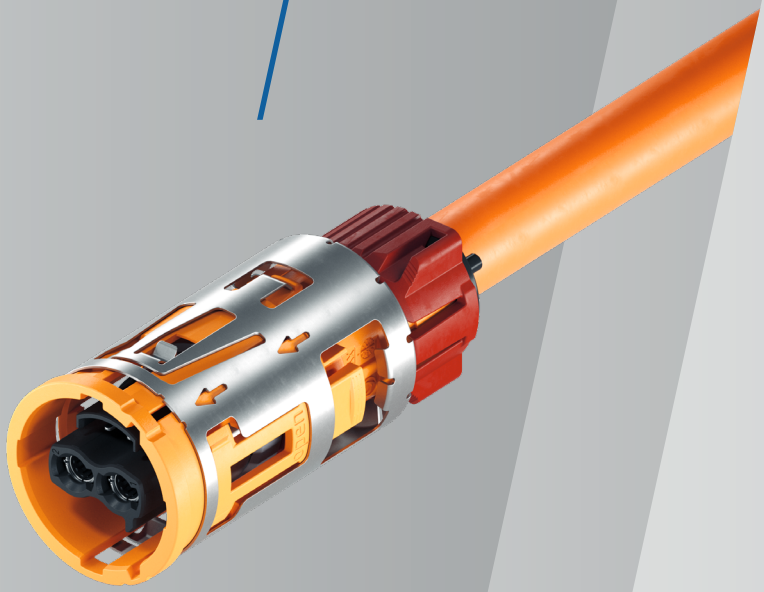


PROCESS SPECIFICATION

HPS40-2 2+2
Female Connector MCC

EVS-100096

HIRSCHMANN
AUTOMOTIVE

TABLE

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 mm² 4.0 mm² 6.0 mm²
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.

1.1.1. 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.

1.1.2. Customer: BMW

Customer: BMW BMW-Number.: 5 A88 290				NAEL: N OU53 B – October 2022	
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

1.3 Other current documents

A	HCT4 Process specification (Ag)	EVS-100068
B	Data sheet 2x 2.5 mm² shielded cable (T180) of Kroschu	Kroschu No. 64996918
C	Data sheet 2x 4.0 mm² shielded cable (T180) of Kroschu	Kroschu No. 64997293
D	Data sheet 2x 6.0 mm² shielded cable (T180) of Kroschu	Kroschu No. 64995979 Kroschu No. 64997213
E	Data sheet 2x 2.5 mm² shielded cable of Coroplast	Coroplast No.: 9-2641 (2x 2.5 mm²)
F	Data sheet 2x 4.0 mm² shielded cable of Coroplast	Coroplast No.: 9-2641 (2x 4.0 mm²)
G	Data sheet 2x 6.0 mm² shielded cable of Coroplast	Coroplast No.: 9-2641 (2x 6.0 mm²)
H	Data sheet 2x 2.5 mm² shielded cable of Leoni	Leoni No.: FHLR2G2GCB2G 00001
I	Data sheet 2x 4.0 mm² shielded cable of Leoni	Leoni No.: FHLR2G2GCB2G 00002
J	Data sheet 2x 6.0 mm² shielded cable of Leoni	Leoni No.: FHLR2G2GCB2G 00003
K	Data sheet 2x 2.5 mm² shielded cable of Coficab	Coficab No.: LGCBG225H
L	Data sheet 2x 4.0 mm² shielded cable of Coficab	Coficab No.: LGCBG240H
M	Data sheet 2x 6.0 mm² shielded cable of Coficab	Coficab No.: LGCBG260H
N	Data sheet 2x 6.0 mm² shielded cable of NBKBE	NBKBE No.: 818-00011 (2x 6.0 mm²)
O	Data sheet 2x 4.0 mm² shielded cable of NBKBE	NBKBE No.: 818-00001 (2x 4.0 mm²)
P	Data sheet 2x 6.0 mm² Radox shielded cable from H+S	H+S No.: 12584915
Q	Data sheet 2x 4.0 mm² shielded cable from Coficab	Coficab No.: V4XXCBX240Hxx
R	Data sheet 2x 4.0 mm² shielded cable from Coficab (not validated yet)	Coficab No.: H3XXCBX240Hxx
S	Data sheet 2x 6.0 mm² shielded cable from Coficab (not validated yet)	Coficab No.: H3XXCBX260Hxx
T	Data sheet 2x 4.0 mm² shielded cable from Aptiv (under development)	Aptiv No.:M9098 (Data sheet no. M90982212 Rev. A)

U	Data sheet 2x 4.0 mm² Radox shielded cable of H+S	H+S Nr.: 12582308
V	Data sheet 2x 4.0 mm² Radox shielded cable of H+S	H+S Nr.: 85149176
W	Data sheet 2x 6.0 mm² shielded cable from Aptiv	Aptiv No.:M9098 (Data sheet no. M90982310 Rev. B)

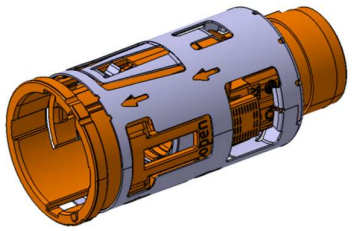
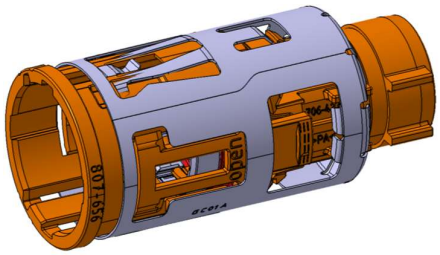
2 Product structure (singe components)

2.1 Sheated cable (see table)

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

Wire manufacturer	Wire cross section		
	2.5 mm²	4.0 mm²	6.0 mm²
Coficab	FHLR2G2GCB2G 600/1000V T180		
	Supplier production site: Portugal, 6300 Guarda		Supplier production site: Portugal, 6300 Guarda China, 301800 Tianjin
	LGCBG225	LGCBG240	LGCBG260
	FHLR91X91XCB91X T4 Supplier production site: Tunisia, 1004 Tunis		
	-	V4XXCBX240Hxx	-
	FHLR91X91XCB91X T3 (not validated yet) Supplier production site: t.b.d.		
	-	H3XXCBX240Hxx	H3XXCBX260Hxx
Kroschu	FHLR2G2GCB2G 600/1000V T180 Supplier production site: Germany, 46414 Rhede		
	64996918	64997293	64995979 64997213
Leoni	FHLR2G2GCB2G 600/900V T180 Supplier production site: Italy, 29010 Monticelli		
	00001	00002	00003
Coroplast	FHLR2G2GCB2G 600/1000V T180 Supplier production site: Germany, 42279 Wuppertal		
	9-2641 2x 2.5 mm²	9-2641 2x 4.0 mm²	9-2641 2x 6.0 mm²
NBKBE	FHLR2G2GCB2G 600/1000V T180 Supplier production site: China		
	-	818-00001 (2x 4.0 mm²)	818-00011 (2x 6.0 mmm²)-
H + S	FHLR91XC13X-2x6 T150 Supplier production site: Switzerland, 8330 Pfäffikon		
	-	-	12584915
	FHLR91XC13X-2x4 T150 Supplier production site: Switzerland, 9100 Herisau		
	-	12582308, 85149176	-
Aptiv	FHLR91X91XC91X-B -40°C / +150°C Supplier production site: t.b.d.		
	-	M9098 (under development)	M9098

2.2 HPS40-2 2+2 locking sleeve

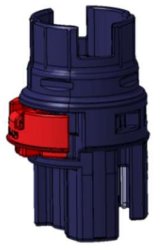
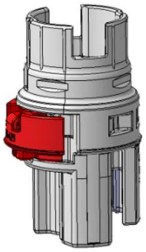
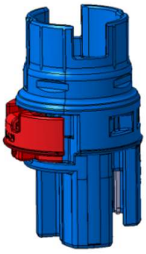
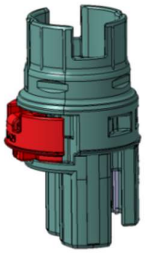
	
-501	-511/ -521

Hirschmann Automotive No.	Wire cross section
807-656-521	2.5 mm²
807-656-511	4.0 mm²
807-656-501	6.0 mm²

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.

