioning and the crimping process of the HCT4 female terminals, the crimping machine of the company “Schäfer” can be used:

<u>Name of the device:</u>	HPS40-2 Double stroke crimping machine
<u>Article number:</u>	185/16
<u>Name of the device:</u>	Interchangeable crimping unit
<u>Article number:</u>	Shown in the process specification HCT4 female terminal „EVS-100068“

The device was designed and implemented by the processing guidelines of Hirschmann Automotive GmbH. The individual details referring to commissioning, handling and process description of the device can be requested directly at the supplier:

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

The commissioning of the crimping device must be done through the manufacturer. The manufacturer is at liberty to use a crimping device of his choice. The crimp process must meet the crimp and positioning data which are specified on the following pages.

This document is not subject to change service!

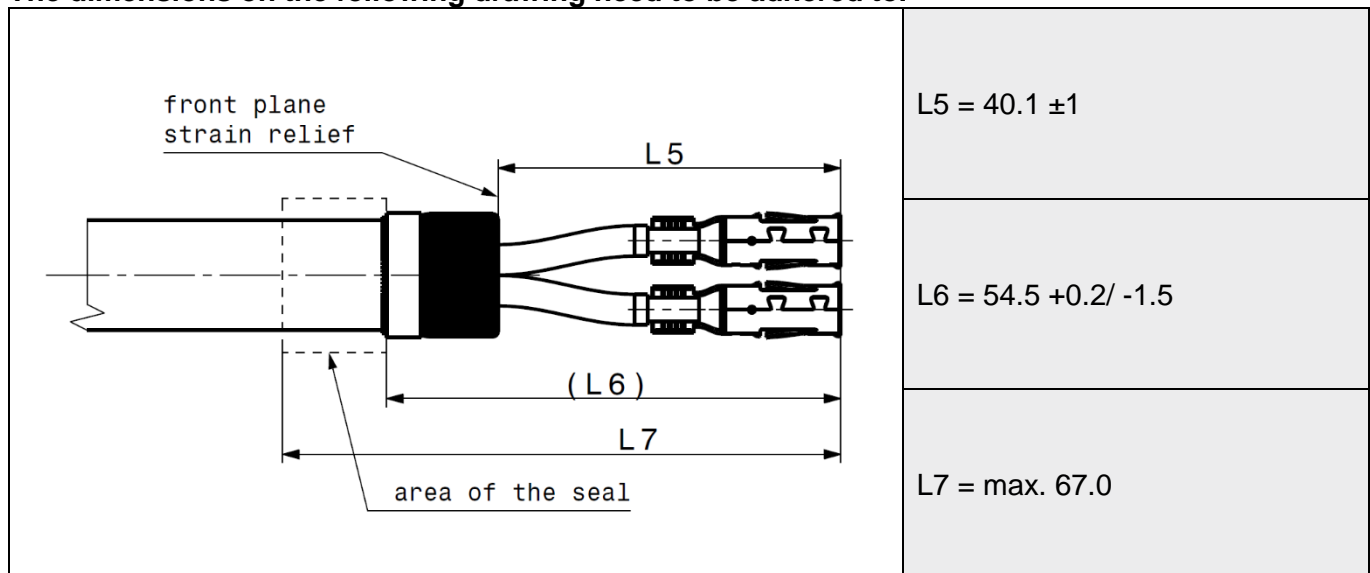




- **Process data**

- a) The crimp data can be seen in the „Process specification HCT4 female terminal EVS-100068“.
- b) 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 drawing need to be adhered to.

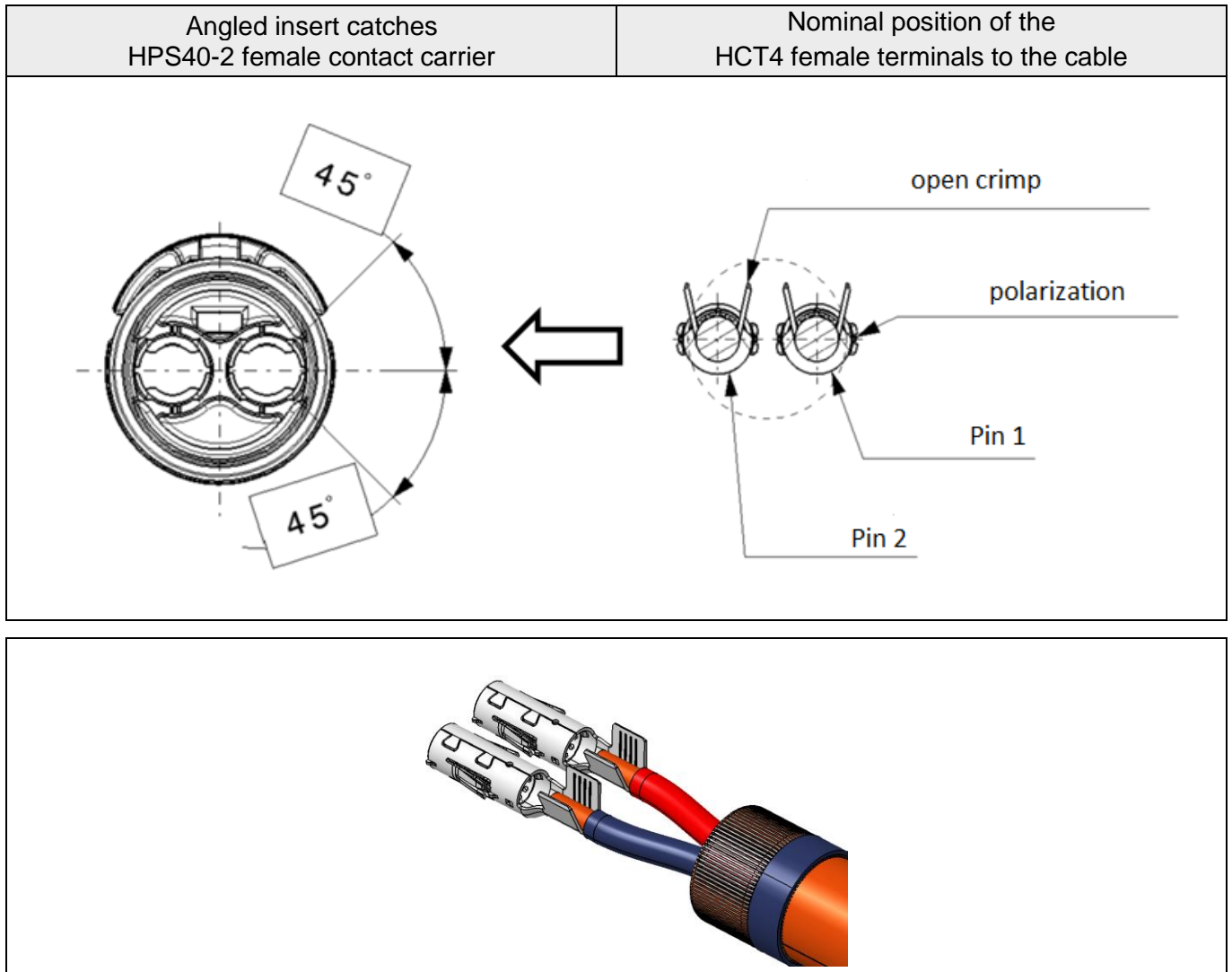


The dimension L5 is decisive for the position of strain relief. As alternative to L5 it is allowed to prove dimension 5.1, but one of the two combinations from L4.1 and L5.1 or L4 and L5 must be chosen. L6 is only for information and is built from L4.1 and L5. The dimensions are caused from L1, L4 and the EVS-100068.

The difference of the length between the female terminals of max. 0.5 mm 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.

This document is not subject to change service!



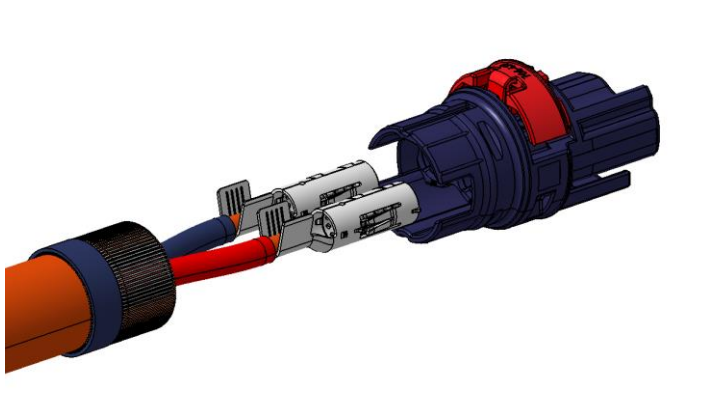
To do an orderly assembling / to ensure the primary locking and the secondary locking, the correct position of the terminals and the wire is very important and needs to be ensured. Usually, the horizontal version is intended.

The allowed angle deviation results from the geometry of the angled insert catches on the female contact holder and the max. assembling force of the cable with the terminals into the contact holder. This can be checked during the assembling process.

This document is not subject to change service!



## 4.7 Assembly I

Assemble HCT4 female terminals into the contact carrier (1).		
	Pin	Polarity / Colour
	1	+ / Red
	2	- / May vary

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 the female terminals will be primary locked. (The female terminals must be crimped.)

The mounting force of the female terminals into the contact holder must be proven if the crimping machine of the company "Schaefer" is not used or if the terminals are mounted fully automated inside the contact holder.

This document is not subject to change service!



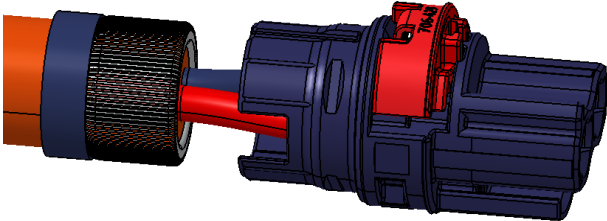
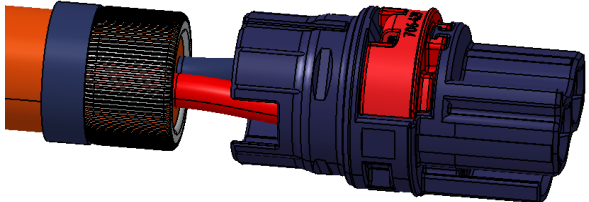
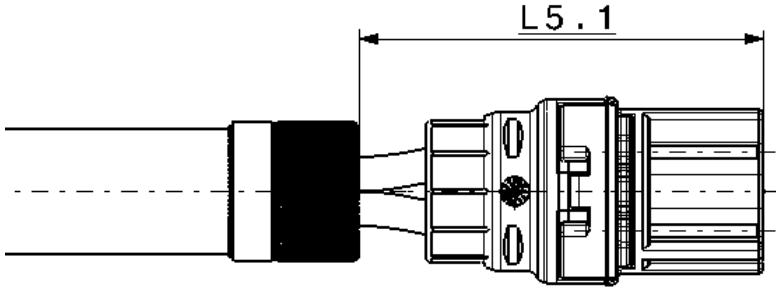
Wire manufacturer	Wire cross section		
	2.5 mm <sup>2</sup>	4.0 mm <sup>2</sup>	6.0 mm <sup>2</sup>
Kroschu	FHLR2G2GCB2G 600/1000V T180		
	64996918	64997293	64995979 64997213
	24 N	30 N	36 N
Leoni	FHLR2G2GCB2G 600/900V T180		
	00001	00002	00003
	24 N	30 N	36 N
Coroplast	FHLR2G2GCB2G 600/1000V T180		
	9-2641 (2 x 2.5 mm <sup>2</sup> )	9-2641 (2 x 4.0 mm <sup>2</sup> )	9-2641 (2 x 6.0 mm <sup>2</sup> )
	24 N	30 N	36 N
NBKBE	FHLR2G2GCB2G 600/1000V T180		
	-	818-00001 (2x 4.0 mm <sup>2</sup> )	818-00011 (2 x 6.0 mm <sup>2</sup> )
	-	30 N	36 N
H+S	FHLR91XC13X-2x6 T150		
	-	-	12584915
	-	-	36 N
Coficab	FHLR91X91XCB91X T3 (not validated yet)		
		H3XXCBX240Hxx	H3XXCBX260Hxx
		30 N	36 N
	FHLR91X91XCB91X T4		
	-	V4XXCBX240Hxx	-
	-	30 N	-
	FHLR2G2GCB2G 600/1000V T180		
	LCGBG225	LCGBG240	LCGBG260
24 N	30 N	36 N	

This document is not subject to change service!

## 4.8 Assembly II

### Assembly of the secondary lock (2)

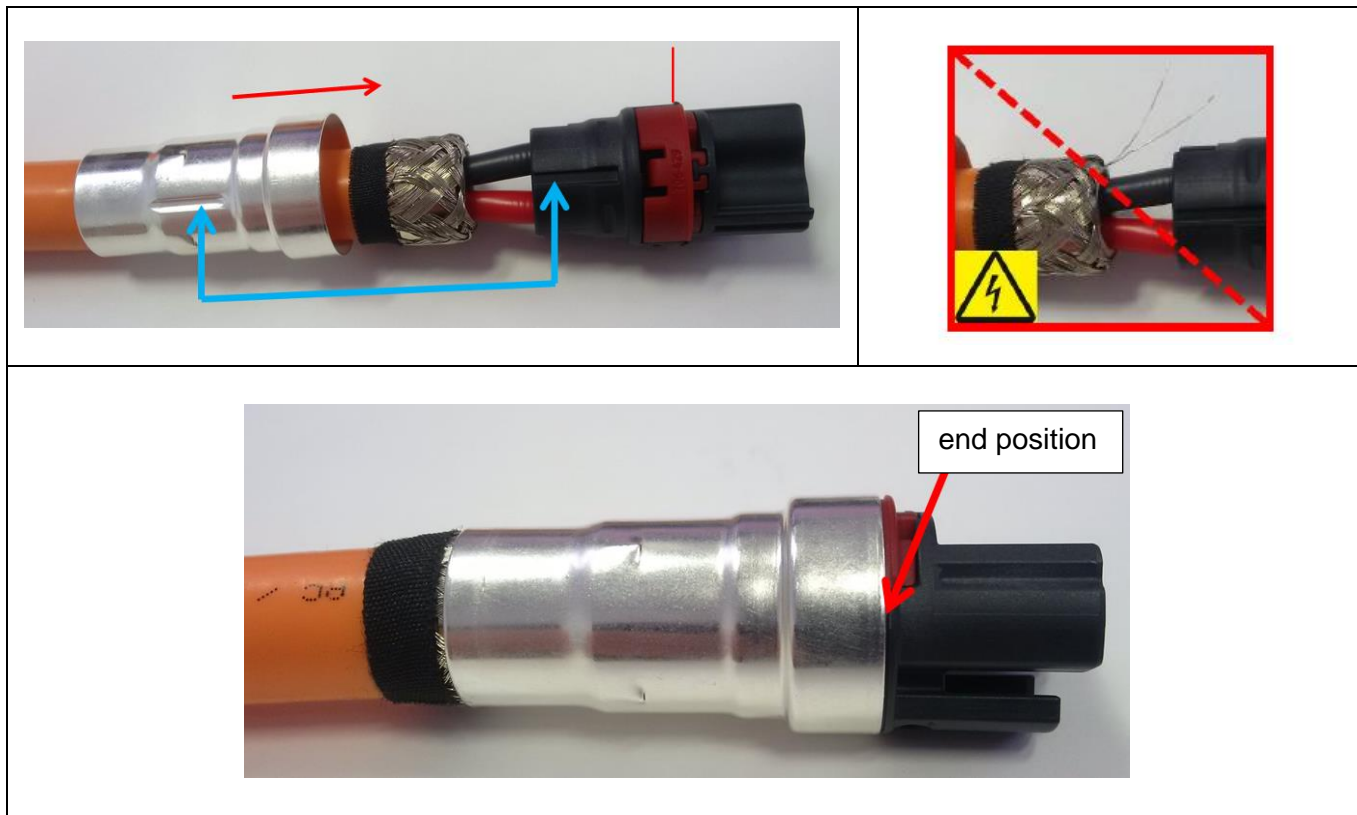
The secondary locking can only be assembled if the terminals are in the end position. A visible difference of the terminals to each other can be possible in the contact cavity. Because of the position of the contacts on the wire, and the play of the contacts in the contact cavity it is possible and acceptable.

Secondary lock/ pre-locking/ HV terminals primary locked	Secondary lock end position
	
	<p>L5.1 = 41.3 ±1</p>
<p>It is allowed to prove L5.1 instead of L5.</p>	

This document is not subject to change service!



## 4.9 Push shielding sleeve onto contact carrier



- The shielding sleeve needs to be assembled onto the contact carrier in the correct position. It can only be turned by 180° C.
- Do not damage the shielding sleeve during the assembly.
- The shielding sleeve must be assembled until the end position is reached.
- The fixing tape must 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 must be clarified with each OEM.



**Risk of insulation failure!**

## 4.10 Press shielding sleeve

- **Pressing device**

For the process of positioning and pressing of the stress relief and the shielding sleeve, the following pressing device of the company “Schäfer” can be used:

Name of the device: Pressing device HPS40-2  
Article number: 188/16

Based on the processing guidelines of Hirschmann Automotive, the device was designed and produced. The details of the commissioning, handling and the process guideline of the device can be requested directly at the supplier:

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

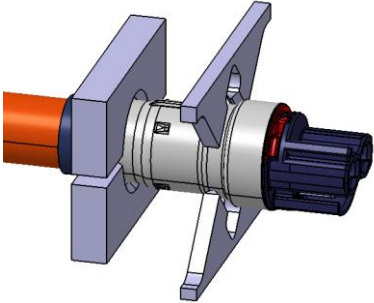
The commissioning of the pressing device must be done through the manufacturer. The manufacturer is at liberty to use a pressing device of his choice. The pressing process must meet the pressing and positioning data which are specified on the following pages.

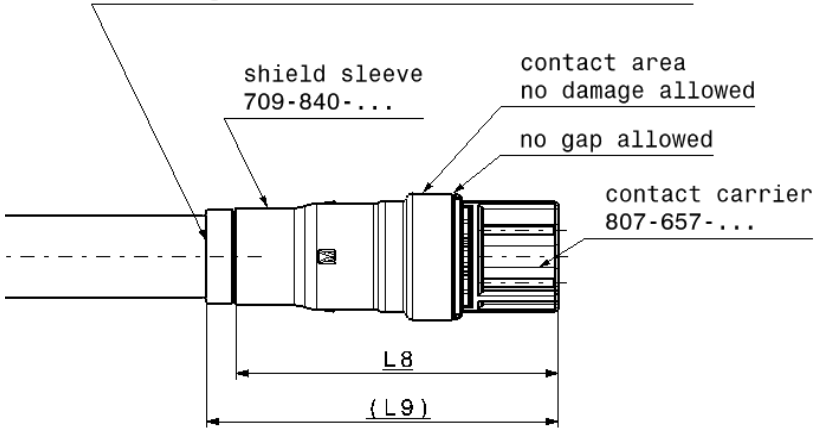
This document is not subject to change service!



- **Pressing data**

- a) The contact holder incl. the female contacts must be put into the device in the correct position.
- b) Make sure, the shielding sleeve is on the end position of the contact holder.  
The tape must stick out of the end of the shielding sleeve.
- c) it must be ensured that there is no damage or deformation in the contact area.
- d) The measurements on the following drawing, must be adhered to, before and after pressing.
- e) Two pressing actions will be done in one step

	1. Shield pressing (shielding sleeve, shielding, stress relief and wire)
	2. Pressing of the contact holder (shielding sleeve and contact holder)

<p>no loose or stick out single strands of the shield behind the fixing tape allowed. The single strands have to be removed.</p> 	$L8 = 49.7 \pm 0.3$
	$L9 = 58.5 +0.2/ -1.5$

The dimension L8 and L9 are just for information. The dimensions are caused from the dimension L1, L4 and the EVS-100068 or L4.1 and L5.1.

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

This document is not subject to change service!





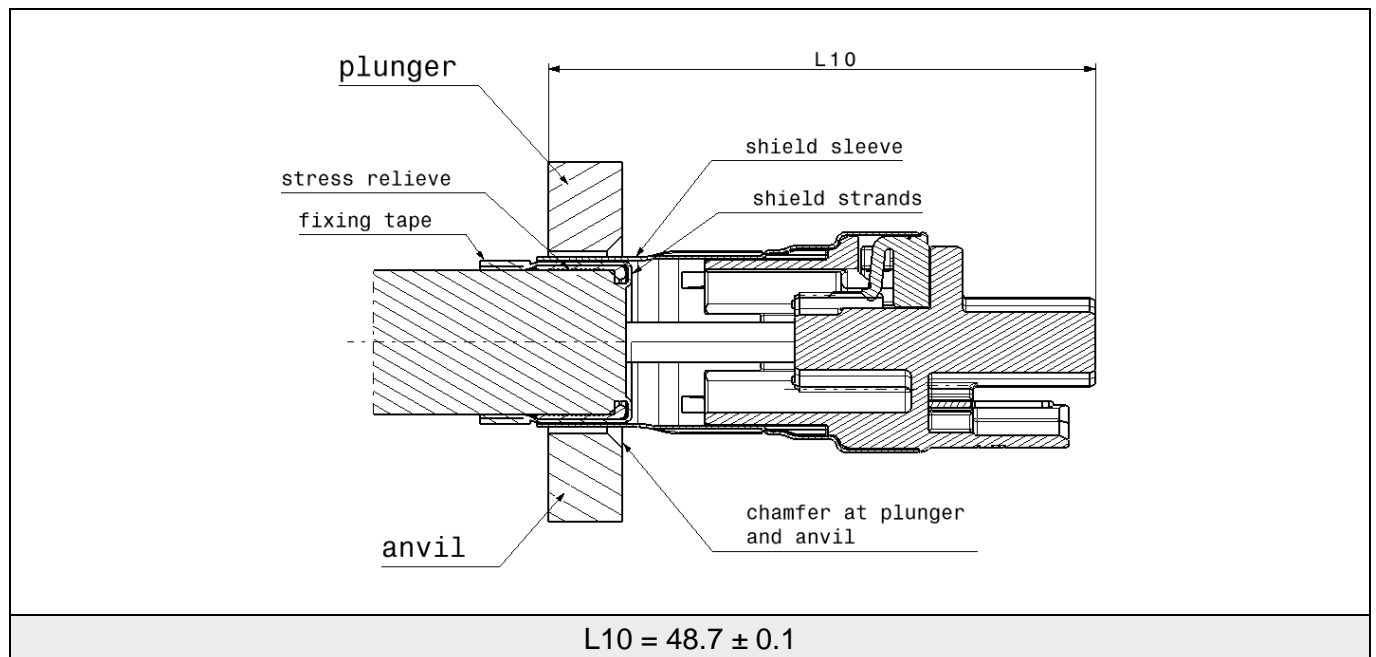
#### 4.10.1 Shield pressing by two half-shells

**!! Not valid for H + S wire !!**

- **Embossing position**

The exact geometry of the plunger and anvil is given. The position of the plunger and the anvil must be reversed to the front plane of the contact holder. The chamfer at the plunger and the anvil must be on the side to the contact holder. The dimension L10 is the position of the plunger and the anvil.

**The dimension L10 is considered as tool dimension and must be ensured in the tool.**

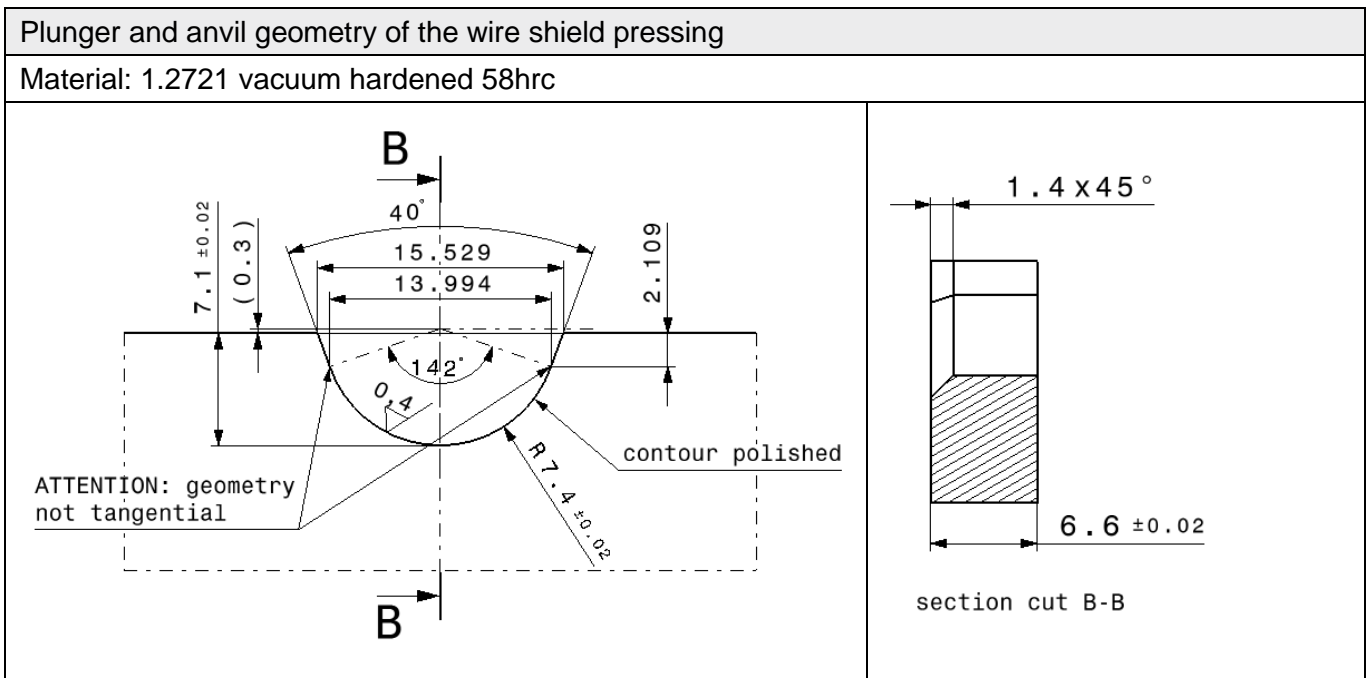
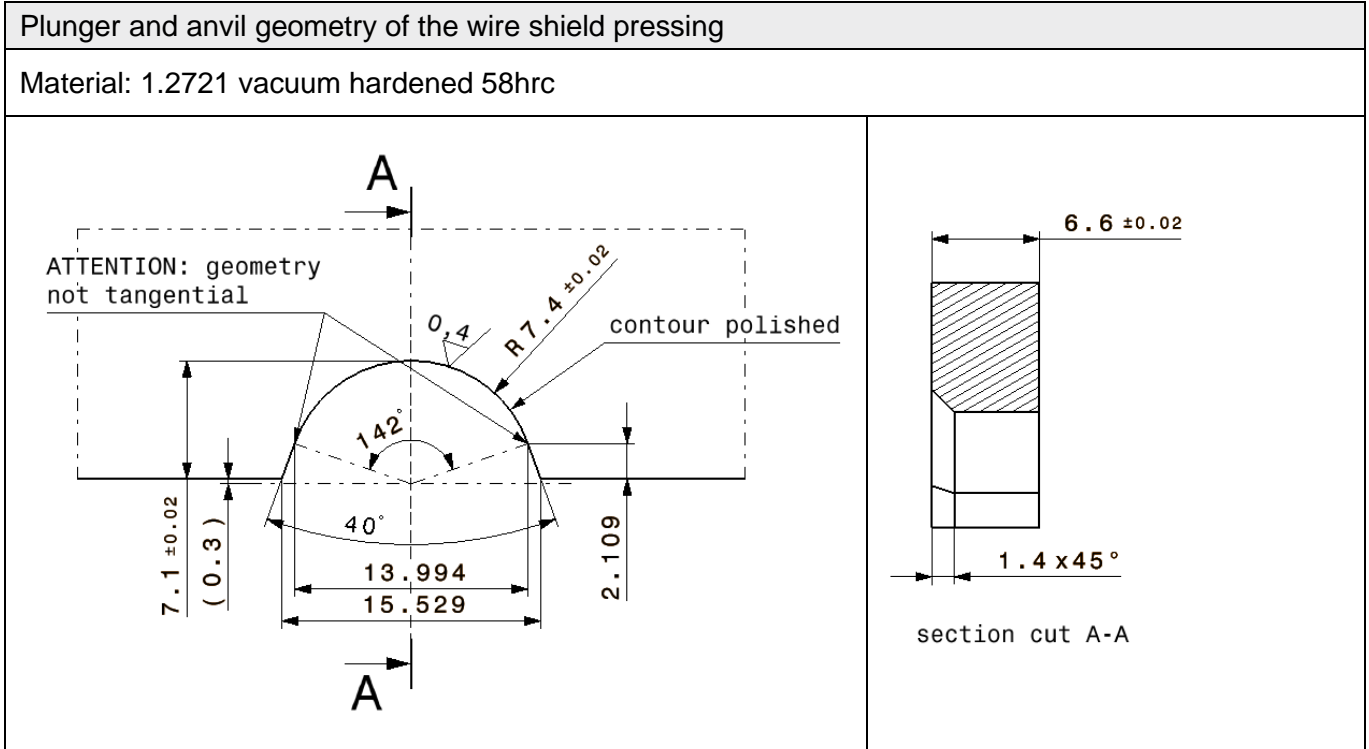


This document is not subject to change service!



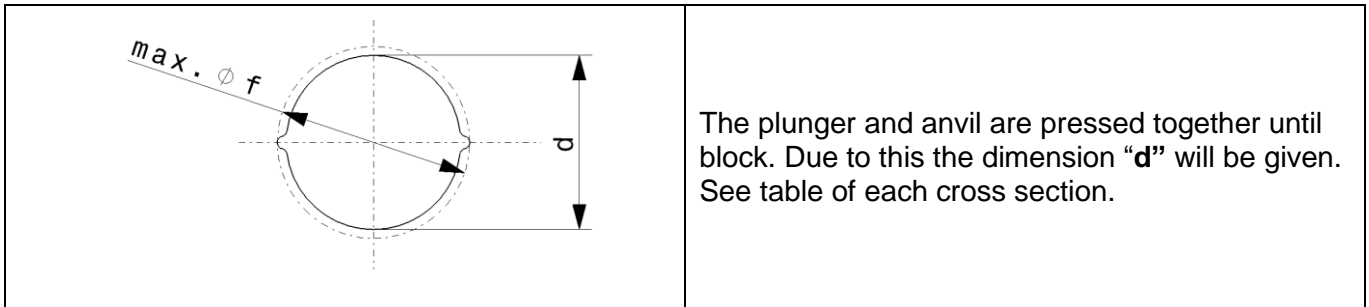
- **Plunger and anvil geometry of the wire shield pressing**

**!! Not valid for H + S wire !!**



This document is not subject to change service!

- **Embossing height**



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

Wire manufacturer	Measurement “d” in mm		
	2.5 mm <sup>2</sup>	4.0 mm <sup>2</sup>	6.0 mm <sup>2</sup>
Kroschu T180	14.57 ± 0.15	14.57 ± 0.15	14.57 ± 0.15
Leoni			
Coroplast			
NBKBE			
Coficab			

During the pressing process a fold appears on two sides.

This fold is not allowed to be bigger than the diameter  $\varnothing f = 16.4 \text{ mm}$  refer to the centerline of the wire. In the area of the fold the material of the shield sleeve is not allowed to be cracked.

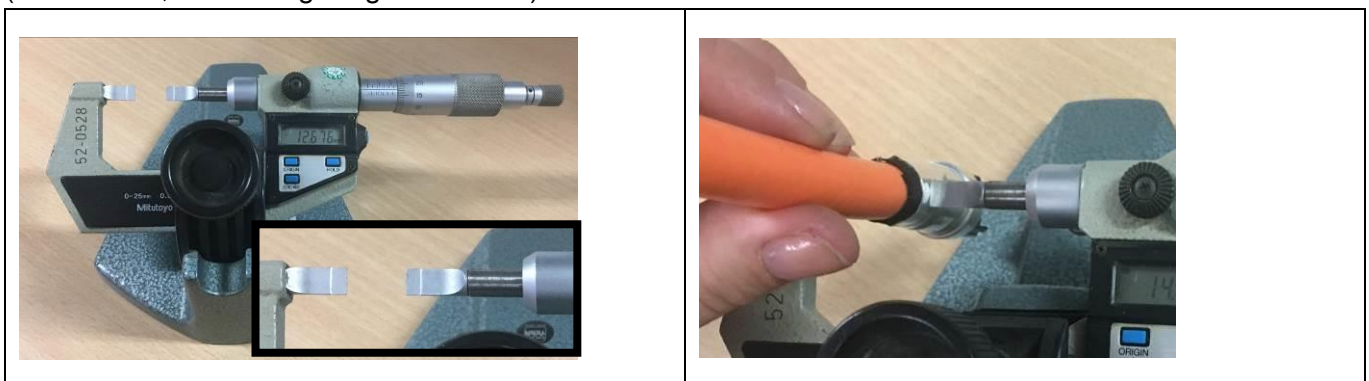
- **Check measurement of the embossing height “f”**

To check the dimension “f”, a gauge with an inner diameter of 16.4 mm must be used.

To check the dimension “d”, the height needs to be measured acc. to the drawing. All the dimensions must be within the given tolerance.

The measuring of the embossing height must be done with a suitable measuring device.

(Micrometer, measuring range: 0-25 mm)

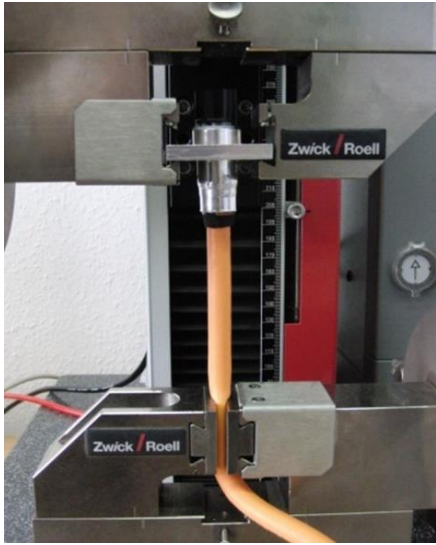


This document is not subject to change service!

- **Pulling force of the wire**

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 70 mm. The connector must be fixed on the shield sleeve at the transition between the largest and the second largest diameter.

HCT4 terminals must not be installed in the test specimens, to test the shield pressing only. In this state, the figure in the table must be reached.

	Wire cross section	Pulling force
	2.5 mm <sup>2</sup>	≥ 120 N
	4.0 mm <sup>2</sup>	≥ 120 N
	6.0 mm <sup>2</sup>	≥ 120 N



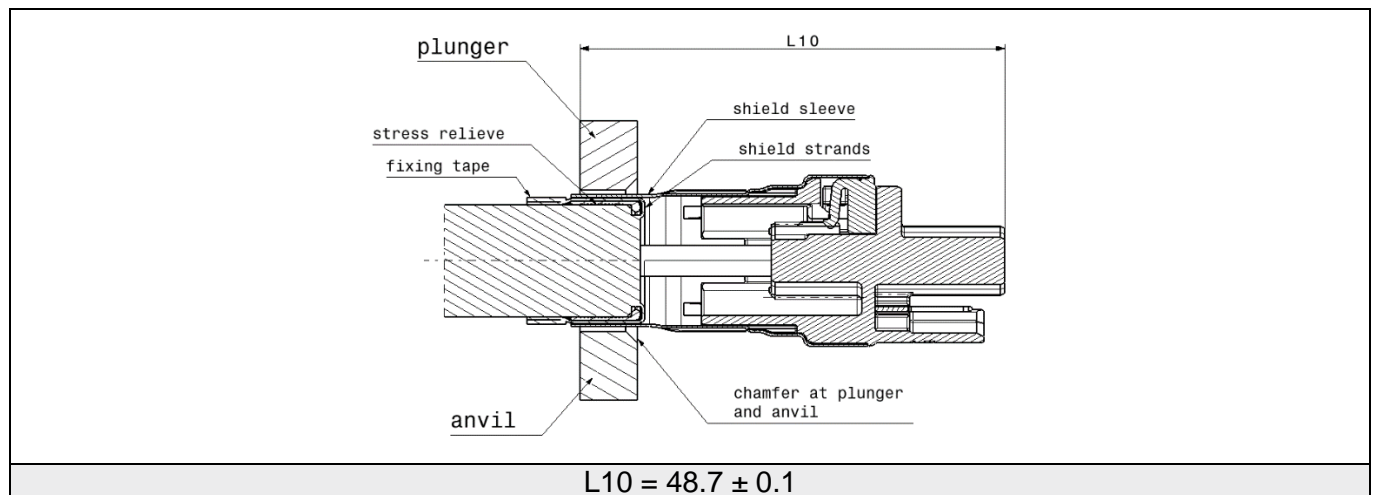
## 4.10.2 Shield pressing by two half-shells

**!! For H+S wire !!**

- **Embossing position**

The exact geometry of the plunger and anvil is given. The position of the plunger and the anvil must be reversed to the front plane of the contact holder. The chamfer at the plunger and the anvil must be on the side to the contact holder. The dimension L10 is the position of the plunger and the anvil.

**The dimension L10 is considered as tool dimension and must be ensured in the tool.**



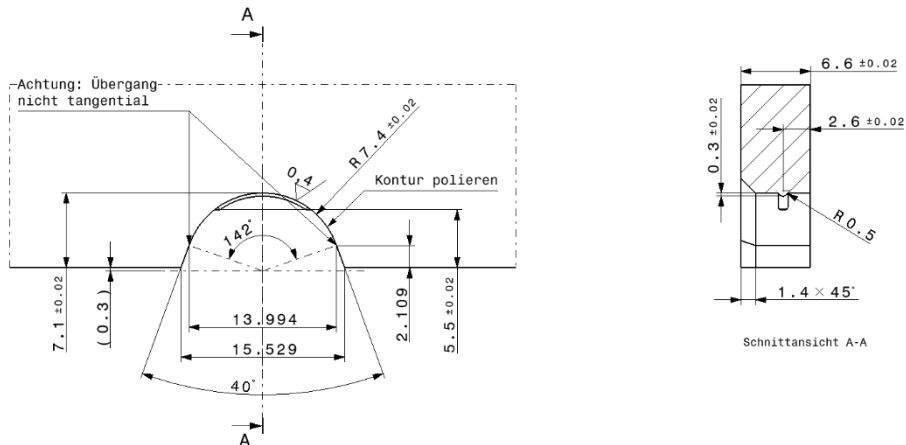
This document is not subject to change service!

- Plunger and anvil geometry of the wire shield pressing

!! For H+S wire !!