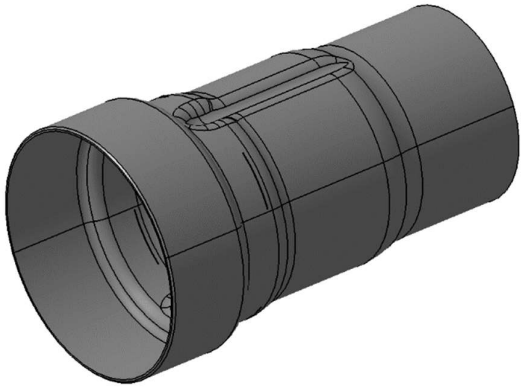
2.3 HPS40-2 2+2 female contact carrier

				
-501/-508 (Cod. A)	-502/-509 (Cod. B)	-503/-510 (Cod. C)	-504/-511 (Cod. D)	-507/-514 (Cod. Z)

Hirschmann Automotive No.	Coding	Colour	HVIL bridge	Wire cross section
807-657-501	A	Black	Yes	2.5 mm² 4.0 mm² 6.0 mm²
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.

2.4 HPS40-2 2+2 shielding sleeve

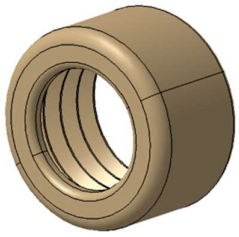
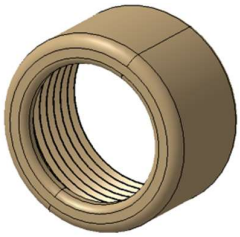
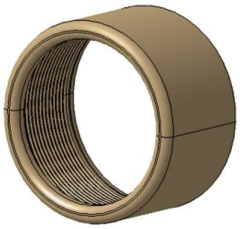
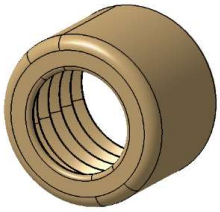
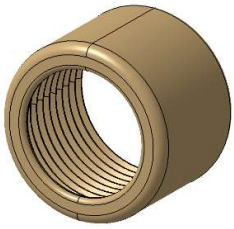


-504/ -514

Hirschmann Automotive No.	Wire cross section
709-840-504	2.5 mm² 4.0 mm² 6.0 mm²
709-840-514 (hot annealed)	2.5 mm² 4.0 mm² 6.0 mm²

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

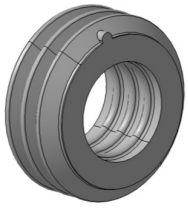
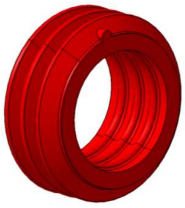
2.5 HPS40-2 2+2 stress relief

		
-501 (2.5 mm²)	-502 (4.0 mm²)	-503 (6.0 mm²)
		
-511 (2.5 mm² extended)	-512 (4.0 mm² extended)	-513 (6.0 mm² extended)
		
-522 (4.0 mm²)		

Hirschmann Automotive No.	Wire cross section
709-841-501	2.5 mm²
709-841-502	4.0 mm²
709-841-503	6.0 mm²
709-841-511	2.5 mm²
709-841-512	4.0 mm²
709-841-513	6.0 mm²
709-841-522	4.0 mm²

Wire manufacturer: On the product drawing (HA No. 807-655-…xx), you can find the released cables for each stress relief. The PN 709-841-522 is only available for H&S wire harenss 4.0 mm².
Delivery condition: The stress reliefs are delivered as bulk good.

2.6 HPS40-2 2+2 wire seal

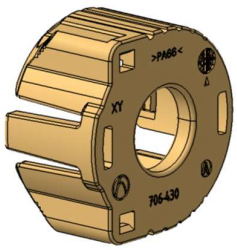
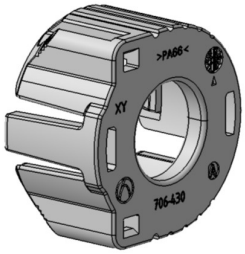
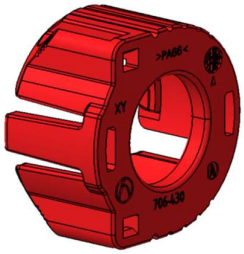
		
-504 (2.5 mm²)	-505 (4.0 mm²)	-506 (6.0 mm²)
		
-522 (4.0 mm²)		

Hirschmann Automotive No.	Colour	Wire cross section
709-113-504	Beige	2.5 mm²
709-113-505	Grey	4.0 mm²
709-113-506	Red	6.0 mm²
709-113-522	Purple	4.0 mm²

Wire manufacturer: On the product drawing (HA No. 807-655-…XX), you can find the released cables for each seal. The PN 709-113-522 is only available for H&S wire harenss 4.0 mm².

Delivery condition: The seals are delivered as bulk good

2.7 HPS40-2 2+2 cover cap

		
-501 (2.5 mm²)	-502 (4.0 mm²)	-503 (6.0 mm²)

Hirschmann Automotive No.	Colour	Wier cross section
706-430-501	Beige	2.5 mm²
706-430-502	Grey	4.0 mm²
706-430-503	Red	6.0 mm²

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.

2.8 HCT4 2+2 female terminal

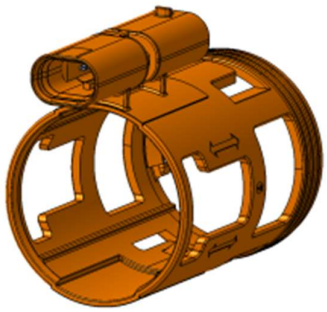
		
-502 (1.5 – 2.5 mm²)	-504 (4.0 mm²)	-505 (6.0 mm²)

Hirschmann Automotive No.	Wire cross section
709-427-502	1.5 – 2.5 mm²
709-427-504	4.0 mm²
709-427-505	6.0 mm²

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

3 Product structure (optional parts)

3.1 HPS40-2 2+2 CPA housing



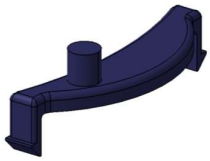
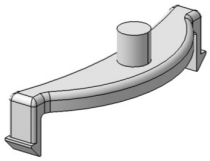
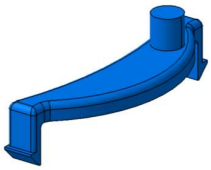
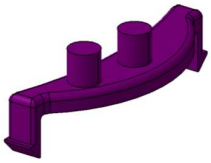
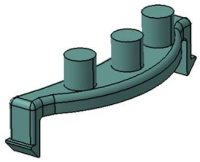
-501

Hirschmann Automotive No.	Wire cross section
810-287-501	2.5 mm² 4.0 mm² 6.0 mm²

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

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

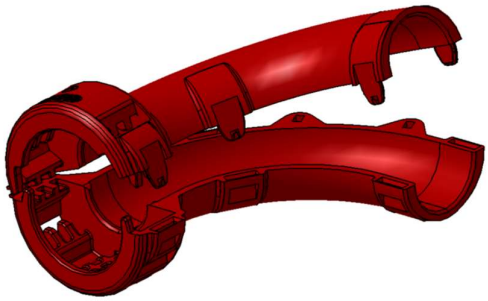
3.2 HPS40-2 2+2 coding clip

				
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 mm² 4.0 mm² 6.0 mm²
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.

3.3 HPS40-2 2+2 90° angle cap

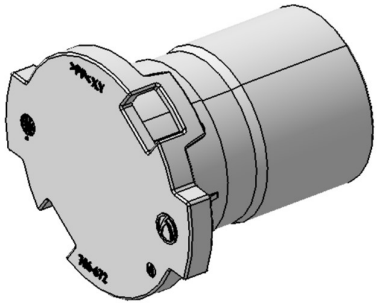


Hirschmann Automotive No.	Wire cross section
706-506-503	2.5 mm² 4.0 mm² 6.0 mm²

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.

3.4 HPS40-2 2+2 protection cap



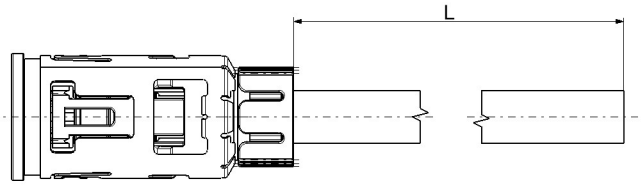
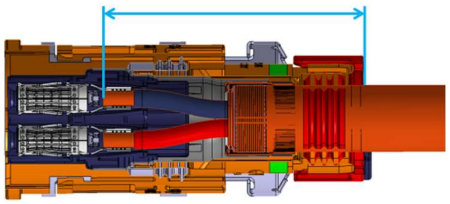
Hirschmann Automotive No.	706-672-501

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 mm²/ 4.0 mm² and 6.0 mm². As a reference sample, a terminal holder coding A and a 6.0 mm² wire was used.

4.1 Cut the shielded cable

	+ wire add-on
	

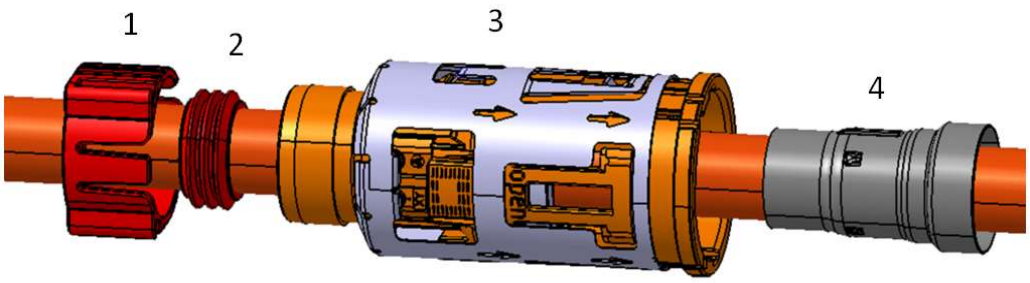
Add following lengths for the HPS40-2 2+2 female connector:

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 mm²	L + 50	L + 54	L + 112	L + 116
4.0 mm²	L + 50	L + 54	L + 112	L + 116
6.0 mm²	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.

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.

1	2	3	4
			

4.3 Strip off the shielded cable

Stripping length:

Wire cross section	Dimension L1 after zero-cut (mm)
2.5 mm²	23.5 ± 1
4.0 mm²	23.5 ± 1
6.0 mm²	23.5 ± 1

The dimension L1 should not be less than 23.5 mm for further processing. In the case of a deviating or longer design, a zero cut, as described in chapter 4.1, must be made before attaching the HCT4 contacts (see chapter 4.6) to maintain dimension L5. The braided shield must not be damaged during processing.

4.4 Wire processing I

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

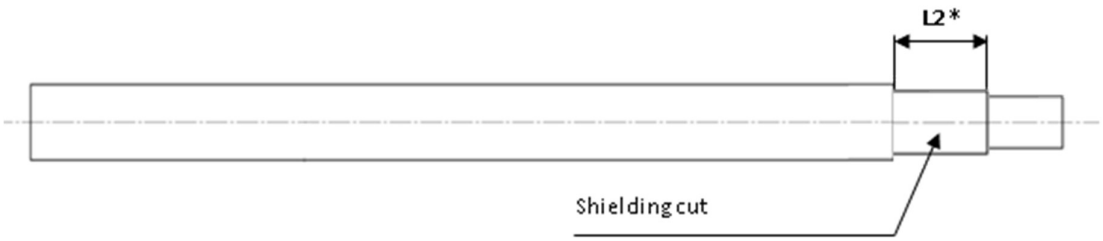


The following process steps must be done, but the manufacturer can choose the sequence:

- 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.

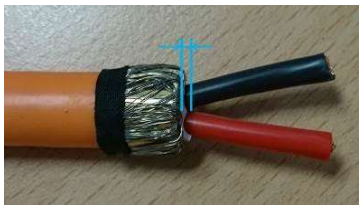
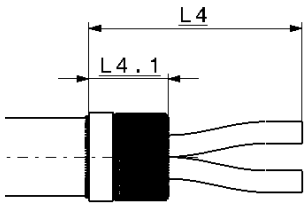
After cutting the shielding, there are no wire residues or parts of the shielding allowed on the cable. This must be ensured with some actions like the following:

- 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%.

4.5 Wire processing II

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

		
	Max. L3 = 3.0 mm	

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. The shielding should be under the fixing tape. NO shield strands are allowed outside the max position of the tape (L4 / L4.1)

The max. position of the tape is showed with the dimension L4 or L4.1.

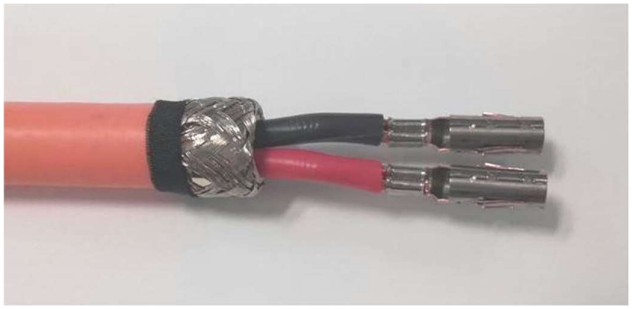
L4 = max. 37.5 mm after zero-cut (measurement in straightened length)
= max. 41.5 mm incl. zero-cut (measurement in straightened length)

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 Ø 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.

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:

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

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:

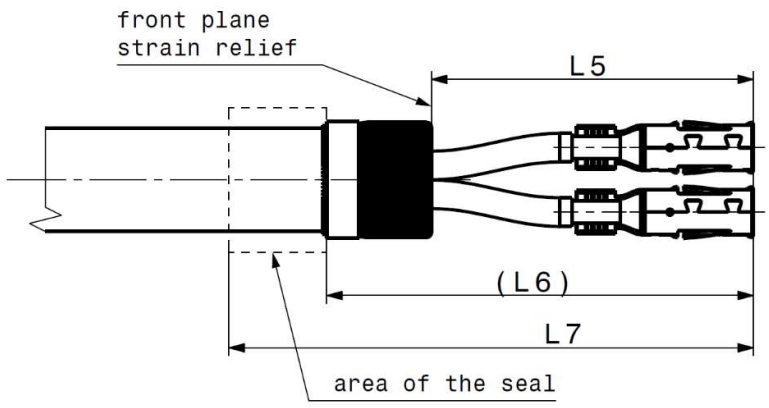
Schäfer Werkzeug- und Sondermaschinenbau GmbH
Dr.-Alfred-Weckesser-Str. 6
76669 Bad Schoenborn-La, Deutschland
Tel: +49 7253 9421-0
Fax: +49 7253 9421-94
www.schaefer.biz

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.