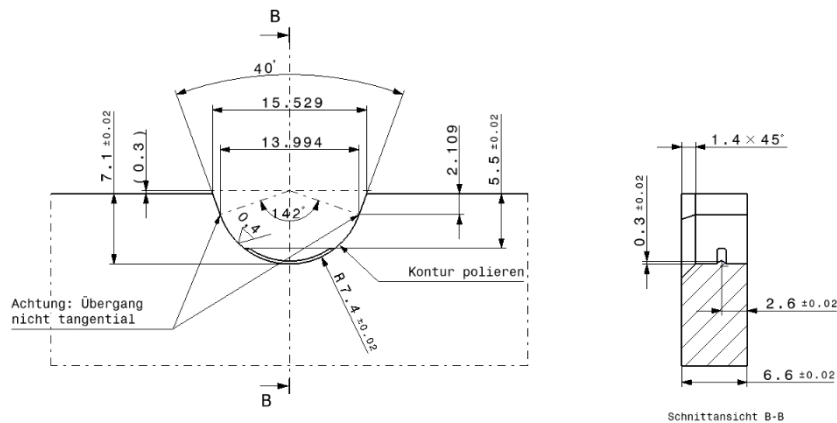
Plunger and anvil geometry of the wire shield pressing

Material: 1.2721 vacuum hardened 58hrc



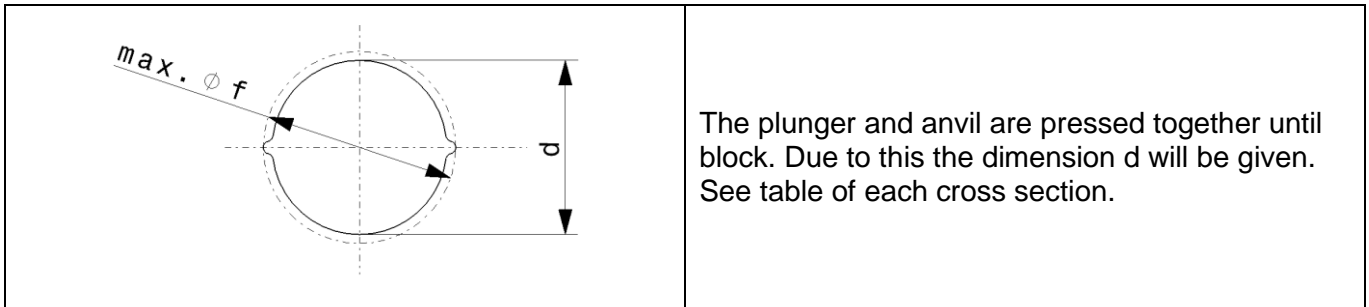
Plunger and anvil geometry of the wire shield pressing

Material: 1.2721 vacuum hardened 58hrc



This document is not subject to change service!

- **Embossing height**



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

Wire manufacturer	Measurement "d" in mm <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">L1</span>		
	2.5 mm <sup>2</sup>	4.0 mm <sup>2</sup>	6.0 mm <sup>2</sup>
H+S T150 (FHLR91X13X 2x 6 mm <sup>2</sup> )	14.57 ± 0.15	14.57 ± 0.15	14.57 ± 0.15

During the pressing process a fold appears on two sides.

This fold is not allowed to be bigger than the diameter  $\varnothing f = 16.4$  mm refer to the centerline of the wire. In the area of the fold the material of the shield sleeve is not allowed to be cracked.

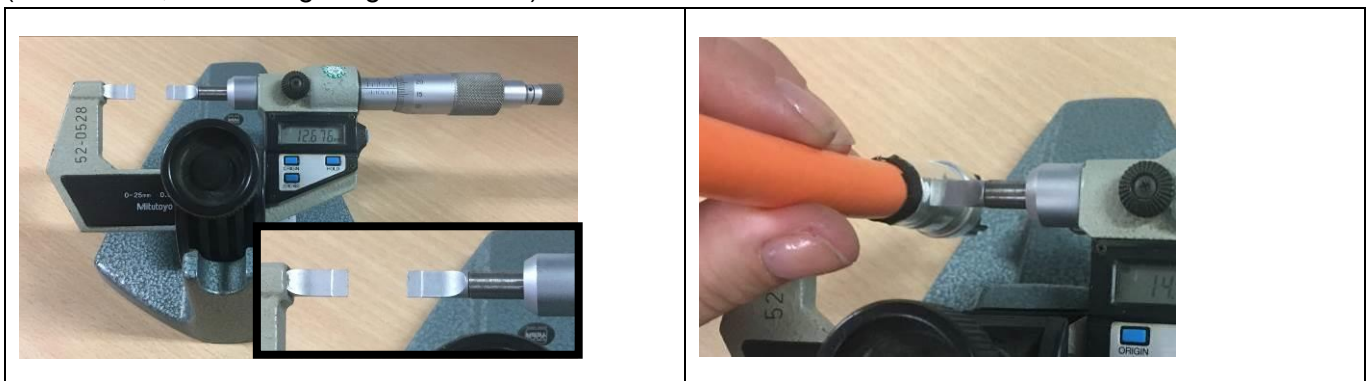
- **Check measurement of the embossing height "d" and the max. diameter "f":**

To check the dimension "f", a gauge with an inner diameter of 16.4 mm must be used.

To check the dimension "d", the height needs to be measured acc. to the drawing. All the dimensions must be within the given tolerance.

The measuring of the embossing height must be done with a suitable measuring device.

(Micrometer, measuring range: 0-25 mm)

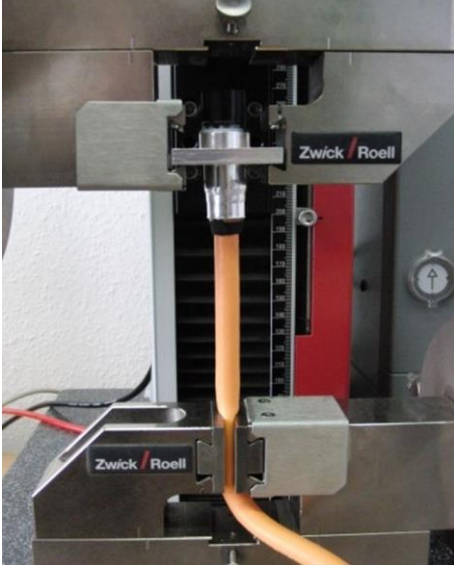


This document is not subject to change service!

- **Pulling force of the wire**

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 70 mm. The connector must be fixed on the shield sleeve at the transition between the largest and the second largest diameter.

HCT4 terminals must not be installed in the test specimens, to test the shield pressing only. In this state, the figure in the table must be reached.

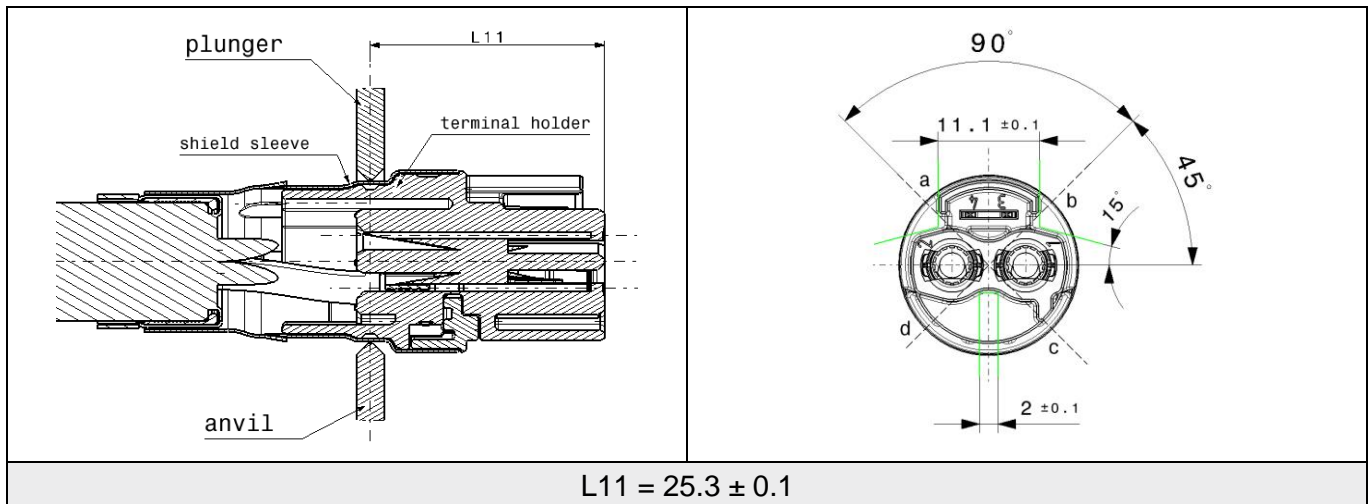
	Wire cross section	Pulling force
	2.5 mm <sup>2</sup>	≥ 120 N
	4.0 mm <sup>2</sup>	≥ 120 N
	6.0 mm <sup>2</sup>	≥ 120 N





### 4.10.3 Pressing contact carrier

- **Embossing position**



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 must be aligned in relation to the front plane of the terminal holder. The four embossing positions (a-d) must be aligned in relation to the terminal holder. Therefore the terminal holder 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 terminal holder can be inserted into the jack.

The exact geometry of the plunger and anvil is given.

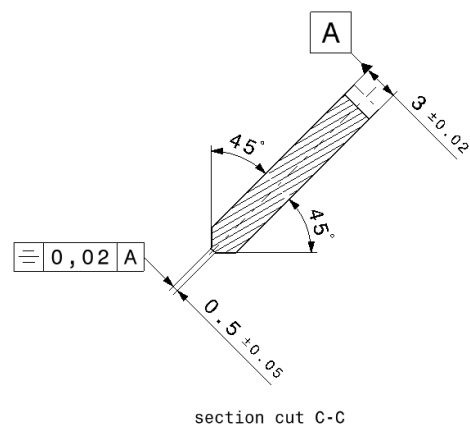
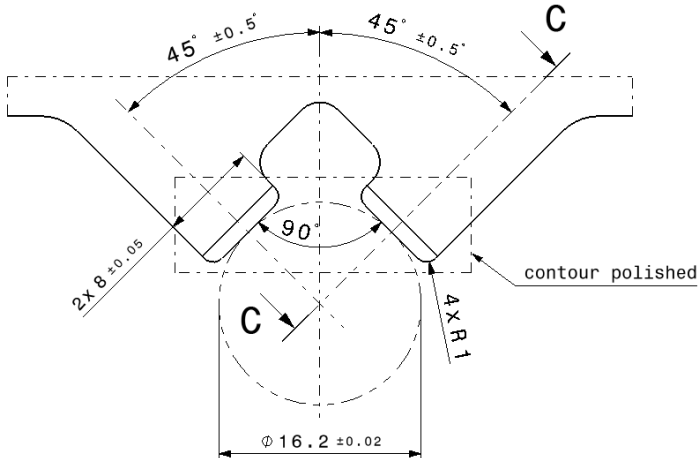
This document is not subject to change service!



- Geometry of the plunger and the anvil pressing on the terminal holder

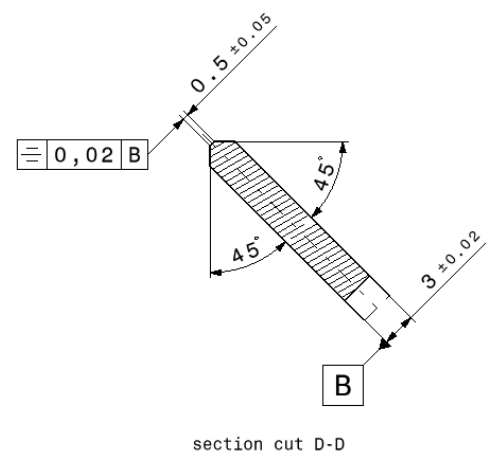
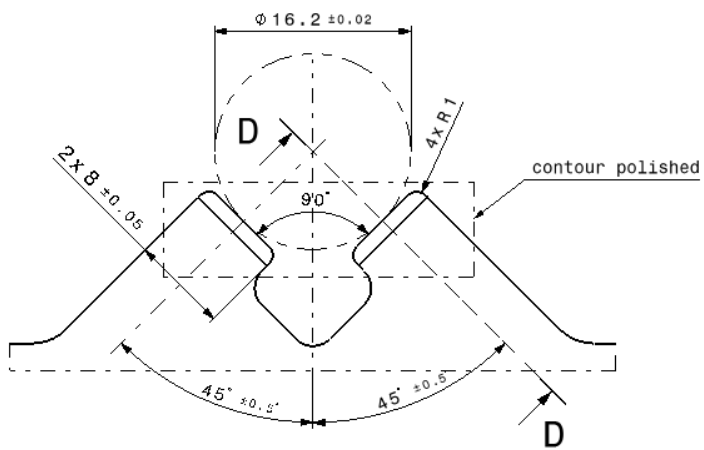
Plunger and anvil geometry of the terminal holder pressing

Material: 1.2721 vacuum hardened 58hrc



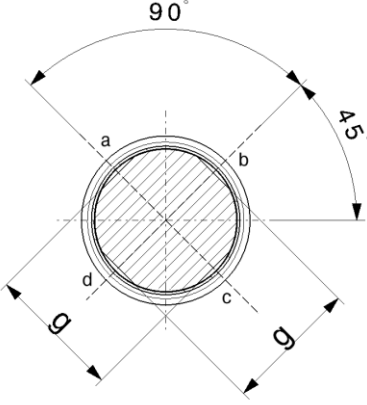
Plunger and anvil geometry of the terminal holder pressing

Material: 1.2721 vacuum hardened 58hrc



This document is not subject to change service!

- **Embossing height “g”**


	<p>The dimension “g” results from the embossing in between a-c and b-d.</p> <p>The embossing must be done at the same time.</p>
---	---

The dimension g is defined as following:

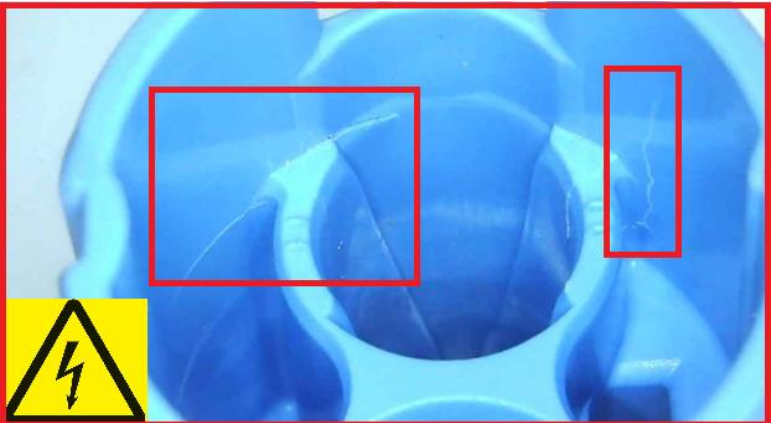
(g = 16.40 mm ± 0,1 – valid for applications already in series production)

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 16.5 mm ± 0,1mm for the dimension “g”.

	<p><b>Risk of insulation failure!</b></p>
---	---

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”.

<p><b>Possible error image for over pressing (stress marks at the plastic part):</b></p>	
--	--

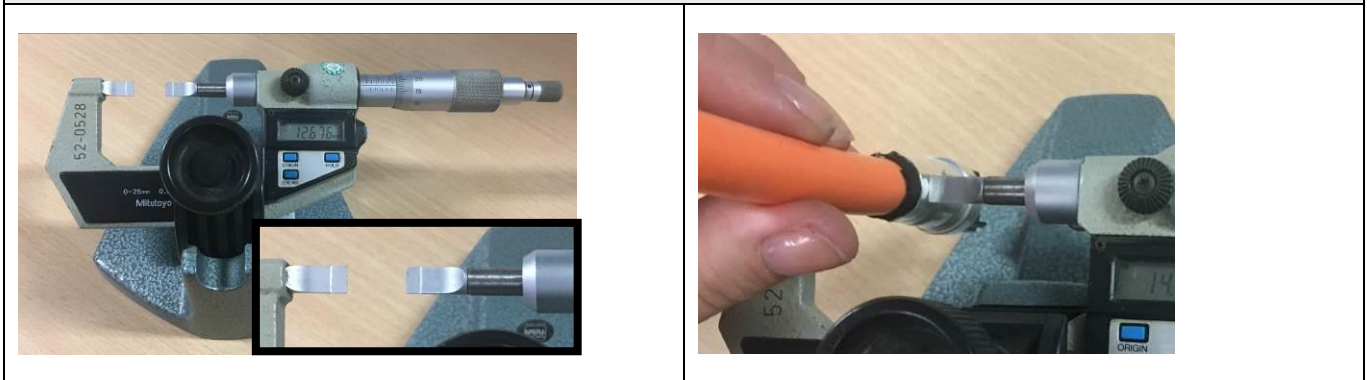
This document is not subject to change service!

- **Check the measurement of the embossing height “g”:**

To check the dimension “g”, the height needs to be measured acc. to the drawing.  
All the dimensions must be within the given tolerance.

The measuring of the embossing height must be done with a suitable measuring device.  
(Micrometer, measuring range: 0-25 mm).

The thickness of the measuring blades must be lower than 0.3 mm.

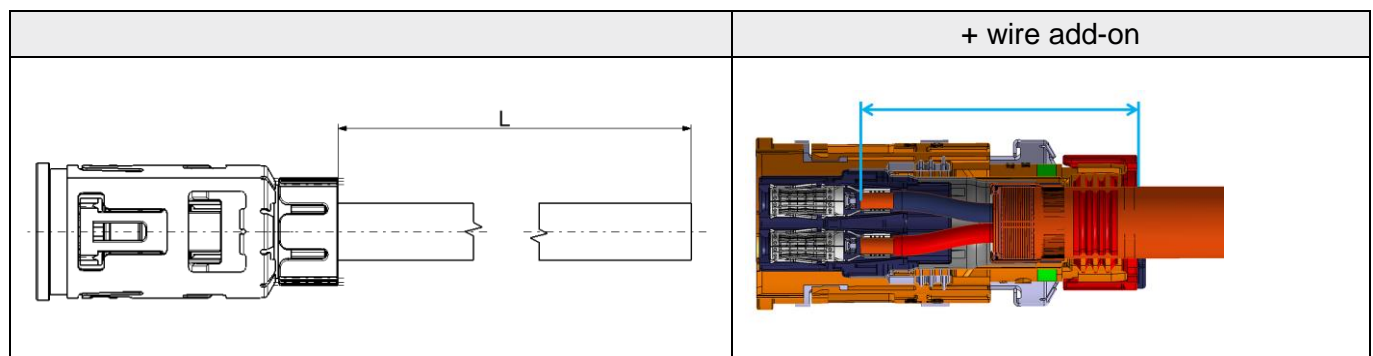




## 5 Processing steps (Rotative orientation)

Use the following described processing steps as necessary for the wire cross sections 2.5 mm<sup>2</sup>/ 4.0 mm<sup>2</sup> and 6.0 mm<sup>2</sup> where the orientation of the connector can be made. Please consider that this is only allowed in combination with the extended strain relief. As a reference sample, a terminal holder coding A and a 6.0 mm<sup>2</sup> wire was used.

### 5.1 Cut the shielded cable



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

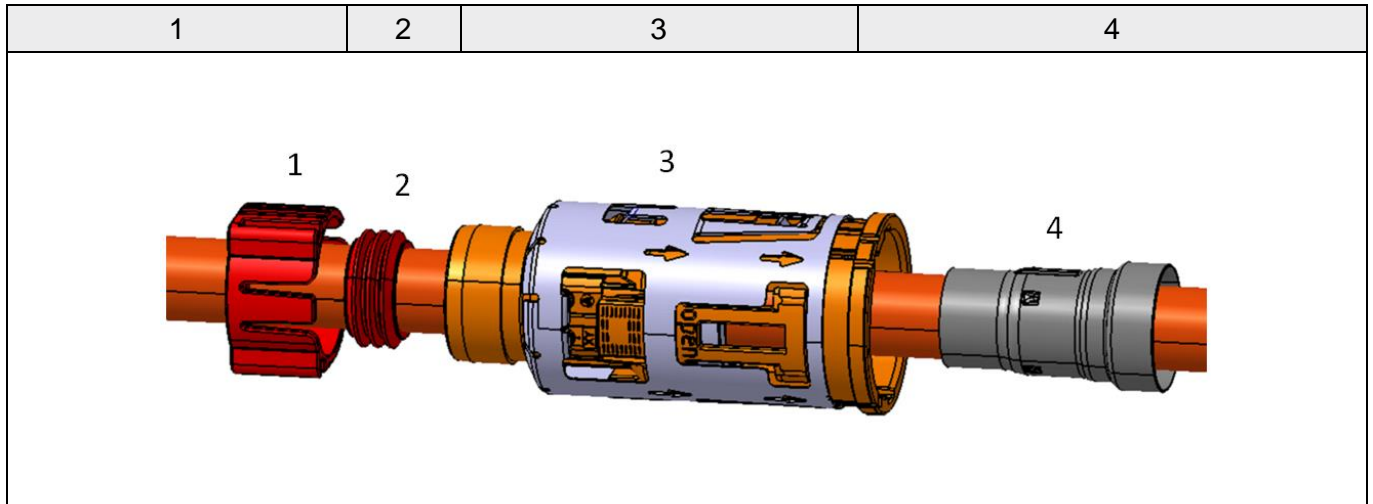
Wire cross section	Dimension L after zero-cut (mm)	Dimension L for the HCT4 terminal incl. zero-cut (mm)	Dimension L after zero-cut with 90° angled cap (mm)	Dimension L for the HCT4 terminal incl. zero-cut and 90° angled cap (mm)
2.5 mm <sup>2</sup>	L + 50	L + 54	L + 112	L + 116
4.0 mm <sup>2</sup>	L + 50	L + 54	L + 112	L + 116
6.0 mm <sup>2</sup>	L + 50	L + 54	L + 112	L + 116

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

This document is not subject to change service!

## 5.2 Assembly of the single components

Slide the cover cap (1), the seal (2), the female locking device (3) and the shielding sleeve (4) onto the shielded cable. If the 90° angled cap is used, the cover cap (1) is omitted.



This document is not subject to change service!

### 5.3 Strip off the shielded cable



Stripping length:



Wire cross section	Dimension L1 after zero-cut (mm)	Dimension L1 for the HCT4 terminal incl. zero-cut (mm)
2.5 mm <sup>2</sup>	22.5 ± 1	26.5 ± 1
4.0 mm <sup>2</sup>	22.5 ± 1	26.5 ± 1
6.0 mm <sup>2</sup>	22.5 ± 1	26.5 ± 1

Do not damage the shielding during the processing operation.

This document is not subject to change service!

## 5.4 Wire processing I

**Assemble the stress relief, remove the foil and shorten the shielding:**

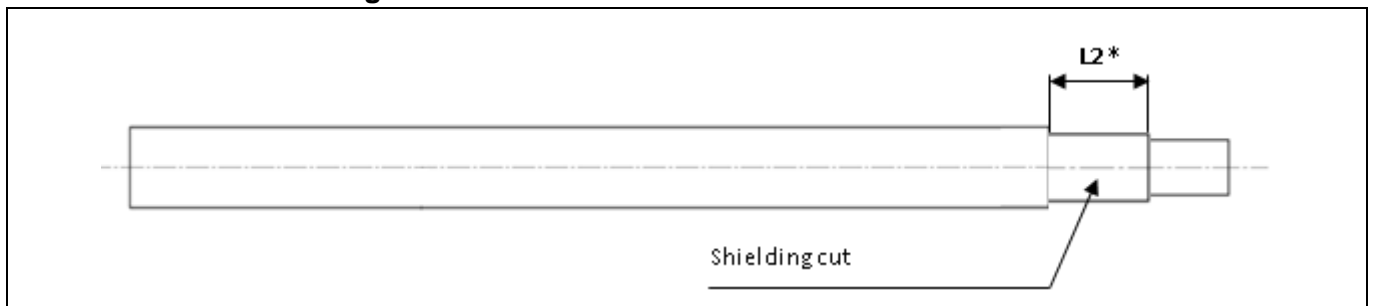


The following process steps must be done, but the manufacturer can choose the sequence:

- Assemble the stress relief.  
Depending on the cross section 709-841-511 or 512 or 513 must be used
- Remove the foil.
- Shorten the shielding.

An overlap of the foil in the strain relief is allowed circulating up to max. 1.5 mm. An overlap of the foil in the ferrule crimp/strain relief, like small edges is allowed up to max. 4.0 mm.

### 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%

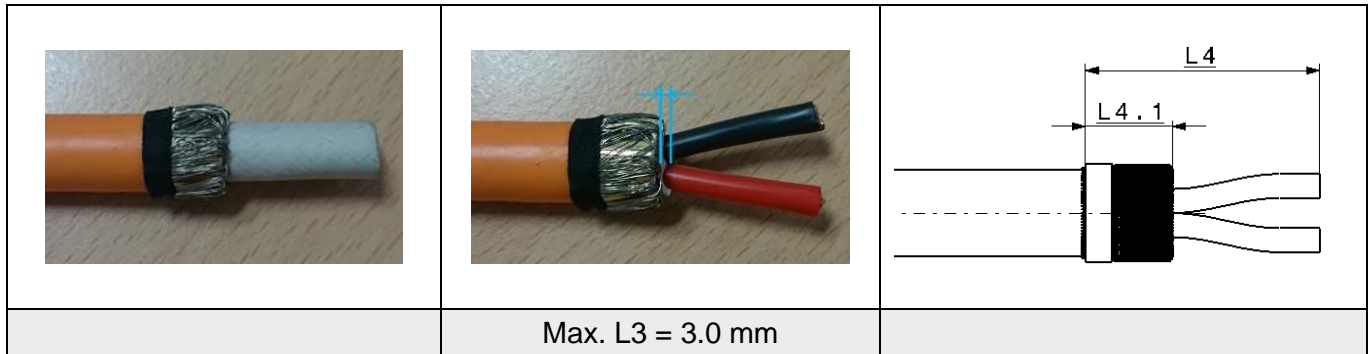
This document is not subject to change service!





## 5.5 Wire processing II

Fold the shield backwards, hold the shield with tape and remove the filling.



100% of the shield must be turned over the stress relief. A targeted unbraiding of the shield is not necessary. By turning over the shield, a process related unbraiding is possible. After this the shield must 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 **5.0 mm**. The fixing tape must 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 or L4.1.

L4 = max. 37.5 mm after zero-cut (measurement in straightened length)

= max. 41.5 mm incl. zero-cut (measurement in straightened length)

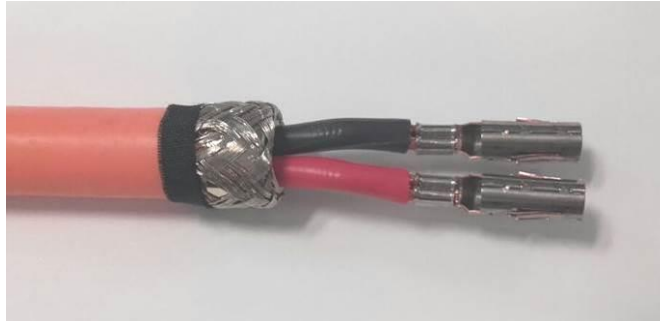
L4.1 = max. 18.7 mm

In this specification the PET- fabric tape 837X (838X) 5 mm of the company coroplast is used. It is possible to use another product to fix the shield. The max. outer diameter after assembling is  $\varnothing$  14.3 mm 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. 3.0 mm towards the outer sheath. In the area between the two single cores the filling material is allowed to be bigger than L3. Single strands of the shield 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.

This document is not subject to change service!

## 5.6 Crimp the HCT4 female terminal



- **Double stroke crimping machine**

For the positioning and the crimping process of the HCT4 female terminals, the crimping machine of the company “Schäfer” can be used:

<u>Name of the device:</u>	HPS40-2 Double stroke crimping machine
<u>Article number:</u>	185/16
<u>Name of the device:</u>	Interchangeable crimping unit
<u>Article number:</u>	Shown in the process specification HCT4 female terminal „EVS-100068“

The device was designed and implemented by the processing guidelines of Hirschmann Automotive. The individual details referring to commissioning, handling and process description of the device can be requested directly at the supplier:

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

The commissioning of the crimping device must be done through the manufacturer. The manufacturer is at liberty to use a crimping device of his choice. The crimp process must meet the crimp and positioning data which are specified on the following pages.

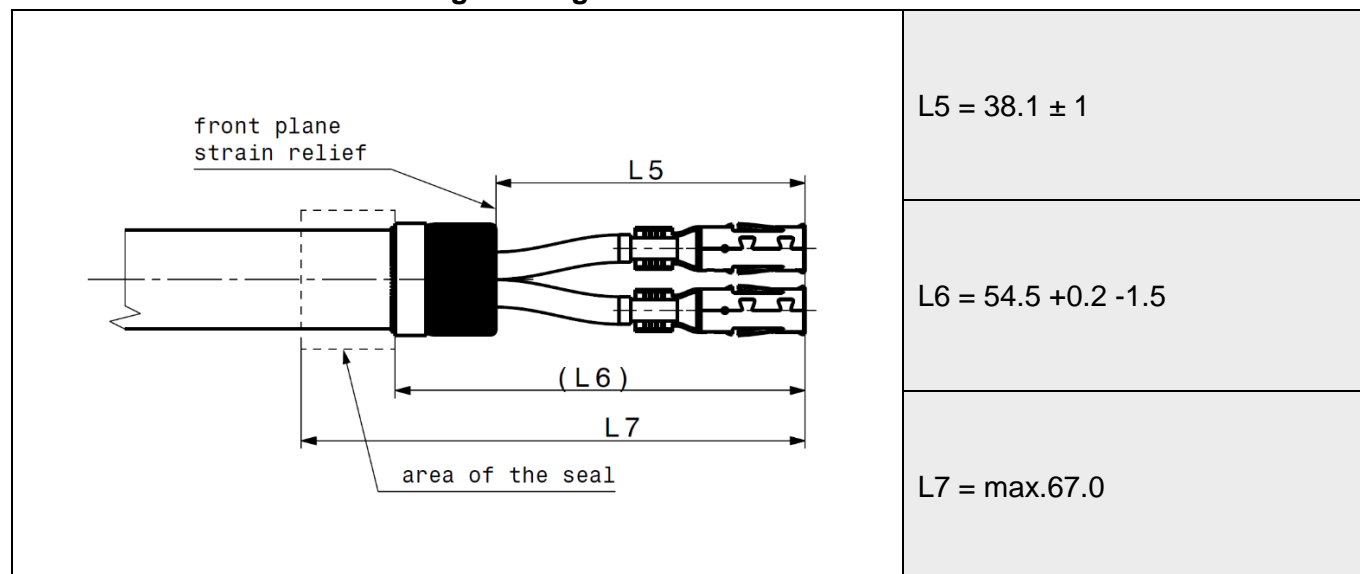
This document is not subject to change service!



- **Process data**

- a) The crimp data can be seen in the „Process specification HCT4 female terminal EVS-100068“.
- b) 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 drawing need to be adhered to.



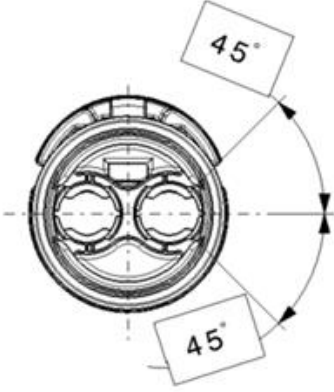
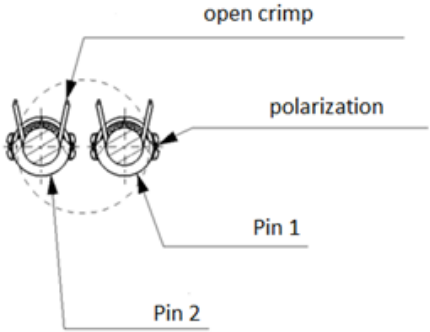
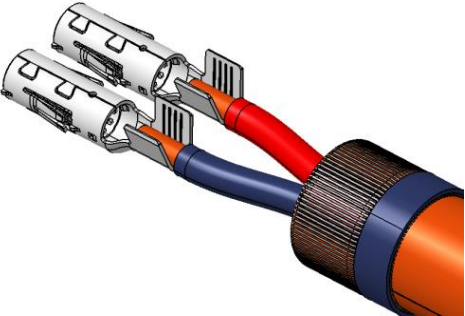
The dimension L5 is decisive for the position of strain relief. As alternative to L5 it is allowed to prove dimension L5.1. L6 is only for information and is built from L4.1 and L5. The dimensions are caused from L1, L4 and the EVS-100068 or L4.1 and L5.1.

The difference of the length between the female terminals of max. 0.5 mm 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.

This document is not subject to change service!



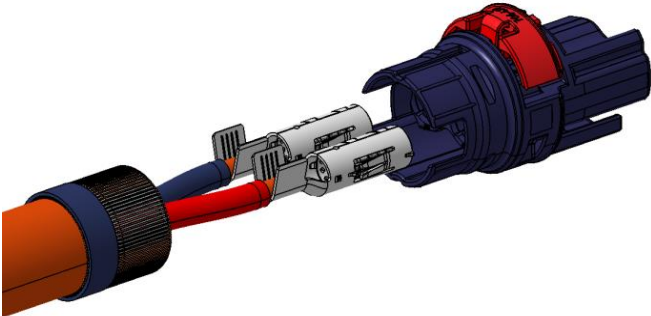
Angled insert catches HPS40-2 female contact holder	Nominal position of the HCT4 female terminals to the cable
	
	

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 female contact holder and the max. assembling force of the cable with the terminals into the contact holder. This can be checked during the assembling process.

This document is not subject to change service!

## 5.7 Assembly I

Assemble HCT4 female terminals into the contact holder (1).		
	Pin	Polarity/ Colour
	1	+ / Red
	2	- / May vary

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 the female terminals will be primary locked. The female terminals must be crimped.

The mounting force of the female terminals into the contact holder must be proven if the crimping machine of the company "Schaefer" is not used or if the terminals are mounted fully automated inside the contact holder.

This document is not subject to change service!



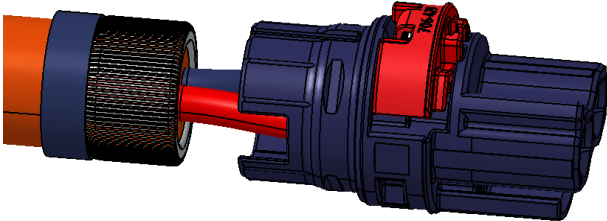
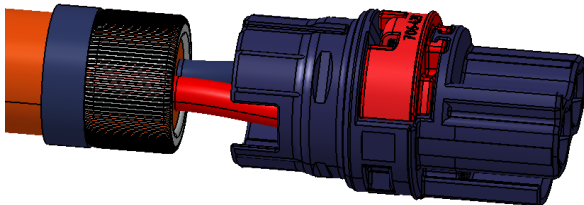
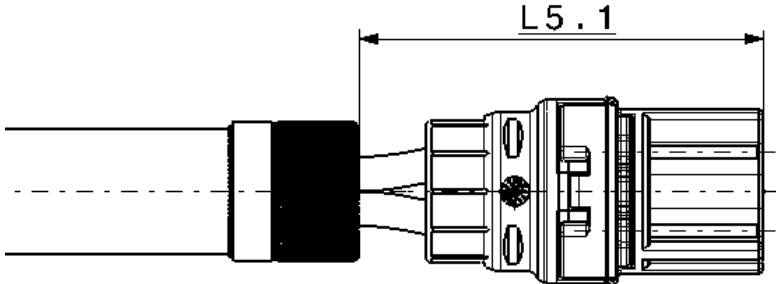
Wire manufacturer	Wire cross section		
	2.5 mm <sup>2</sup>	4.0 mm <sup>2</sup>	6.0 mm <sup>2</sup>
<b>Kroschu</b>	FHLR2G2GCB2G 600/1000V T180		
	64996918	64997293	64995979 64997213
	24 N	30 N	36 N
<b>Leoni</b>	FHLR2G2GCB2G 600/900V T180		
	00001	00002	00003
	24 N	30 N	36 N
<b>Coroplast</b>	FHLR2G2GCB2G 600/1000V T180		
	9-2641 (2x 2.5 mm <sup>2</sup> )	9-2641 (2x 4.0 mm <sup>2</sup> )	9-2641 (2x 6.0 mm <sup>2</sup> )
	24 N	30 N	36 N
<b>NBKBE</b>	FHLR2G2GCB2G 600/1000V T180		
	-	818-00001 (2x 4.0 mm <sup>2</sup> )	818-00011 (2x 6.0 mm <sup>2</sup> )
	-	30 N	36 N
<b>H+S</b>	FHLR91XC13X-2x6 T150		
	-	-	12584915
	-	-	36 N
<b>Coficab</b>	FHLR91X91XCB91X T3 (not validated yet)		
		H3XXCBX240Hxx	H3XXCBX260Hxx
		30 N	36 N
	FHLR91X91XCB91X T4		
	-	V4XXCBX240Hxx	-
	-	30 N	-
	FHLR2G2GCB2G 600/1000V T180		
	LCGBG225	LCGBG240	LCGBG260
24 N	30 N	36 N	

This document is not subject to change service!

## 5.8 Assembly II

### Assembly of the secondary lock (2).

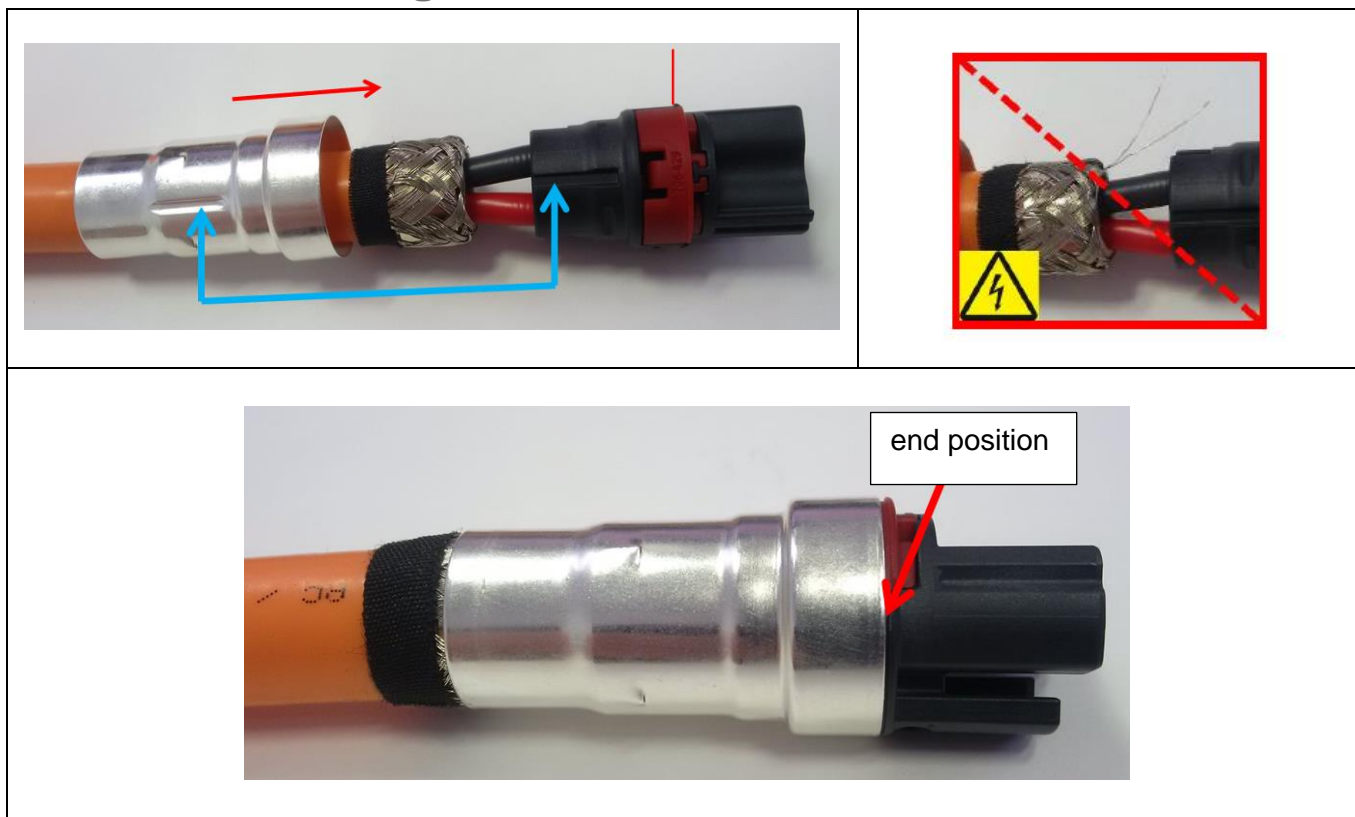
The secondary locking can only be assembled if the terminals are in the end position. A visible difference of the terminals to each other can be possible in the contact cavity. Because of the position of the contacts on the wire, and the play of the contacts in the contact cavity it is possible and acceptable.