- **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.



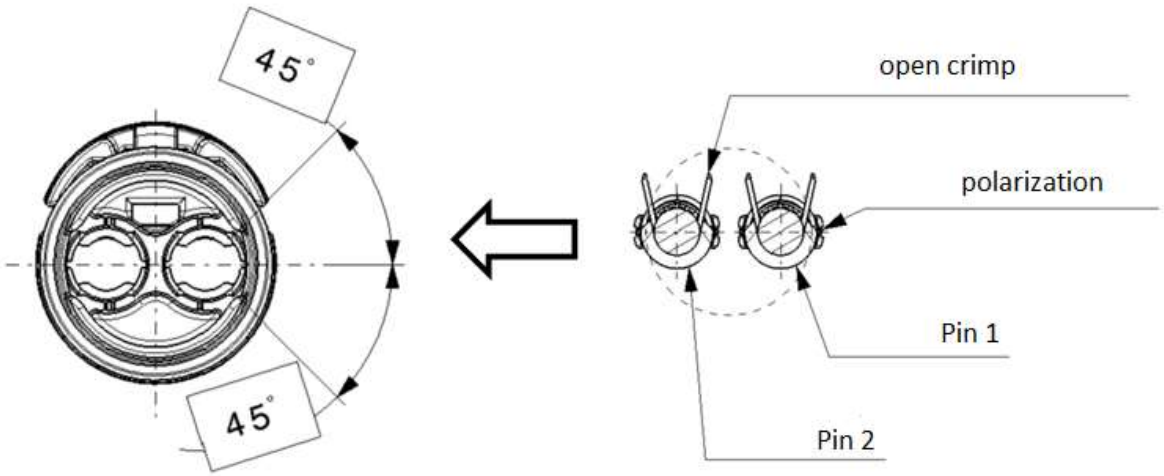
L5 = 40.1 ±1
L6 = 54.5 +0.2/ -1.5
L7 = max. 67.0

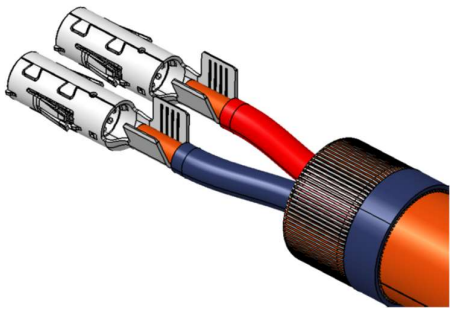
The dimension L5 is decisive for the position of strain relief. As alternative to L5 it is allowed to prove dimension 5.1, but one of the two combinations from L4.1 and L5.1 or L4 and L5 must be chosen. L6 is only for information and is built from L4.1 and L5. The dimensions are caused from L1, L4 and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

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

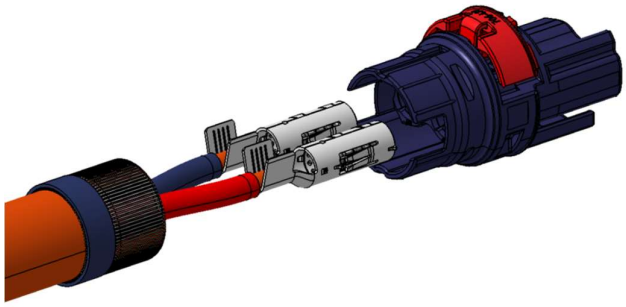




To do an orderly assembling / to ensure the primary locking and the secondary locking, the correct position of the terminals and the wire is very important and needs to be ensured. Usually, the horizontal version is intended.

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.

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.)

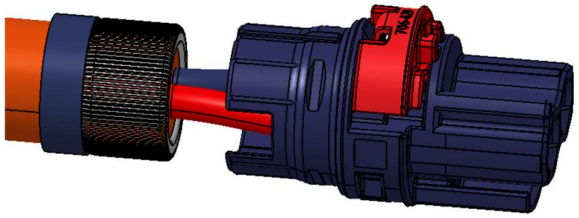
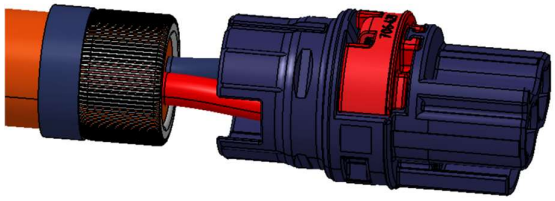
The mounting force of the female terminals into the contact holder must be proven if the crimping machine of the company “Schaefer” is not used or if the terminals are mounted fully automated inside the contact holder.

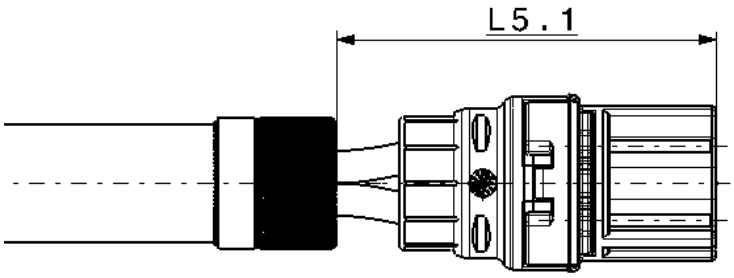
Wire manufacturer	Wire cross section		
	2.5 mm²	4.0 mm²	6.0 mm²
Kroschu	FHLR2G2GCB2G 600/1000V T180		
	64996918	64997293	64995979 64997213
	24 N	30 N	36 N
Leoni	FHLR2G2GCB2G 600/900V T180		
	00001	00002	00003
	24 N	30 N	36 N
Coroplast	FHLR2G2GCB2G 600/1000V T180		
	9-2641 (2 x 2.5 mm²)	9-2641 (2 x 4.0 mm²)	9-2641 (2 x 6.0 mm²)
	24 N	30 N	36 N
NBKBE	FHLR2G2GCB2G 600/1000V T180		
	-	818-00001 (2x 4.0 mm²)	818-00011 (2 x 6.0 mm²)
	-	30 N	36 N
H+S	FHLR91XC13X-2x6 T150		
	-	-	12584915
	-	-	36 N
	FHLR91XC13X-2x4 T150		
	-	12582308, 85149176	-
	-	30 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

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.

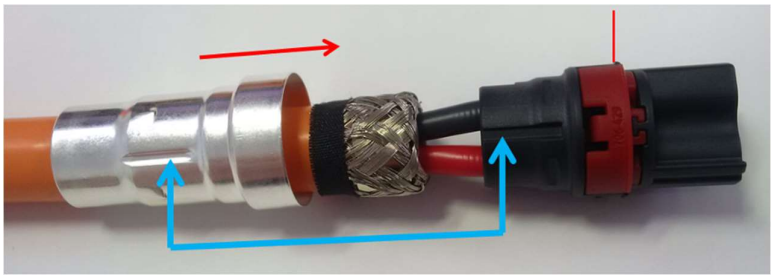
Secondary lock/ pre-locking/ HV terminals primary locked	Secondray lock end position
	

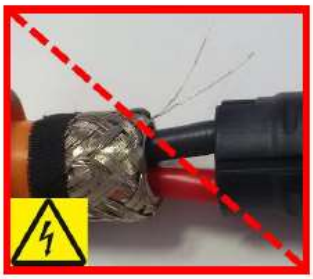


L5.1 = 41.3 ±1

It is allowed to prove L5.1 instead of L5.