Secondary lock pre-locking/ HV terminals primary locked	Secondary lock end position
	
	<p>L5.1 = 39.3 ±1</p>
<p>As mentioned at point 4.6 it is allowed to prove L5.1 instead of L5.</p>	

This document is not subject to change service!



## 5.9 Push shielding sleeve onto contact carrier



- The shielding sleeve needs to be assembled onto the contact holder in the correct position. It can only be turned by 180°.
- Do not damage the shielding sleeve during the assembly.
- The shielding sleeve must be assembled until the end position is reached.
- The fixing tape must 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 must be clarified with each OEM.



**Risk of insulation failure!**

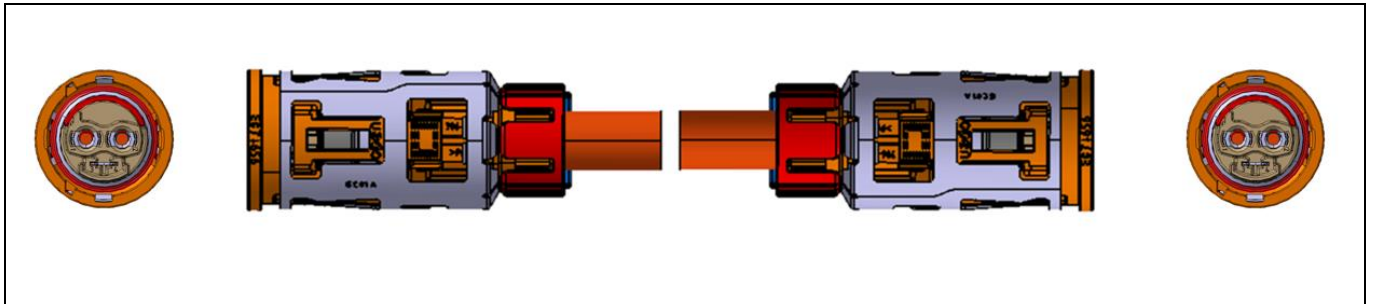
This document is not subject to change service!



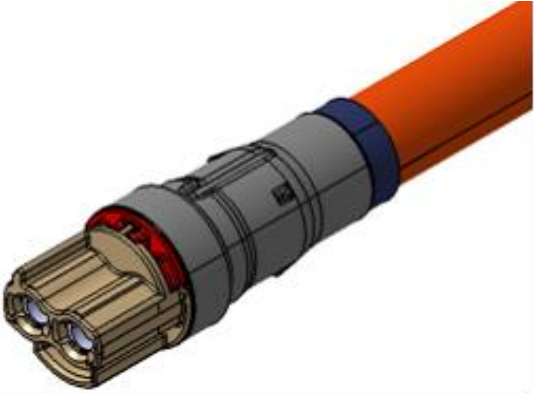
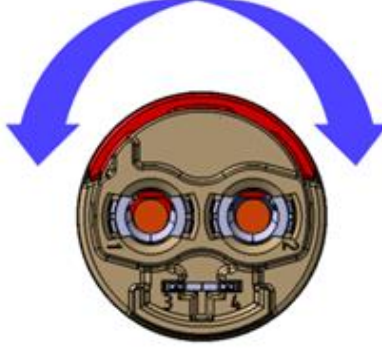
## 5.10 Rotative orientation

- **Application area**

Rotational alignment is used when there is a connector on both sides of the cable, and they must be aligned with each other.



Before the shield crimping, the alignment of the connector can be corrected by the following options:

The assembled contact carrier and shield sleeve can be rotated in relation to the wire.	The wire can be rotated in relation to the contact carrier.
 <p>The diagram shows a perspective view of a cable with a grey contact carrier and a blue shield sleeve. The cable is orange. The contact carrier is shown in a slightly rotated position relative to the cable.</p>	 <p>The diagram shows a cross-sectional view of a connector housing with two contact points. A blue curved arrow indicates the rotation of the wire within the housing.</p>

A maximum rotation of up to  $\pm 180^\circ$  is possible and cannot be exceeded.

This twisting results in an overturning of the single wires, which leads to a reduction in length between the contact carrier and the strain relief.

The movability must be ensured at least on one side (by the contact carrier or cable) to enable the length reduction.

This document is not subject to change service!

## 5.11 Press shielding sleeve

- **Pressing device**

For the process of positioning and pressing of the stress relief and the shielding sleeve, the following pressing device of the company "Schäfer" can be used:

<u>Name of the device:</u>	Pressing device HPS40-2
<u>Article number:</u>	188/16

Based on the processing guidelines of Hirschmann Automotive, the device was designed and produced. The details of the commissioning, handling and the process guideline of the device can be requested directly at the supplier:

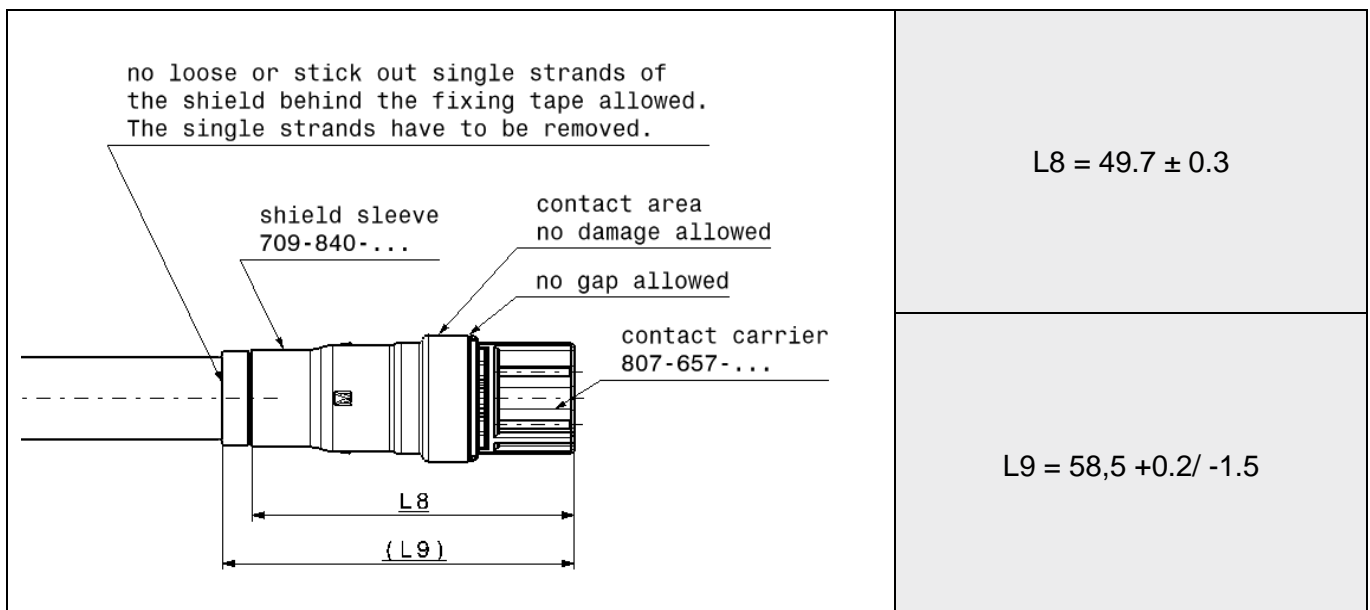
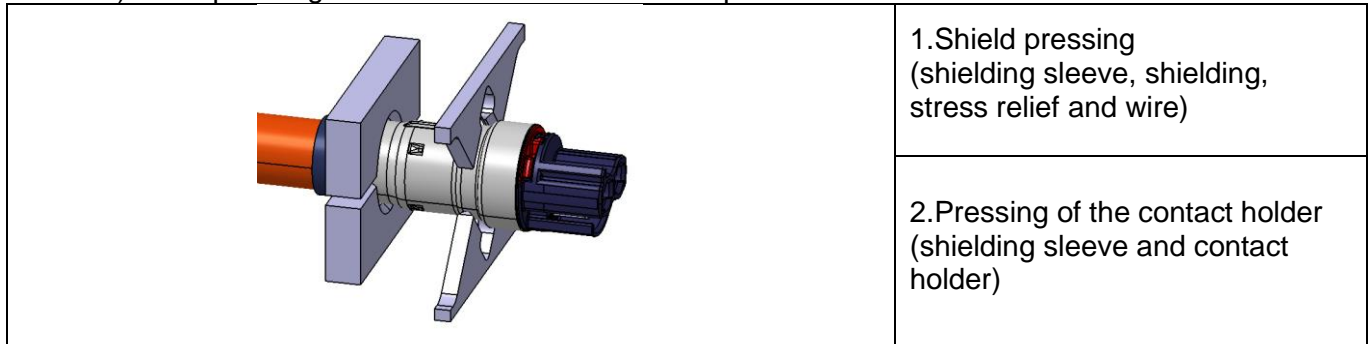
**Schäfer Werkzeug- und Sondermaschinenbau GmbH**  
**Dr.-Alfred-Weckesser-Str. 6**  
**76669 Bad Schoenborn-La, Deutschland**  
**Tel: +49 7253 9421-0**  
**Fax: +49 7253 9421-94**  
[www.schaefer.biz](http://www.schaefer.biz)

The commissioning of the pressing device must be done through the manufacturer. The manufacturer is at liberty to use a pressing device of his choice. The pressing process must meet the pressing and positioning data which are specified on the following pages.



- **Pressing data**

- a) The contact holder incl. the female contacts must be put into the device in the correct position.
- b) Make sure, the shielding sleeve is on the end position of the contact holder. The tape must stick out of the end of the shielding sleeve.
- c) it must be ensured that there is no damage or deformation in the contact area.
- d) The measurements on the following drawing, must be adhered to, before and after pressing.
- e) Two pressing actions will be done in one step



The dimension L8 and L9 are just for information. The dimensions are caused from the dimension L1, L4 and the EVS-100068 or L4.1 and L5.1.

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

This document is not subject to change service!



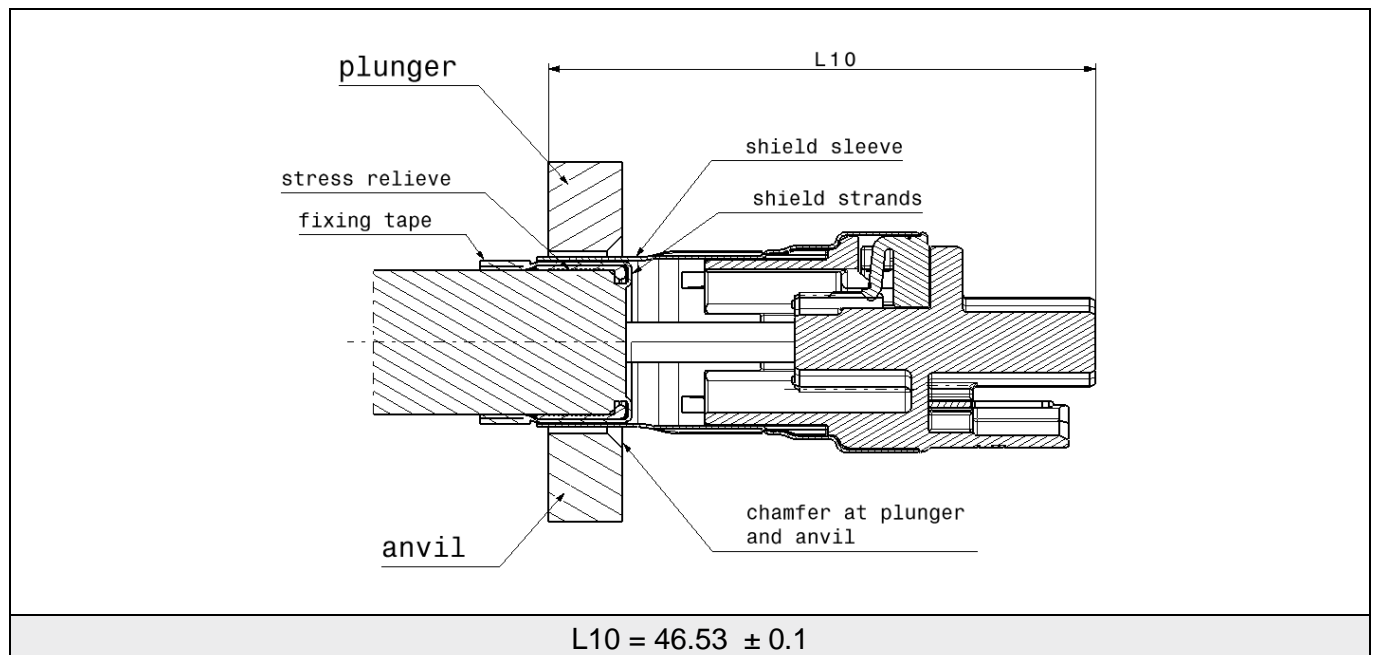
## 5.11.1 Shield pressing by two half-shells

**!! Not valid for H+S wire !!**

- **Embossing position**

The exact geometry of the plunger and anvil is given. The position of the plunger and the anvil must be reversed to the front plane of the contact holder. The chamfer at the plunger and the anvil must be on the side to the contact holder. The dimension L10 is the position of the plunger and the anvil.

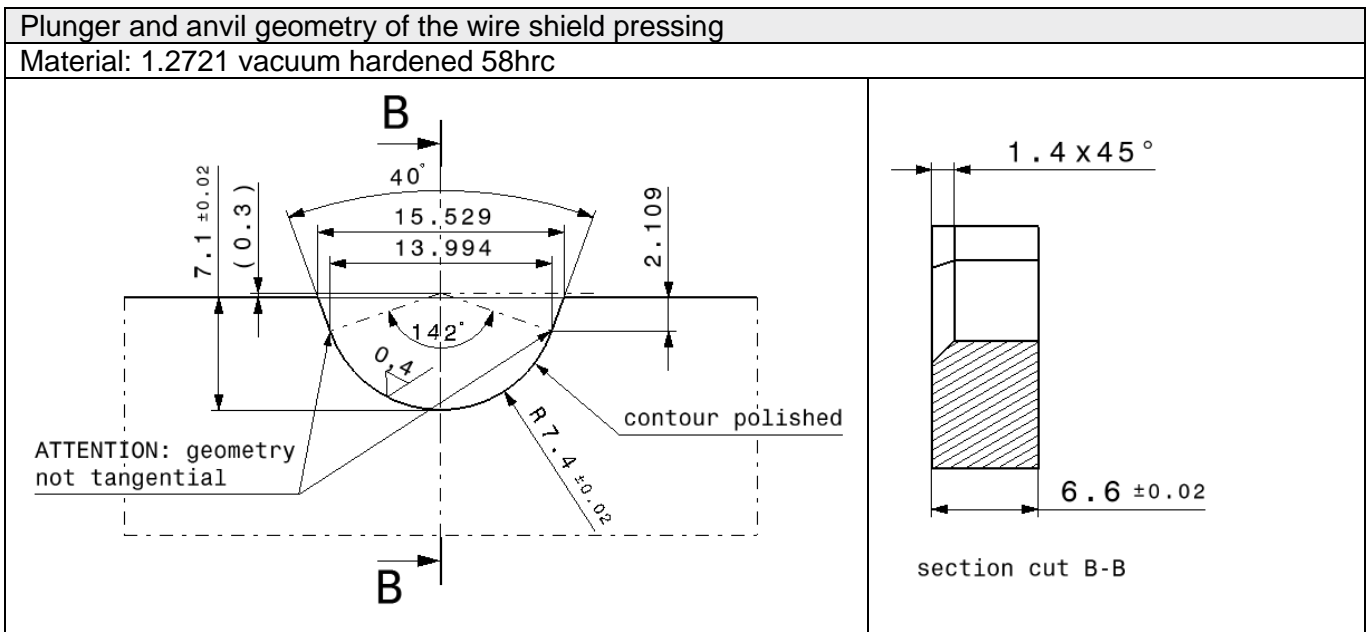
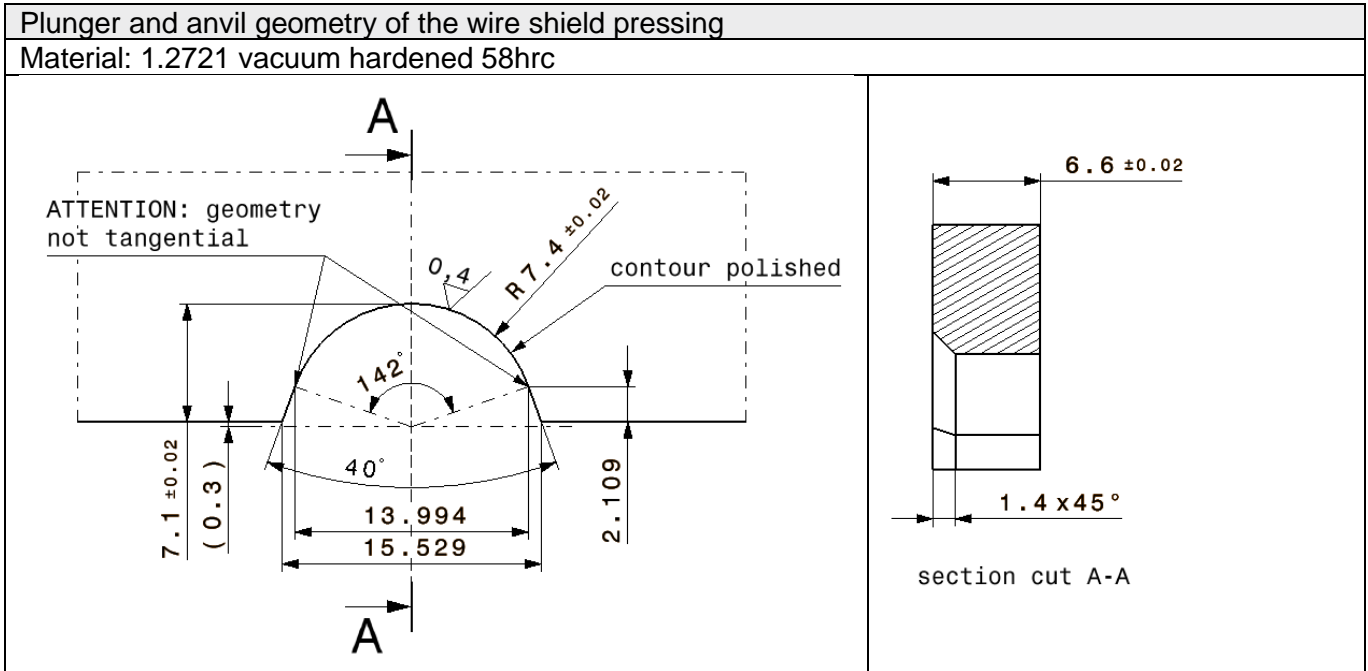
**The dimension L10 is considered as tool dimension and must be ensured in the tool.**





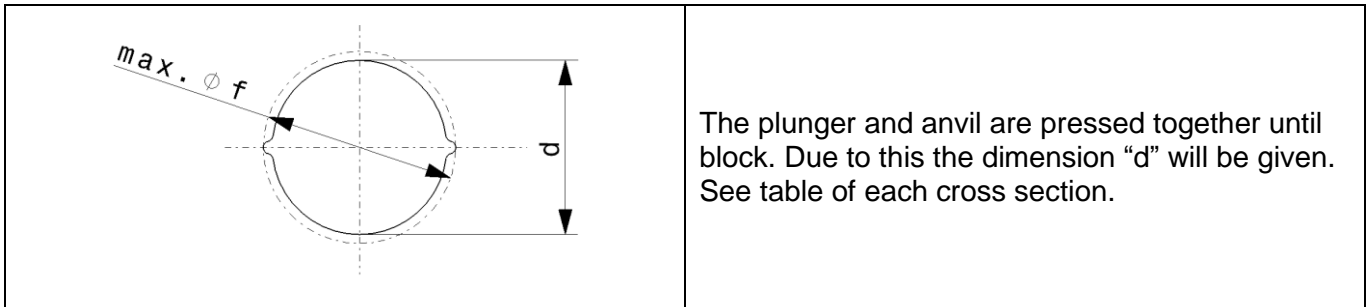
- **Plunger and anvil geometry of the wire shield pressing**

**!! Not valid for H+S wire !!**



This document is not subject to change service!

- **Embossing heights “d” - wire shield pressing**



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

	Measurement “d” in mm		
Wire manufacturer	2.5 mm <sup>2</sup>	4.0 mm <sup>2</sup>	6.0 mm <sup>2</sup>
Kroschu T180	14.57 ± 0.15	14.57 ± 0.15	14.57 ± 0.15
Leoni			
Coroplast			
NBKBE			
Coficab			

During the pressing process a fold appears on two sides.

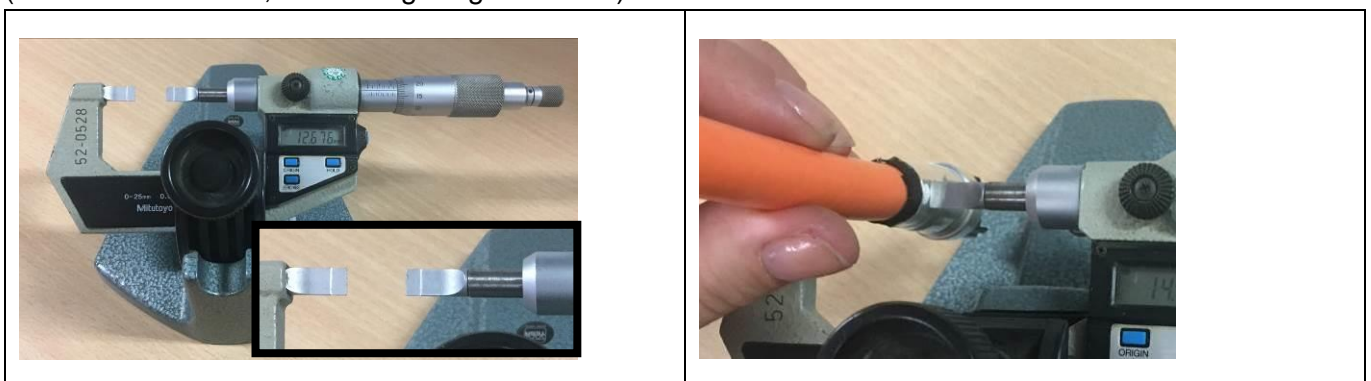
This fold is not allowed to be bigger than the diameter  $\varnothing f = 16.40 \text{ mm}$  refer to the centerline of the wire. In the area of the fold the material of the shield sleeve is not allowed to be cracked.

- **Check measurement of the embossing height “d” and the max. diameter “f”**

To check the dimension “f”, a gauge with an inner diameter of 16.40 mm must be used.

To check the dimension “d”, measure the height as indicated in the drawing. The measured values must all lie within the specified tolerance.

The grouting height must be measured with a suitable measuring device (outside micrometer, measuring range 0-25mm).

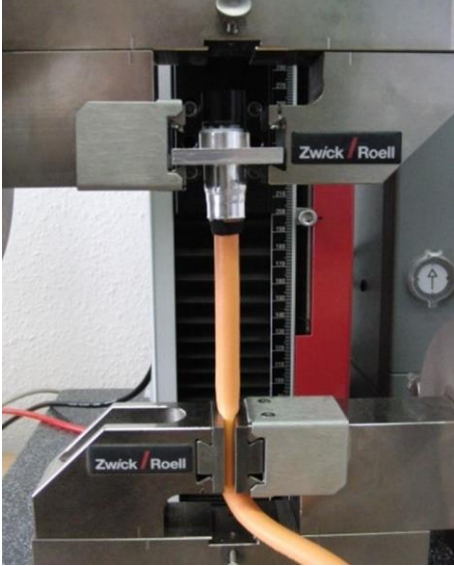


This document is not subject to change service!

- **Pulling force of the wire**

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 70 mm. The connector must be fixed on the shield sleeve at the transition between the largest and the second largest diameter.

HCT4 terminals must not be installed in the test specimens, to test the shield pressing only. In this state, the figure in the table must be reached

	Wire cross section	Pulling force
	2.5 mm <sup>2</sup>	≥ 120 N
	4.0 mm <sup>2</sup>	≥ 120 N
	6.0 mm <sup>2</sup>	≥ 120 N



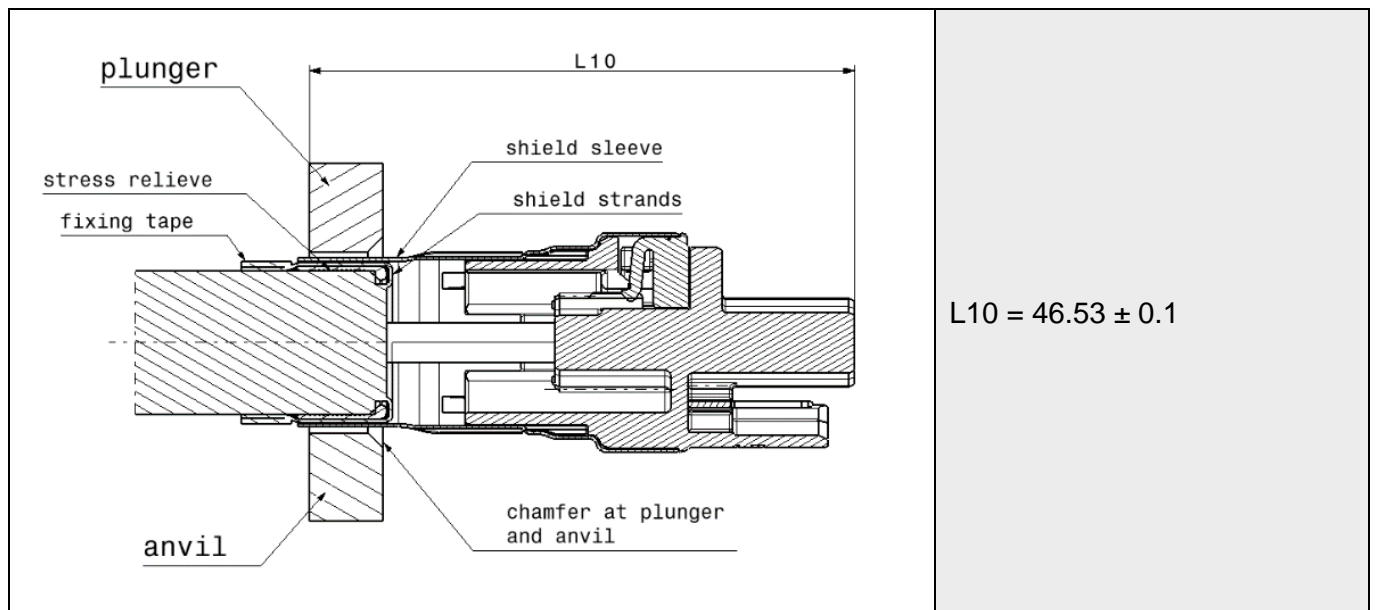
## 5.11.2 Shield pressing by two half-shells

**!! For H+S wire !!**

- **Embossing position**

The exact geometry of the plunger and anvil is given. The position of the plunger and the anvil must be reversed to the front plane of the contact holder. The chamfer at the plunger and the anvil must be on the side to the contact holder. The dimension L10 is the position of the plunger and the anvil.

**The dimension L10 is considered as tool dimension and must be ensured in the tool.**



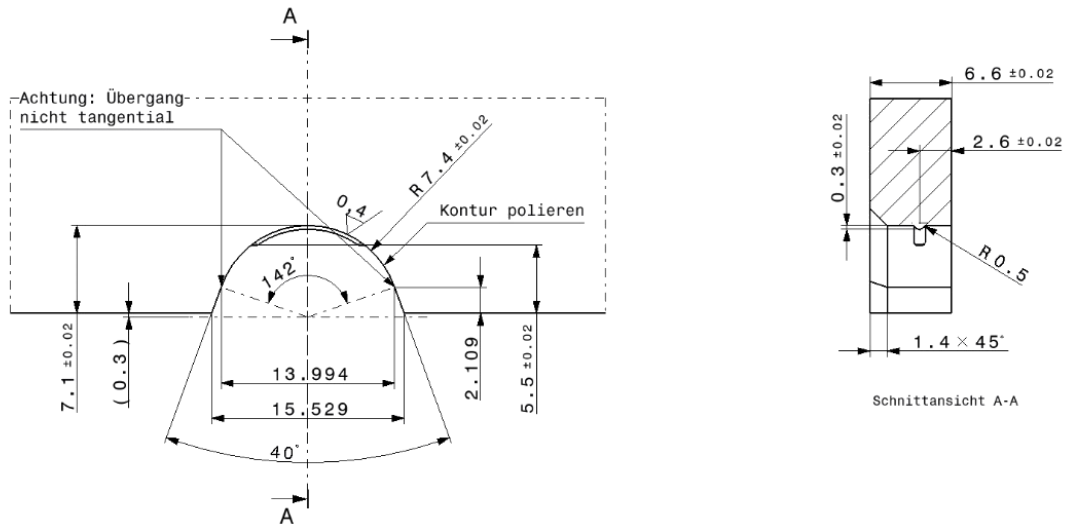




- **Plunger and anvil geometry of the wire shield pressing**

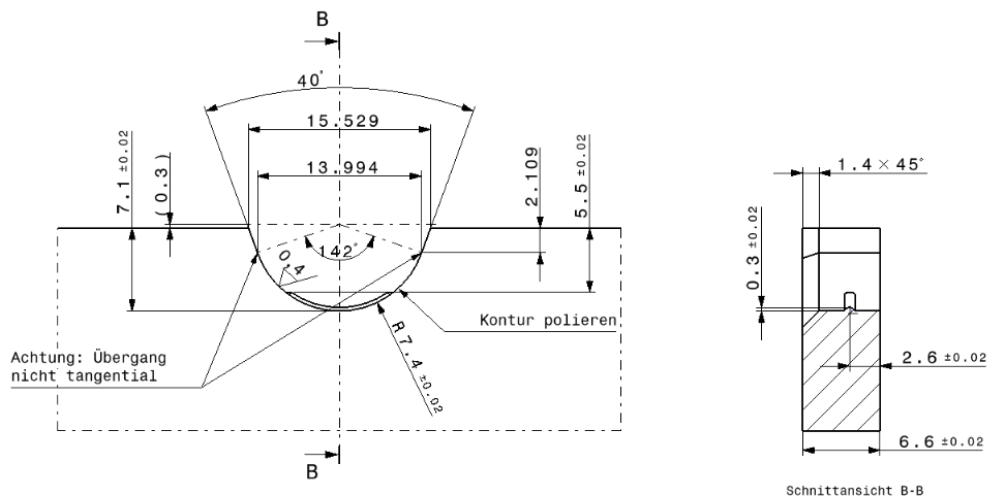
**Plunger and anvil geometry of the wire shield pressing**

Material: 1.2721 vacuum hardened 58hrc



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

Material: 1.2721 vacuum hardened 58hrc



This document is not subject to change service!



- **Embossing height “d”**

	<p>The plunger and anvil are pressed together until block. Due to this the dimension “d” will be given. See table of each cross section.</p>
--	--

Wire manufacturer	Measurement “d” in mm <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">L1</span>		
	2.5 mm <sup>2</sup>	4.0 mm <sup>2</sup>	6.0 mm <sup>2</sup>
H+S T150 (FHLR91XC13X 2x6)	-	-	14.57 ± 0.15

During the pressing process a fold appears on two sides. This fold is not allowed to be bigger than the diameter  $\varnothing f = 16.4 \text{ mm}$  refer to the centerline of the wire. In the area of the fold the material of the shield sleeve is not allowed to be cracked.

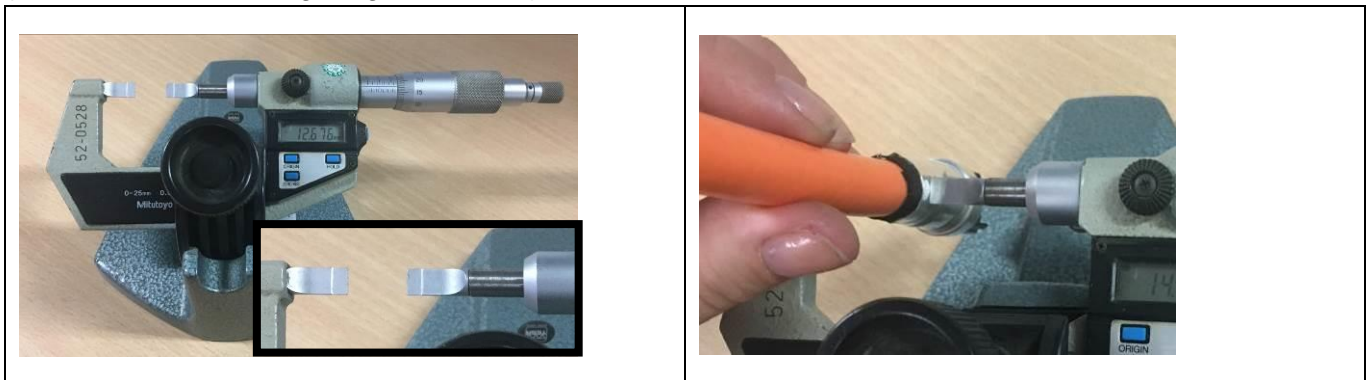
- **Check measurement of the embossing height “d” and the max. diameter “f”**

To check the dimension “f”, a gauge with an inner diameter of 16.40 mm must be used.

To check the dimension “d”, the height needs to be measured acc. to the drawing. All the dimensions must be within the given tolerance.

The measuring of the embossing height must be done with a suitable measuring device.

(Micrometer, measuring range: 0-25 mm)

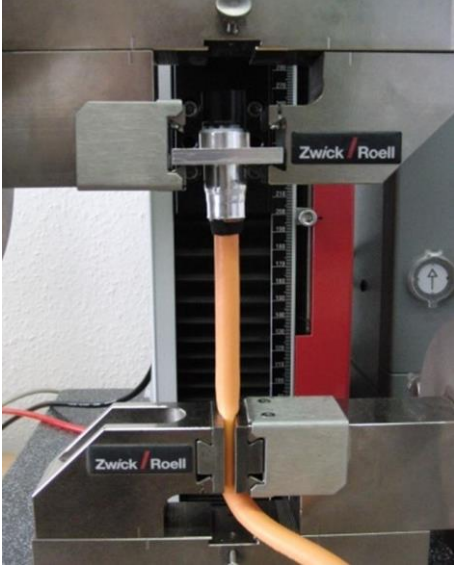


This document is not subject to change service!

- **Pulling force of the wire**

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 70 mm. The connector must be fixed on the shield sleeve at the transition between the largest and the second largest diameter.

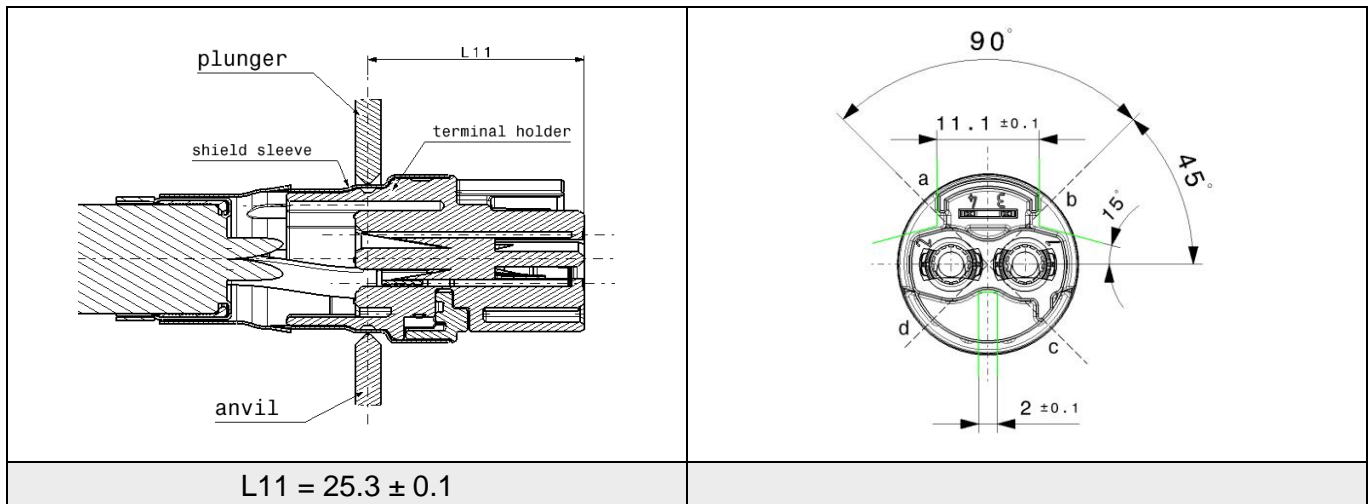
HCT4 terminals must not be installed in the test specimens, to test the shield pressing only. In this state, the figure in the table must be reached.

	Wire cross section	Pulling force
	2.5 mm <sup>2</sup>	≥ 120 N
	4.0 mm <sup>2</sup>	≥ 120 N
	6.0 mm <sup>2</sup>	≥ 120 N



### 5.11.3 Pressing contact carrier

- **Embossing position:**



$L11 = 25.3 \pm 0.1$

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 must be aligned in relation to the front plane of the terminal holder.

The four embossing positions (a-d) must be aligned in relation to the terminal holder. Therefore the terminal holder 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 terminal holder can be inserted into the jack.

The exact geometry of the plunger and anvil is given.

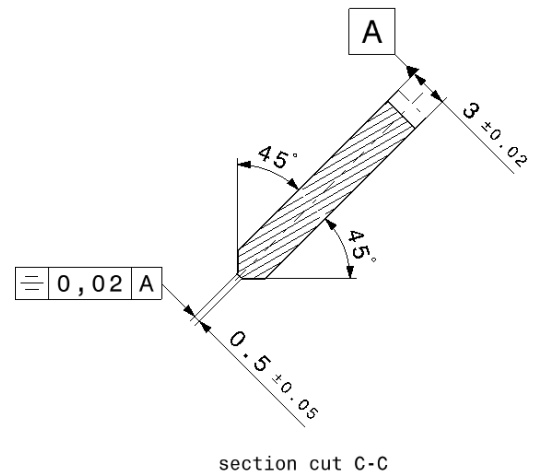
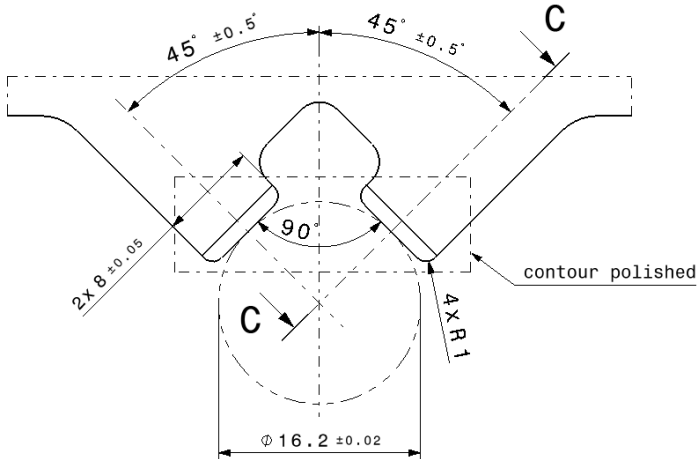
This document is not subject to change service!