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

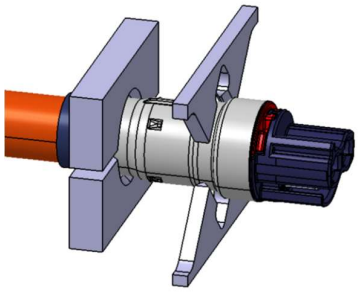
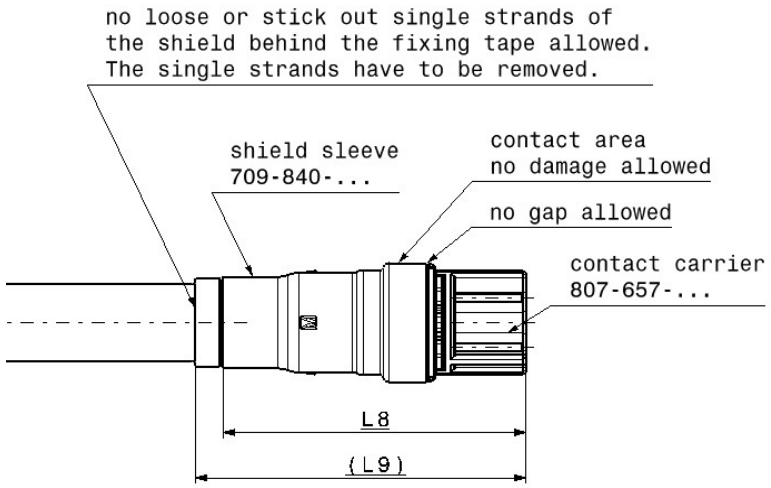
Based on the processing guidelines of Hirschmann Automotive, the device was designed and produced. The details of the commissioning, handling and the process guideline of the device can be requested directly at the supplier:

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

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

	1.Shield pressing (shielding sleeve, shielding, stress relief and wire) 2.Pressing of the contact holder (shielding sleeve and contact holder)
	L8 = 49.7 ± 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.

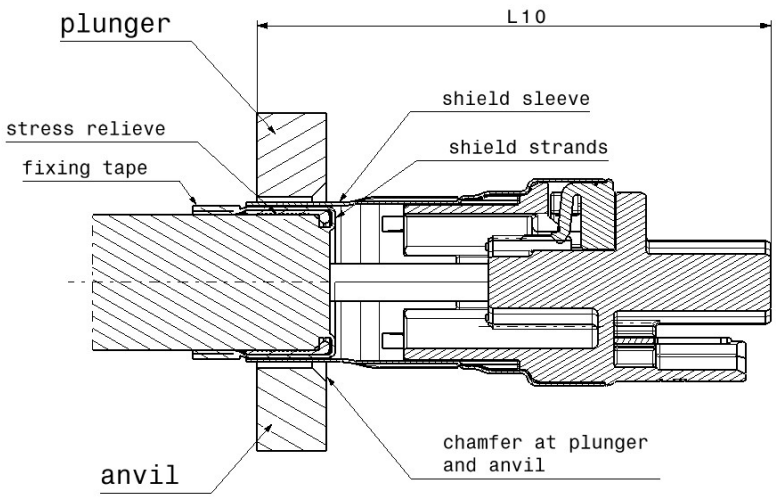
- Insulation of the wire
- Insulation of the single wires
- Stress relief
- Shield sleeve
- Shield strands of the wire

4.10.1 Shield pressing by two half-shells

- **Embossing position**

The exact geometry of the plunger and anvil is given. The position of the plunger and the anvil must be revered 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.

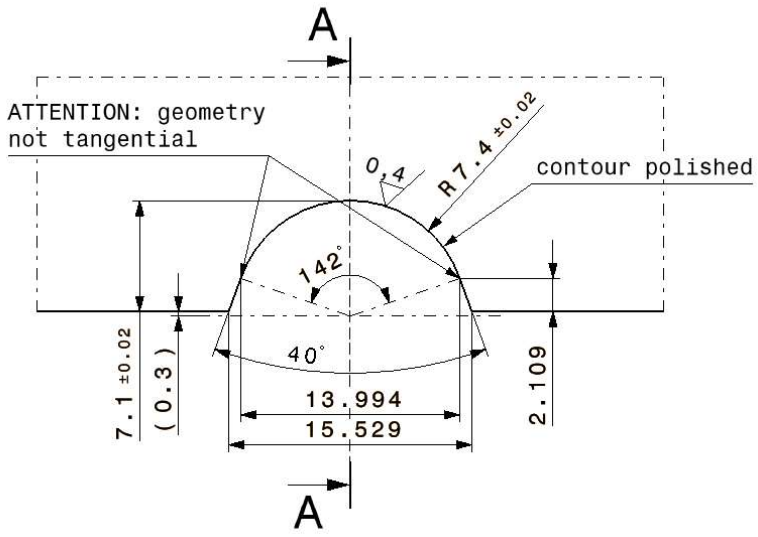


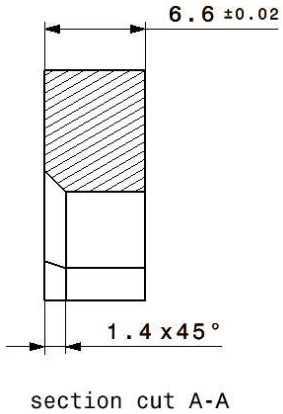
L10 = 48.7 ± 0.1

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

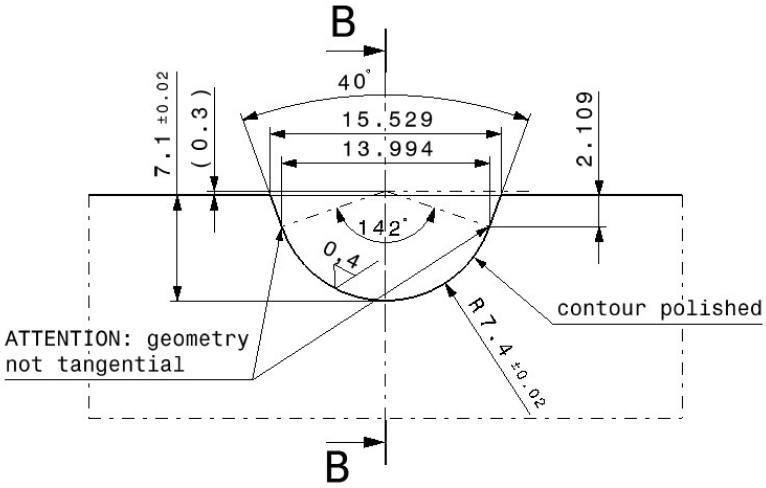
!! Not valid for H + S wire !!

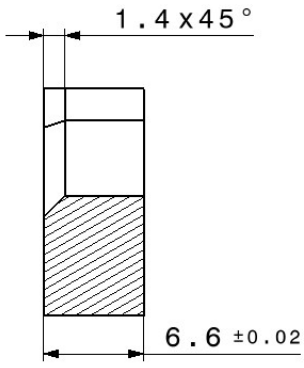
Plunger and anvil geometry of the wire shield pressing
Material: 1.2721 vacuum hardened 58hrc





Plunger and anvil geometry of the wire shield pressing
Material: 1.2721 vacuum hardened 58hrc

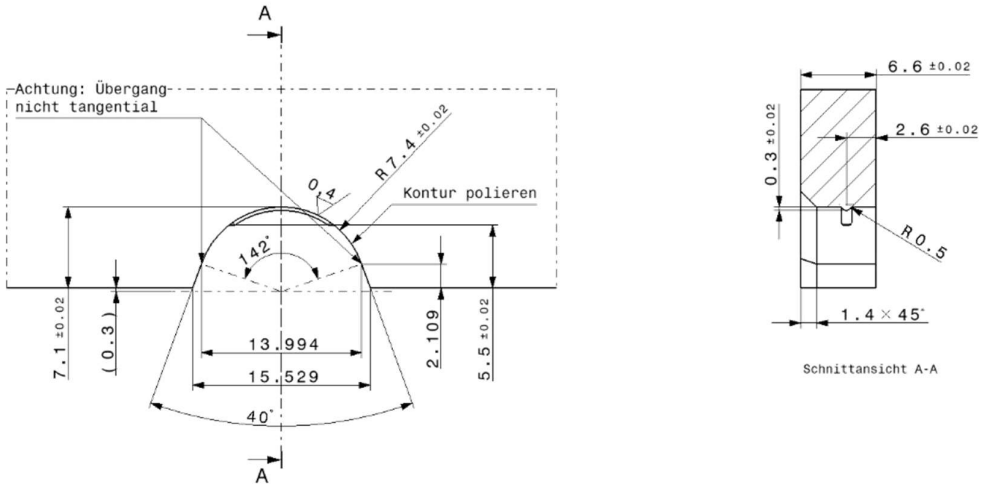




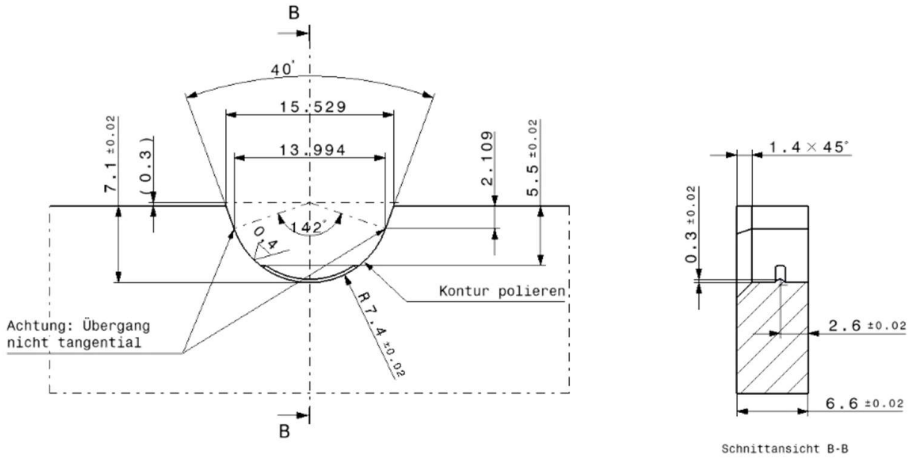
- **Plunger and anvil geometry of the wire shield pressing**

!! Valid for H+S wire 6.0 mm² !!

Plunger and anvil geometry of the wire shield pressing
Material: 1.2721 vacuum hardened 58hrc



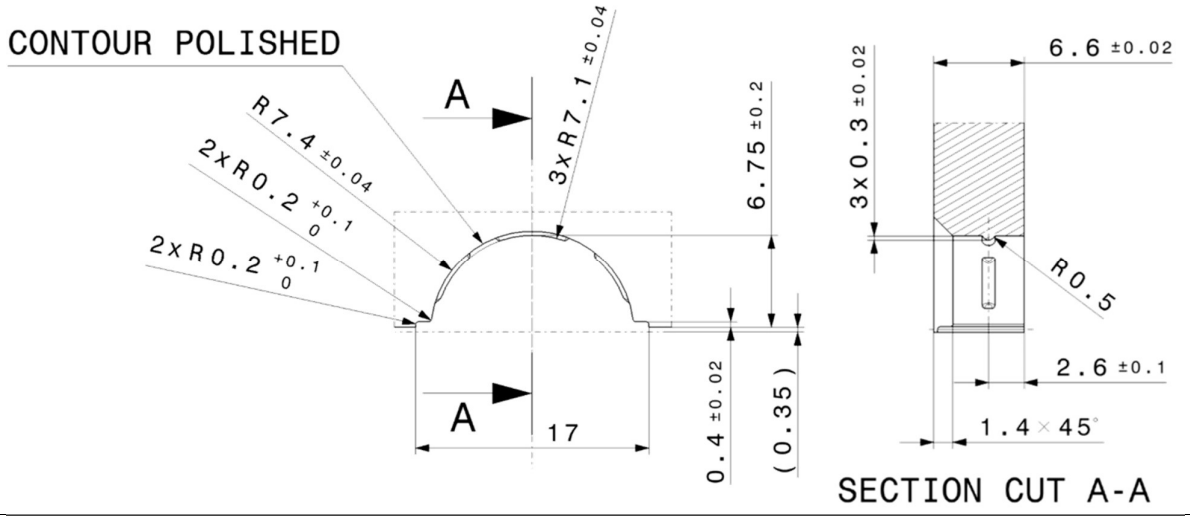
Plunger and anvil geometry of the wire shield pressing
Material: 1.2721 vacuum hardened 58hrc



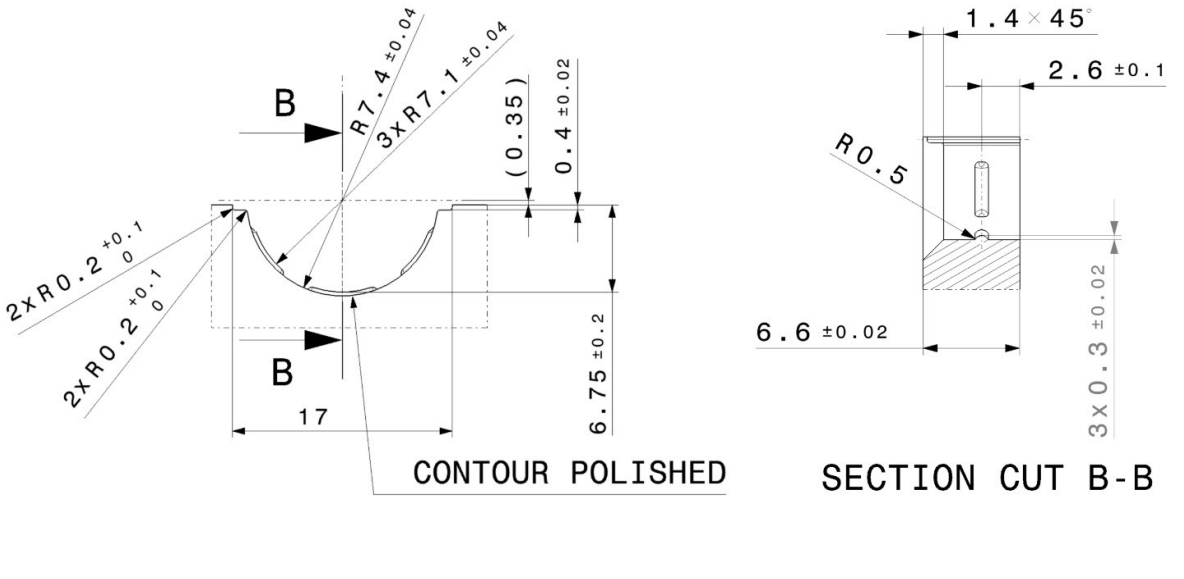
- **Plunger and anvil geometry of the wire shield pressing**

!! Valid for H+S wire 4.0 mm² !!

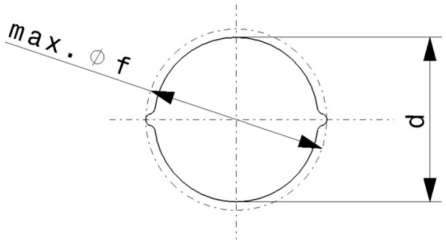
Plunger and anvil geometry of the wire shield pressing
Material: 1.2721 vacuum hardened 58hrc



Plunger and anvil geometry of the wire shield pressing
Material: 1.2721 vacuum hardened 58hrc



- **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.

Measurement "d" in mm		
2.5 mm²	**4.0 mm²**	**6.0 mm²**
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 **Ø 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 "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.