- Geometry of the plunger and the anvil pressing on the terminal holder

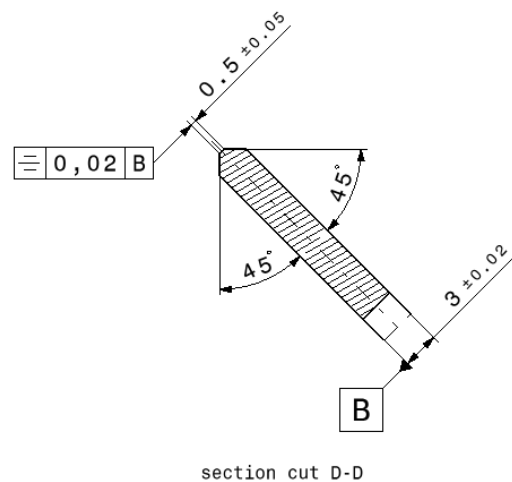
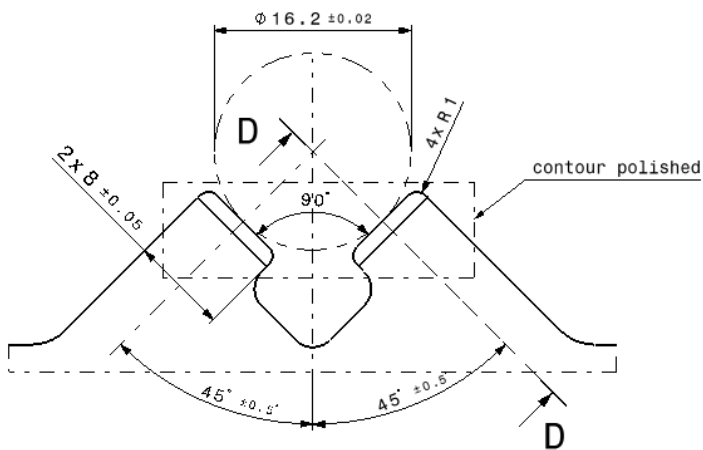
Plunger and anvil geometry of the wire shield pressing

Material: 1.2721 vacuum hardened 58hrc



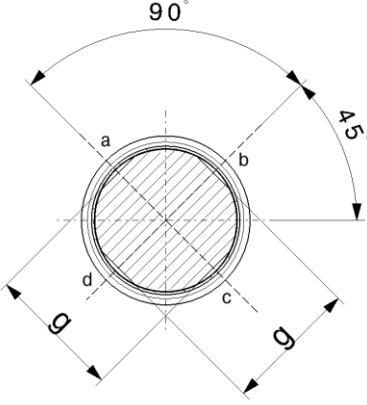
Plunger and anvil geometry of the wire shield pressing

Material: 1.2721 vacuum hardened 58hrc



This document is not subject to change service!

- **Embossing height “g”**


	<p>The dimension g results from the embossing in between a-c and b-d.</p> <p>The embossing must be done at the same time.</p>
---	---

The dimension g is defined as following:

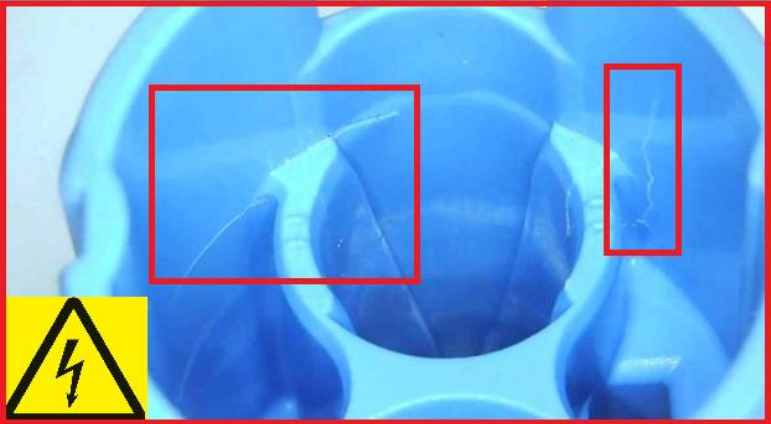
(g = 16.40 mm ± 0.1 – valid for applications already in series production)

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 16.5 mm ± 0.1mm for the dimension “g”.

	<p><b>Risk of insulation failure!</b></p>
---	---

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”.

<p><b>Possible error image for over pressing (stress marks at the plastic part):</b></p>	
--	--

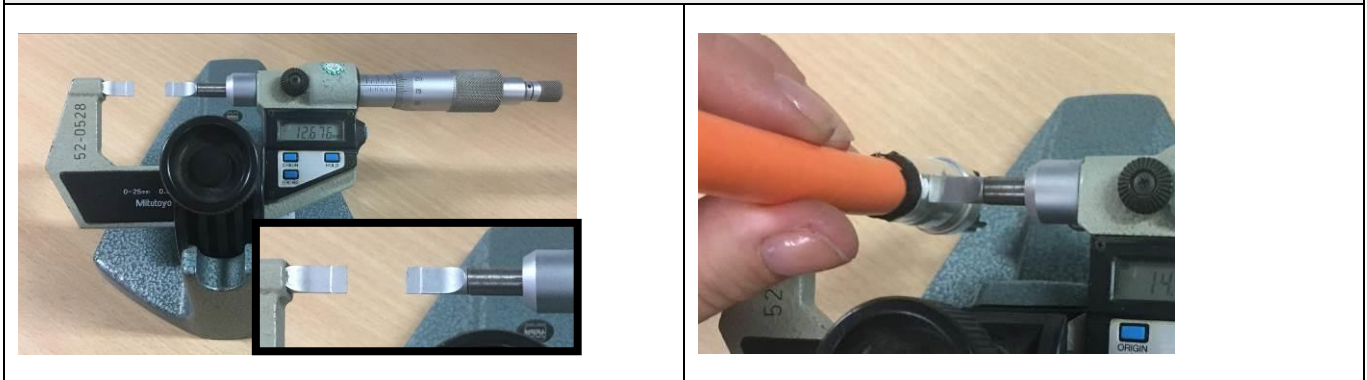
This document is not subject to change service!

- **Check measurement of the embossing height “g”:**

To check the dimension “g”, the height needs to be measured acc. to the drawing. All the dimensions must be within the given tolerance.

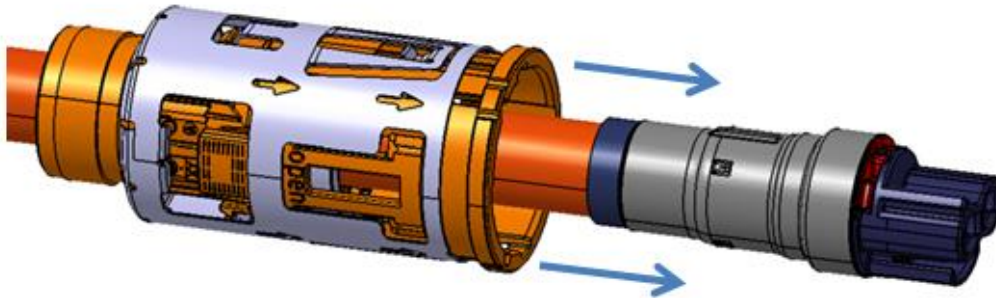
The measuring of the embossing height must be done with a suitable measuring device.  
(Micrometer, measuring range: 0-25 mm)

The thickness of the measuring blades must be lower than 0.3 mm.



## 5.12 Positioning of the female locking device

The female locking device must be assembled power assisted, and in the correct position.



For the positioning and the assembling process of the female locking device unit onto the wire unit, the assembling device (Hand device) of the company “WKM” can be used.

Name of the device: Assembling device HPS40-2  
Article number: HPS40-2

Based on the processing guidelines of Hirschmann Automotive, the device was designed and produced. The details of the commissioning, handling and the process guideline of the device can be requested directly at the supplier: Each manufacturer is responsible of the commissioning of the pressing device.

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

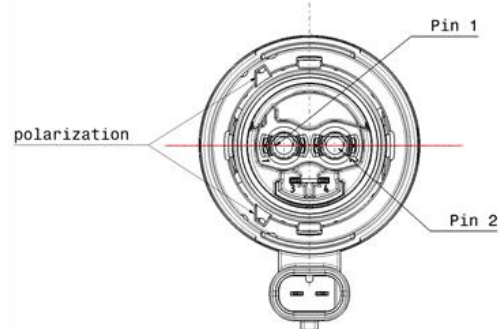
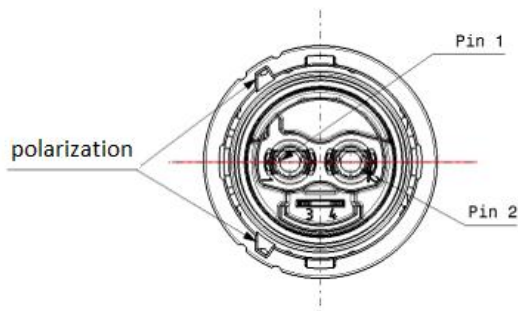
The commissioning of the pressing device must be done through the manufacturer. The manufacturer is at liberty to use a pressing device of his choice. The assembling process must meet the assembling data which are specified on the following pages.

This document is not subject to change service!

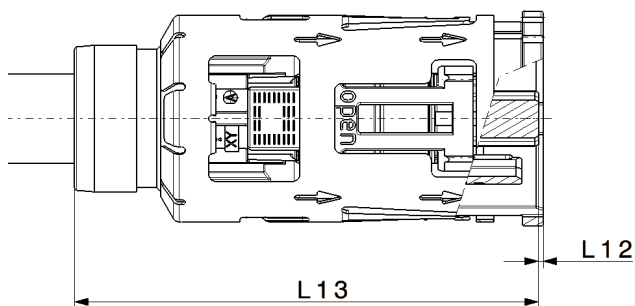




The contact holder incl. the shield sleeve needs to be assembled into the locking device unit in the correct position. Both polarizations need to be symmetric to the axis in between of the centre of Pin1 and Pin2. Also, the polarization must be on the side of Pin 1.

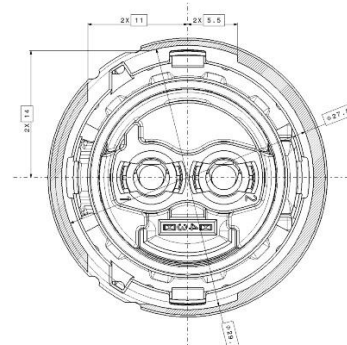
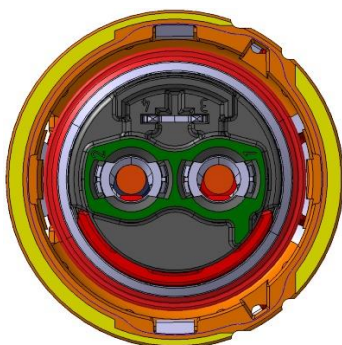


The locking sleeve must be assembled onto the shield sleeve force-assisted until the dimension L12 is reached. The reference on the terminal holder is in the middle between Pin 1 and Pin 2. The dimension L13 is only for checking purposes. During the assembling process, there are no damages allowed on the shield sleeve, the contact holder, or the wire. There is no pull on the wire necessary. Especially do not pull out the cable sheath out of the stress relief.



L12 =  $0.7 \pm 0.1$   
L13 = 66.7 (Info)

F1

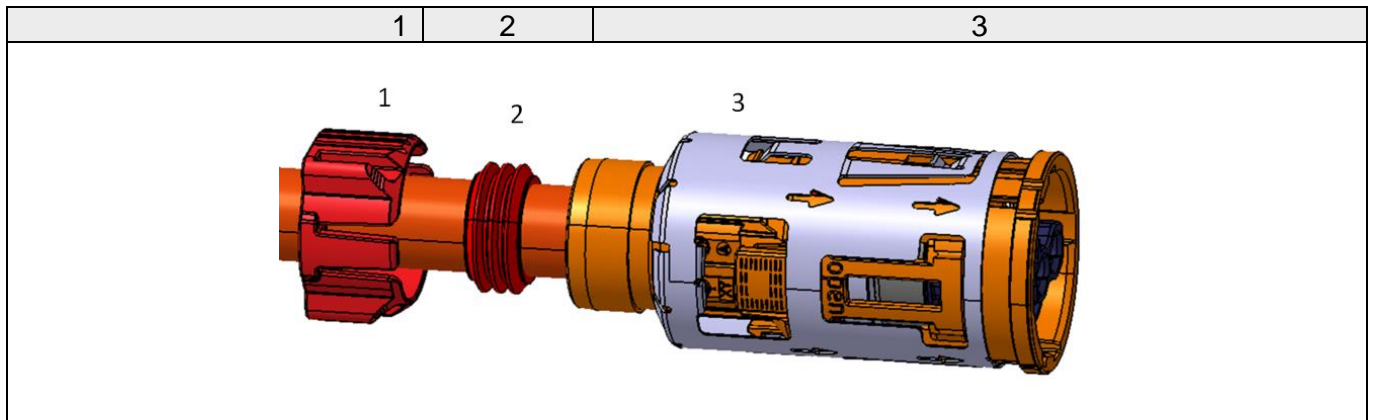


The adjustments in the processing specification with the status 08/ 2023 must be considered for new applications, but not for existing applications.

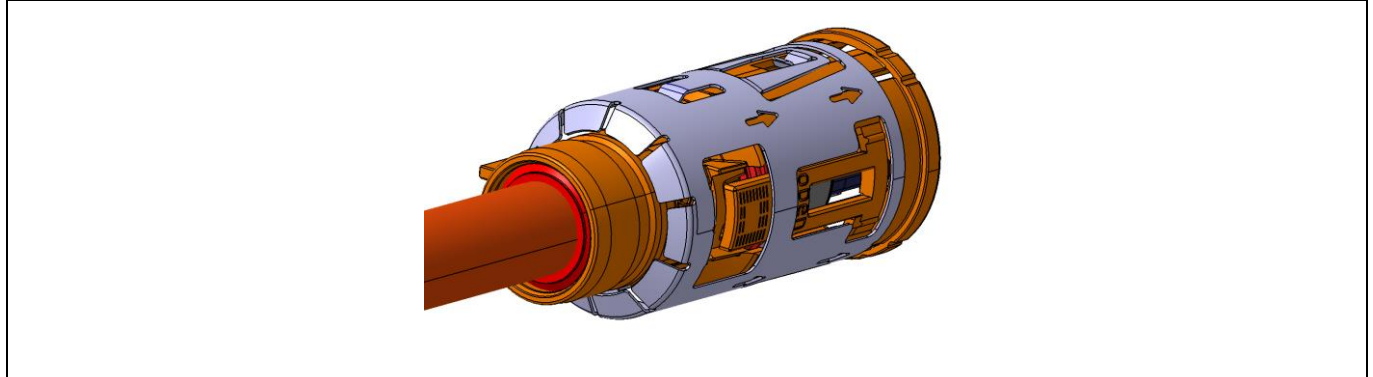
This document is not subject to change service!



## 5.13 Assemble seal and cover cap



Push seal (2) into the female locking device unit (3)

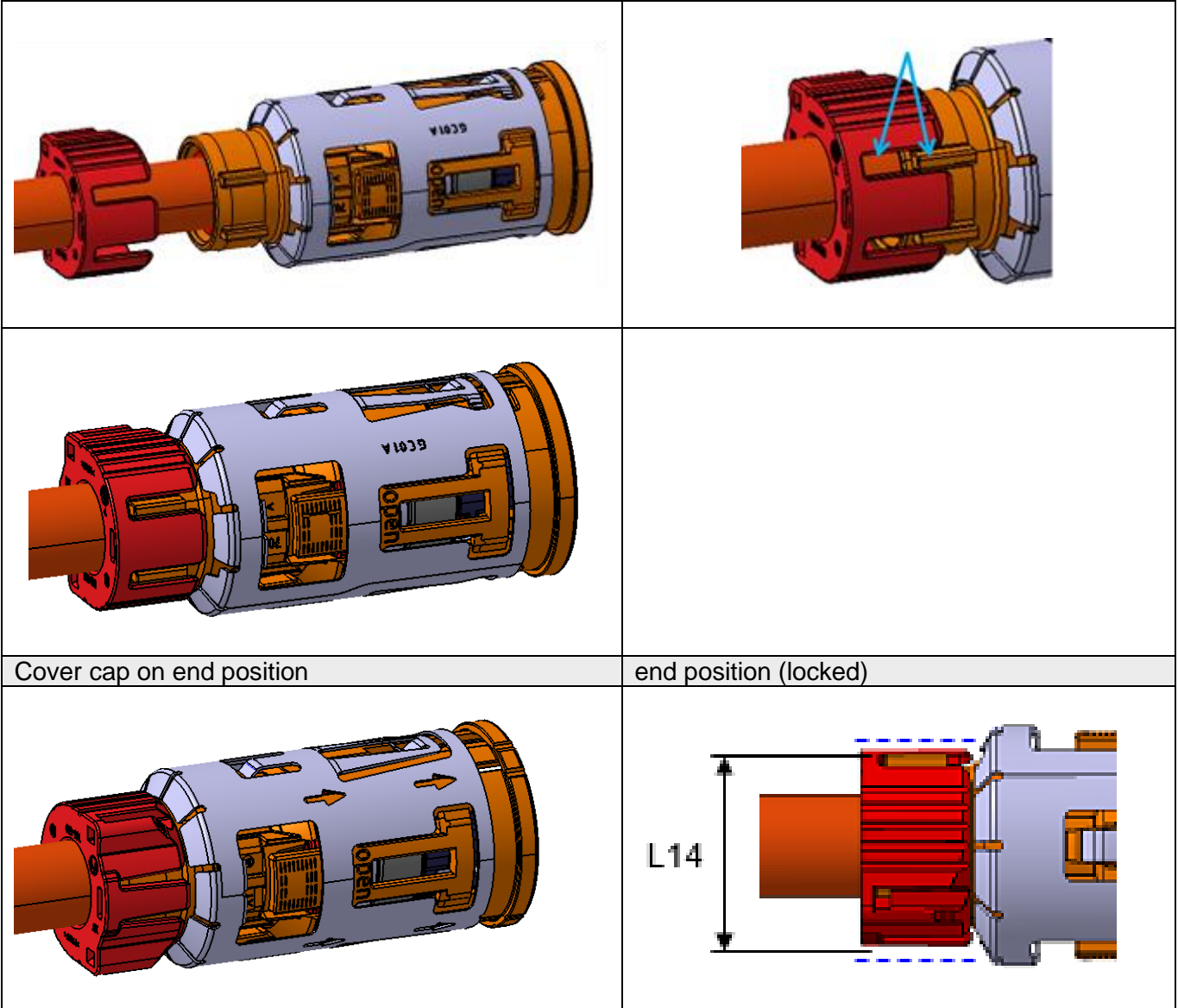


The cable seal can be slightly widened during assembly. It is possible to move the seal with the cover cap (1) on the wire, but care must be taken that the seal does not twist and is not pinched or damaged.

This document is not subject to change service!



Snap the cover cap (1) into the recess of the female locking device unit (3) and consider the polarization.



Cover cap on end position

end position (locked)

Do not damage the cover cap (1) or the seal (2) during assembly. If the cover cap is in end position the locking hooks on both sides must be about straight on the female locking device unit. They are not allowed to stay in a deflected position. They must be within the dimension L14 = max. 25 mm

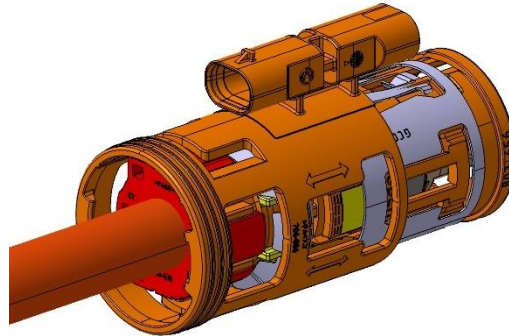
If the 90° angled cap is used, the process steps of the cover cap (1) are omitted.

This document is not subject to change service!

## 6 Processing steps (Rotative orientation)

### 6.1 Positioning of the CPA Housing

The female locking device unit must be assembled power assisted, and in the correct position.



For the positioning and the assembling process of the female locking device unit onto the wire unit, the assembling device (Hand device) of the company “WKM” can be used.

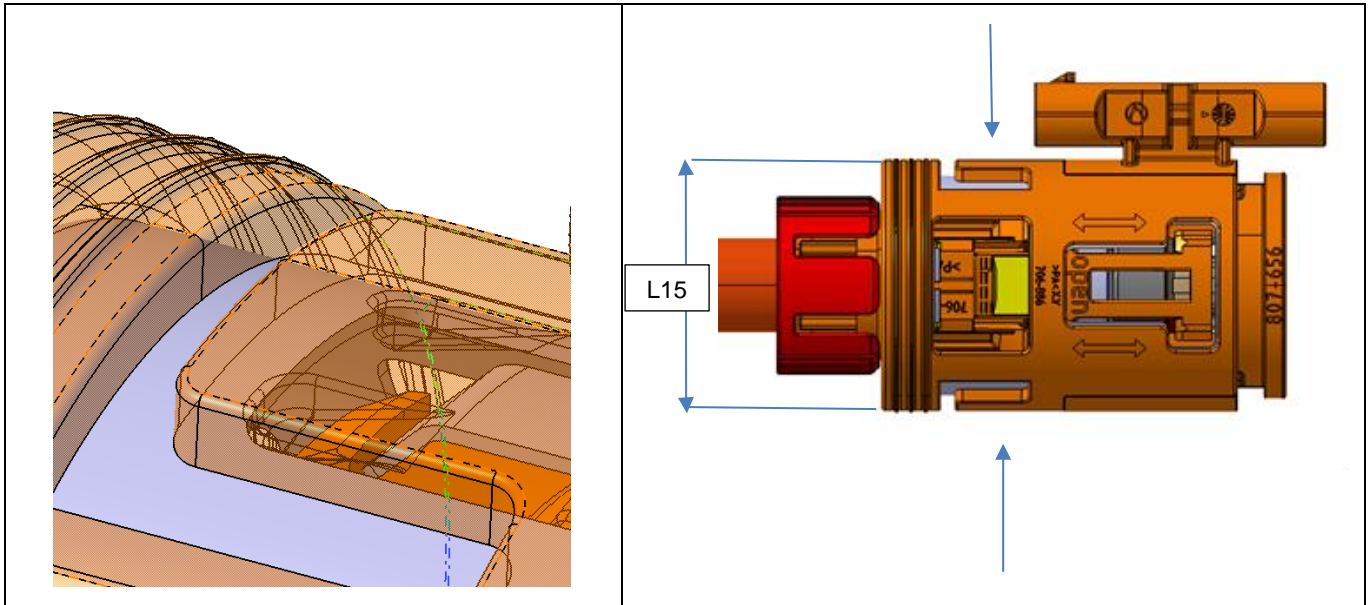
Name of the device: Assembly device horizontal positioning assembly group  
Article number: 197079

Based on the processing guidelines of Hirschmann Automotive, the device was designed and produced. The details of the commissioning, handling and the process guideline of the device can be requested directly at the supplier: Each manufacturer is responsible of the commissioning of the pressing device.

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

The commissioning of the pressing device must be done through the manufacturer. The manufacturer is at liberty to use a pressing device of his choice. The assembling process must meet the assembling data which are specified on the following pages.

This document is not subject to change service!



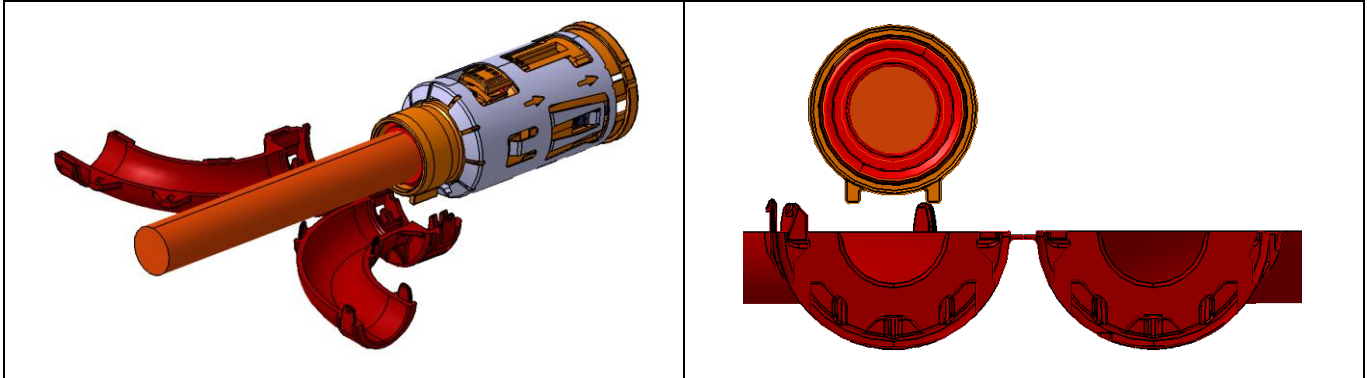
If the CPA Housing is in end position at least one of the locking hooks must about straight on the female locking device unit. They are not allowed to stay in a deflected position. They must be within the dimension L15 = max. 35.0 mm. Under certain circumstances (Tolerances) it needed to press on the locking hooks by hand.

Each manufacturer is free to carry out this work step in an earlier point in production. Appropriate actions for handling the component and the influence on the equipment of previous work steps must be considered.

## 7 Processing steps (optional parts)

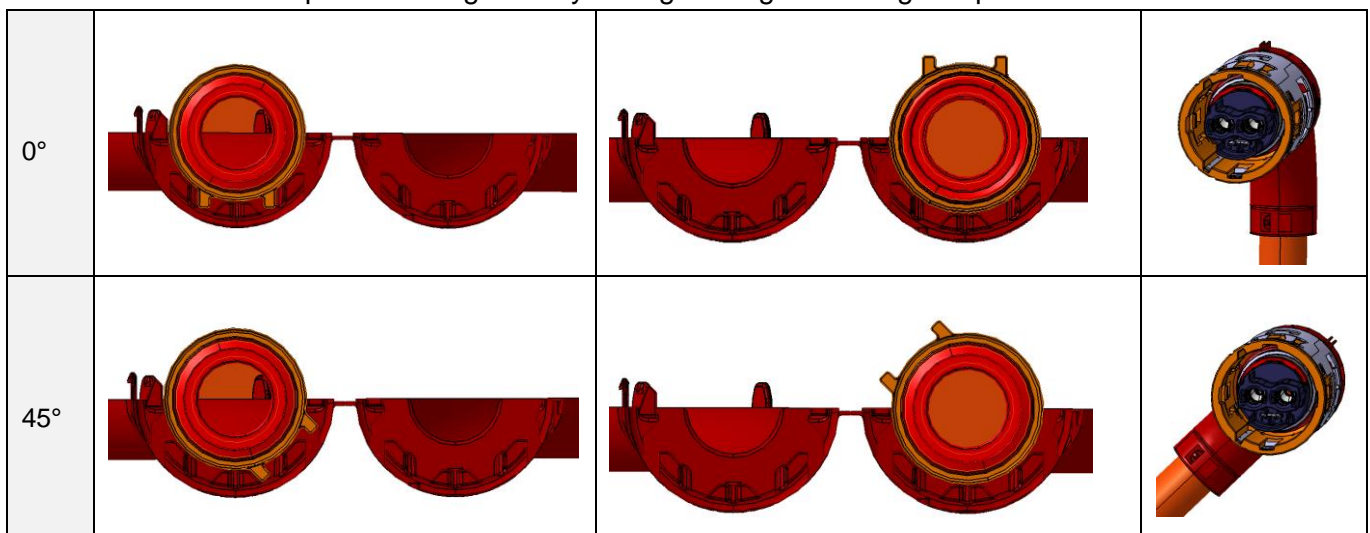
### 7.1 Assemble 90° angled cap

This process steps are only necessary if the 90° angled cap is used instead of the cover cap.



The orientation of the wire direction will be fixed with the polarization geometry of the connector housing. The wire direction of the angle cap is conceived to be set in 45° angles during the assembling process. The polarization geometry should be placed in one side of the half-shell to get a pre orientation. (left side) It is possible to place the connector into the angle cap without pre orientation (right side) but be aware during closing that the polarization geometry finds the correct position.

The position -90° can only be placed in one side, because on the other side there will be a collision of the half-shells with the polarization geometry during closing of the angle cap.



This document is not subject to change service!

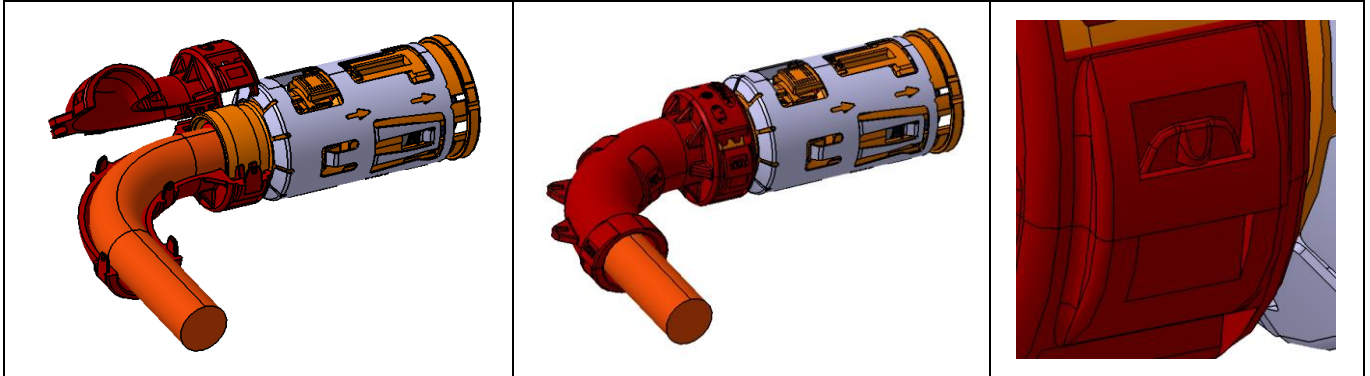


90°			
135°			
180°			
-135°			
-90°			
-45°			

This document is not subject to change service!



Bend the wire for 90° and insert it into the half-shell of the angled cap.



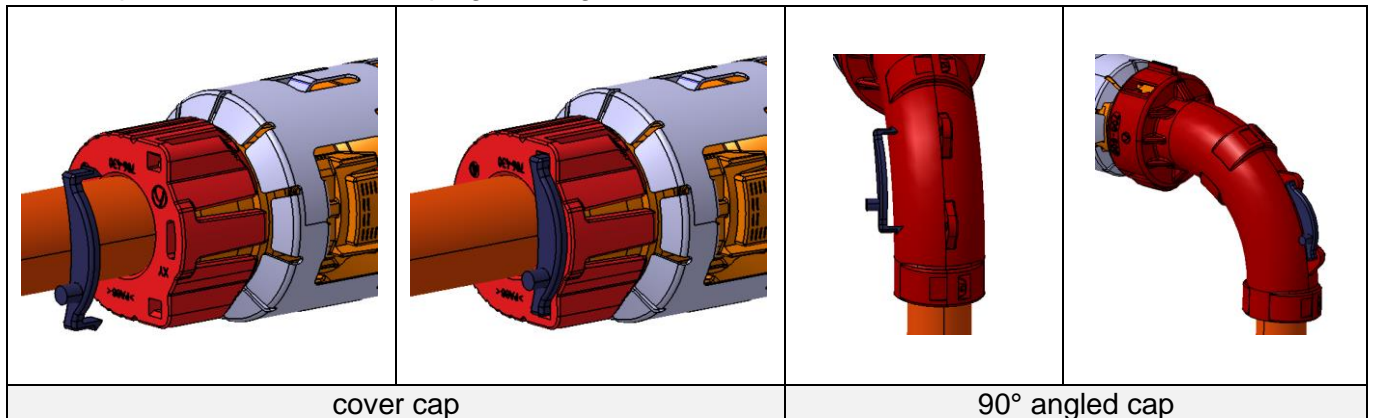
During closing the angled cap, make sure the wire insulation material doesn't get damaged. Take care that only the multi core cable is allowed under the angled cap. No Tape, protective tube, or other additional parts is allowed. All five latching hooks must be locked. Once the angled cap is closed, it is not possible to change the angle anymore.

This document is not subject to change service!



## 7.2 Assemble coding clip

If the customer is requesting an additional coding identification, a coding clip can be assembled onto the cover cap or the 90° angled cap. The coding clip has the same colour as the contact holder and is used for a simpler identification of the plugs coding.



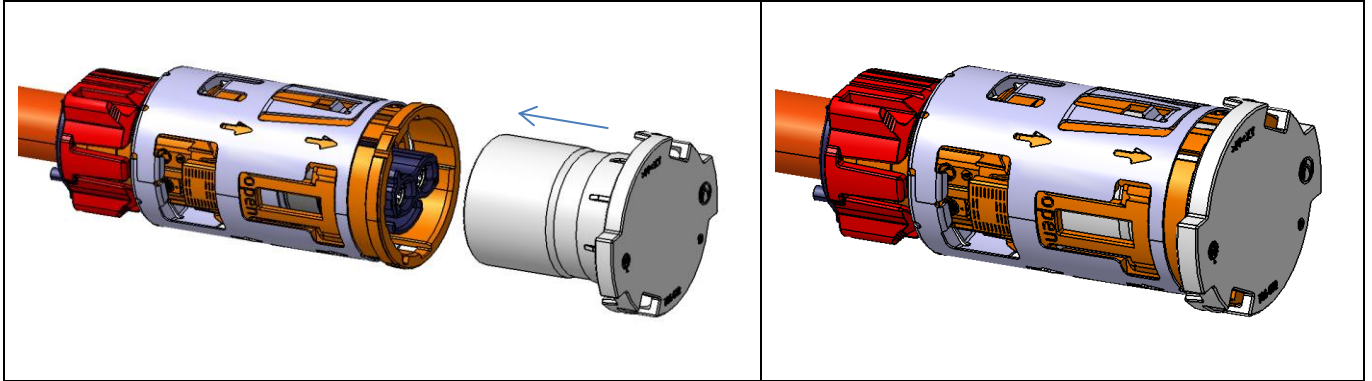
Ensure that the coding / color of the coding clip matches the coding / color of the built-in contact carrier. Therefore bars are attached to the coding clip according to a binary code which can be checked mechanically.

The design of the bars can be found in the individual drawing of the coding clip.

This document is not subject to change service!

## 7.3 Assemble transport protection cap

If the customer is requesting an additional transport protection of the connector interface, a transport protection cap can be assembled onto the connector housing.



Insert the transport protection cap until both locking elements snap over the front collar of the connector housing. It is possible to turn the transport protection cap 360° during and after the assembling.

## 7.4 Stacking of produced harnesses

For an orderly and controlled stacking of the harnesses to quantitatively free defined bundles.

This document is not subject to change service!

## 8 Technical information

### 8.1 General requirements

Damage on the single components is not allowed during the whole production process.

### 8.2 Technical cleanliness

In general, pay attention to the cleanliness on the connector and inside of the connector. Metallic particles generated during the assembly process, must be removed with a suitable device. Inside the connector and on the connector, there are no metallic particles > 1,000 µm allowed.

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

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

BMW-specific requirements according to QV11111 for assembled connector can be seen in the following table. The surface information can be found in the customer drawings.

Technical cleanliness acc. to QV11111			
HV system (assembled final product without cable)			
Requirement class (t.b.d. -> BMW manufacturer)			
Reference size A (1,000 cm <sup>2</sup> )			
Number of allowable particles by length size class			
		NOT shiny metallic	Shiny metallic
G	150 - 200 µm	-	-
H	200- 400 µm	1,200	1,200
I	400 – 600 µm	130	130
J	600 – 1,000 µm	60	15
K	1,000 – 1,500 µm	4	-

It is also important to protect the component from further contamination during transport. Appropriate packaging must be provided. A protective cap is available from Hirschmann Automotive as an Option.

This document is not subject to change service!



## 8.3 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 GmbH. Each manufacturer is responsible of the commissioning 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)

Concept of automation HPS40-2

This document is not subject to change service!



## 9 Change of documentation

Version	Description	Change date	Editor
1	First edition	08/ 2015	Breuss L.
2	Update made for the serial design	03/ 2016	Breuss L.
3	English version added	09/ 2016	Shaw S.
4	Update shield pressing and measuring devices	04/ 2017	Breuss L.
5	Correct number of Kroschu cable	05/ 2017	Breuss L.
6	Added Kroschu cable typ	09/ 2017	Breuss L.
7	Dimension d and g corrected	11/ 2017	Breuss L.
8	90° angled cap and transport protection cap added	03/ 2018	Breuss L.
9	Connector Rotation angle added and locking of cover cap specified	11/ 2018	Breuss L.
10	In-Line version added & savety ring specified	02/ 2019	Bas Ü.
11	In-Line Version reorganized, Product version specified precisely,	06/ 2019	Bas Ü.
12	Angled cap and torsion specified	03/ 2020	Breuss L.
13	Added Coficab cable typ	05/ 2020	Breuss L.
14	added stress relief with rotative orientation= <b>not approved</b>	05/ 2020	Shaw S.
15	rotative orientation specified precisely, general comments adapted= <b>not approved</b>	01/ 2021	Bas Ü.
16	Comments and part usage for rotative orientation adapted= <b>not approved</b>	04/ 2021	Bas Ü.
17	chapter 2.3/4.7/5.7: NBKBE wire added; chapter 3.1: NBKBE wire added; production location of validated wires added; chapter 3.8: Female locking device unit OEM specific HA part number added, 807-652-502 removed; chapter 4.4/5.4: definition of foil overlap adapted/added; chapter 4.5/5.5: Dimension L4 - addition "measurement in straightened length" added; chapter 4.9.1/5.10.1: Dimension L10 – addition/definition as tool related dimension; chapter 4.9.2/5.10.2: Dimension L11 - addition/definition as tool related dimension; chapter 4.9.2/5.10.2: controll measurement of the embossing height g - max. thickness of the measuring blades changed to 0,3mm;	02/ 2022	Kleiner T.

This document is not subject to change service!



18	Chapter 4.5 / 5.5: added dimension L4.1 Chapter 4.6 / 5.6: dimension L6 as info-dimension in brackets Chapter 4.7 / 5.7 : added dimension L5.1 Chapter 4.9 / 5.9 : dimension L9 as info-dimension in brackets	03/ 2022	Campehl F.
19	H+S wire added Hot annealed Shield Sleeve for H+S wire added Chapter 4.9.2 Crimping of the shielding by two half-shells for H+S wire added Chapter 5.10.2 Crimping of the shielding by two half-shells for H+S wire added Coficab wire added	06/ 2022	Feldhofer V.
20	Chapter: 5.9.3: Stamping height g changed from 16.40±0.1mm to 16.50±0.1 for new applications. Additional text and picture "Risk of insulation failure" added. Chapter: 5.10.3: Stamping height g changed from 16.40±0.1mm to 16.50±0.1 for new applications. Additional text and picture "Risk of insulation failure" added.	09/ 2022	Kleiner T.
21	Chapter Customer releases added; Changed cleanliness requirement and added BMW specific requirement based on surface reference; BMW Number and special characteristics added;	10/ 2022	Breuss L.
22	Coficab FHLR91X91XCB91X T3 cable added (not validated yet) Dimension L5.1 adapted to 41.3 mm or for rotative alignment to 39.3 mm Page reference to dimension table adapted on page 38,42,64,67,120,124,146 and 180 150 Dimension L9 adapted from 56 mm to 58.5 mm on page 34,60,117 and 143	12/ 2022	Natter T.
23	Update Design Specification	06/ 2023	Jussel E-M.
24	Adjusting data of the bottom line	07/ 2023	Jussel E-M.
25	Additional validation with Coficab China of wire FHLR2G2GCB2G 600/1000V T180	08/ 2023	Jussel E-M.
26	Data on page 4,47,49,57,60,62,75,84	08/ 2023	Jussel E-M.
27	Topic 1.2: adjusted with additional "Miscellaneous" Page 72: update layout, picture, additional statement	10/ 2023	Jussel E-M.
28	Topic 1.3 + 2.1.: additional wire for supplier Aptiv	03/ 2024	Jussel E-M.
29	Page 4) Change of L from length to legal Topic 1.3 + 2.1 updated with comment "under development"	04/ 2024	Jussel E-M.

This document is not subject to change service!