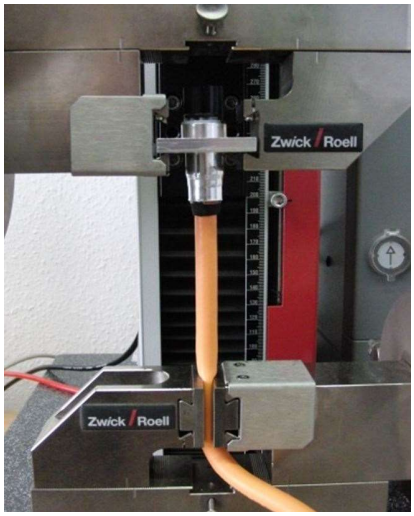
The measuring of the embossing height must be done with a suitable measuring device.
(Micrometer, measuring range: 0-25 mm)

- **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.

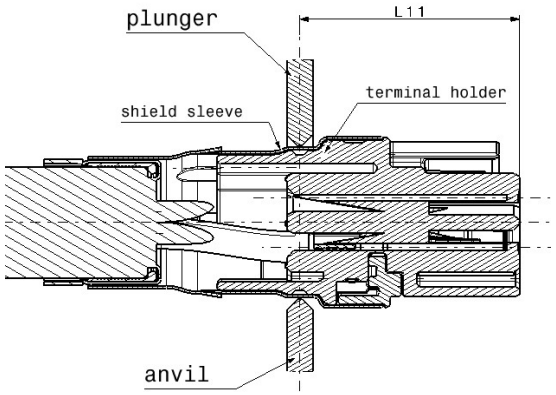
HCT4 terminals must not be installed in the test specimens, to test the shield pressing only. In this state, the figure in the table must be reached.

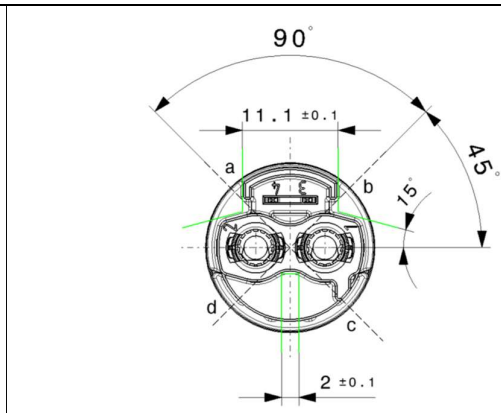


Wire cross section	Pulling force
2.5 mm²	≥ 120 N
4.0 mm²	≥ 120 N
6.0 mm²	≥ 120 N

4.10.2 Pressing contact carrier

- **Embossing position**





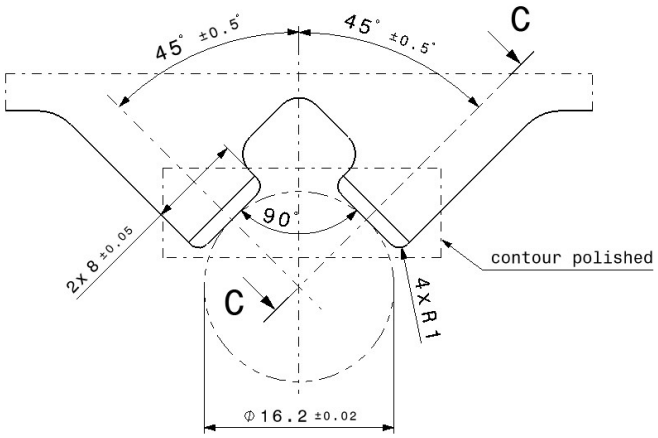
L11 = 25.3 ± 0.1

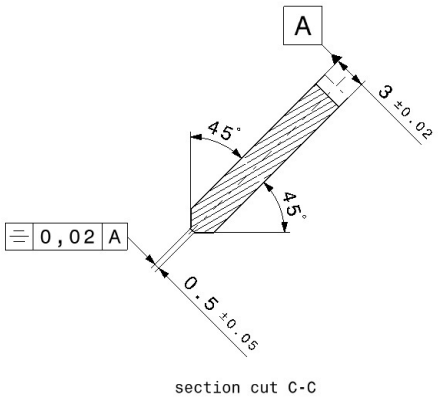
The dimension L11 describes the position of the pressing. The dimension L11 is considered as tool dimension and must be ensured in the tool. The position of the plunger and the anvil must be aligned in relation to the front plane of the terminal holder. The four embossing positions (a-d) must be aligned in relation to the terminal holder. Therefor 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.

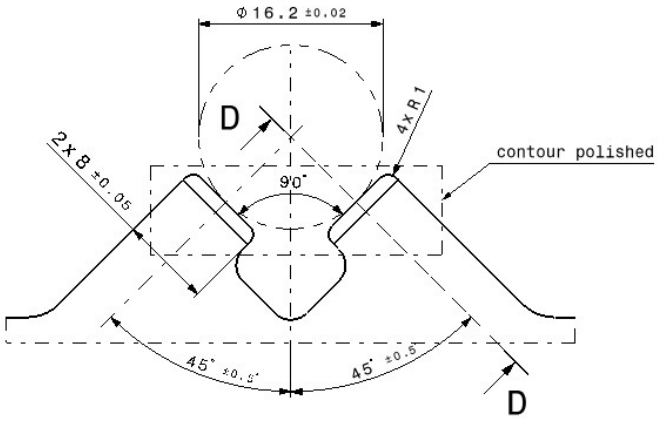
- **Geometry of the plunger and the anvil pressing on the terminal holder**

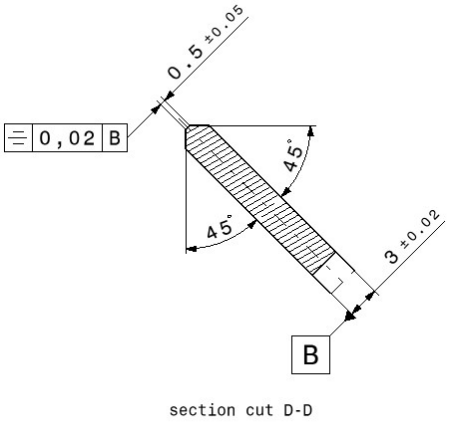
Plunger and anvil geometry of the terminal holder pressing
Material: 1.2721 vacuum hardened 58hrc



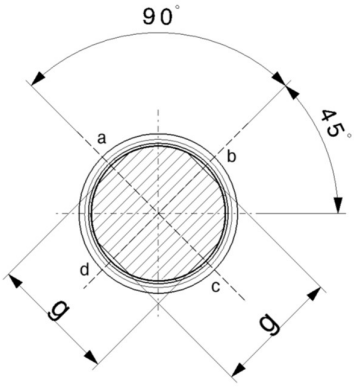


Plunger and anvil geometry of the terminal holder pressing
Material: 1.2721 vacuum hardened 58hrc



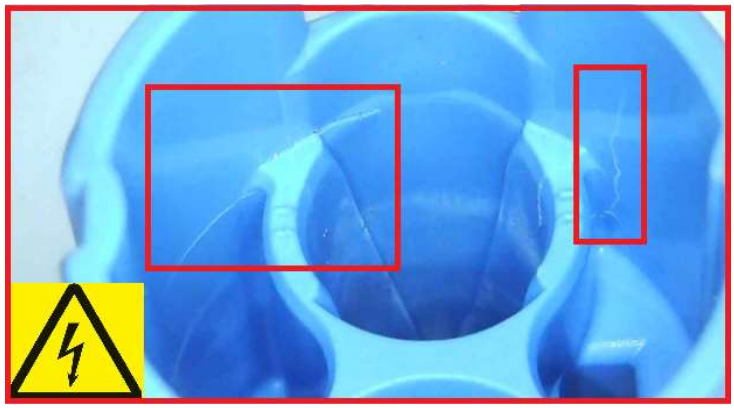


- **Embossing height “g”**

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

The dimension g is defined as follwing:
(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**”.

	**Risk of insulation failure!**
The embossing of the shield sleeve must not cause any damage to the supporting terminal holder part. It´s not allowed to go below the min. limit of the dimension “**g**”.	
Possible error image for over pressing (stress marks at the plastic part):	

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

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

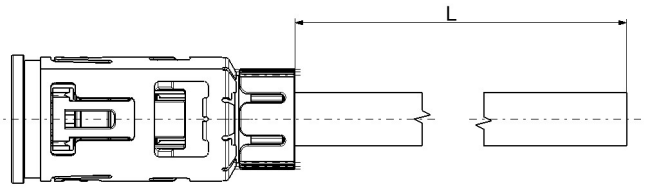
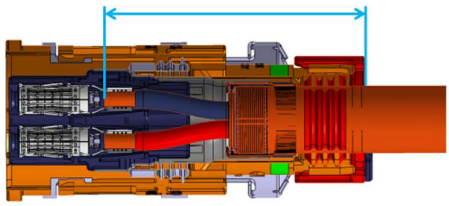
The measuring of the embossing height must be done with a suitable measuring device.
(Micrometer, measuring range: 0-25 mm).

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 mm²/ 4.0 mm² and 6.0 mm² 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 mm² wire was used.

5.1 Cut the shielded cable

	+ wire add-on
	

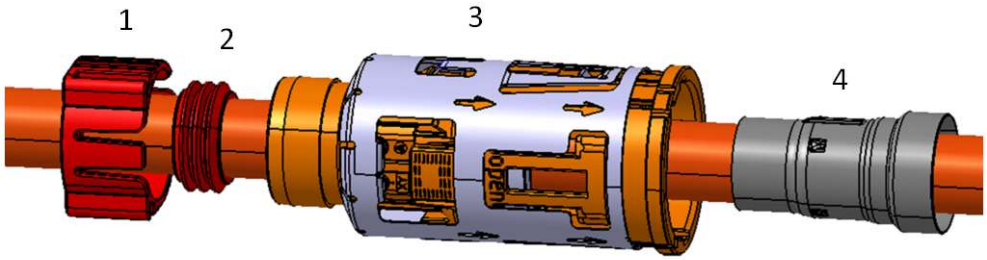
Add the following lengths for the Hirschmann Automotive HPS40-2 2+2 female connector:

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 mm²	L + 50	L + 54	L + 112	L + 116
4.0 mm²	L + 50	L + 54	L + 112	L + 116
6.0 mm²	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.

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.

1	2	3	4
			

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 mm²	22.5 ± 1	26.5 ± 1
4.0 mm²	22.5 ± 1	26.5 ± 1
6.0 mm²	22.5 ± 1	26.5 ± 1

Do not damage the shielding during the processing operation.

5.4 Wire processing I

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

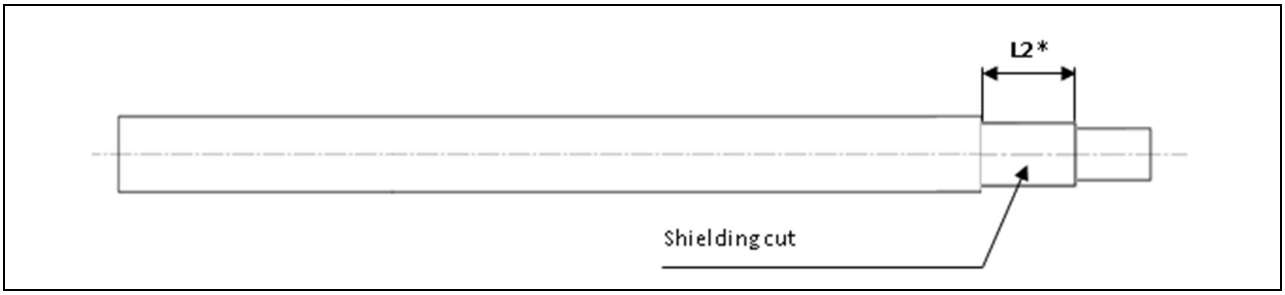


The following process steps must be done, but the manufacturer can choose the sequence:

- 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.

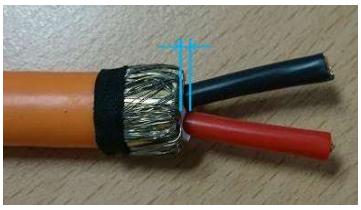
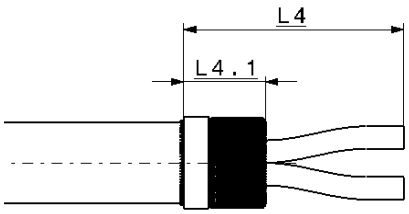
After cutting the shielding, there are no wire residues or parts of the shielding allowed on the cable. This must be ensured with some actions like the following:

- 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%

5.5 Wire processing II

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

		
	Max. L3 = 3.0 mm	

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. The shielding should be under the fixing tape. NO shield strands are allowed outside the max position of the tape (L4 / L4.1)

The max. position of the tape is showed with the dimension L4 or L4.1.

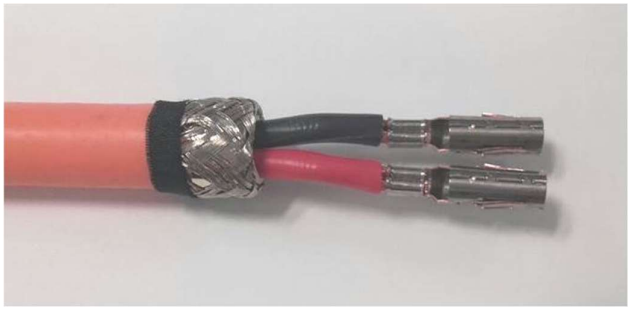
L4 = max. 37.5 mm after zero-cut (measurement in straightened length)
= max. 41.5 mm incl. zero-cut (measurement in straightened length)

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 Ø 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.

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:

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

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:

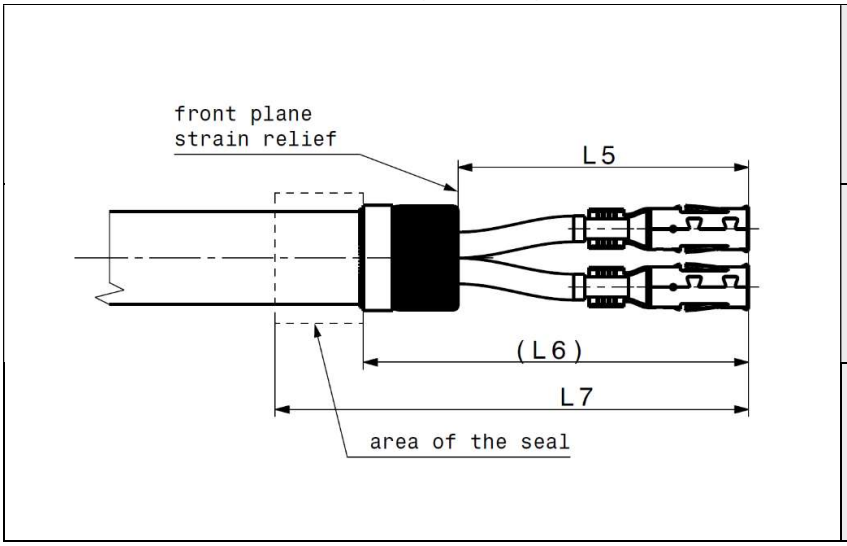
Schäfer Werkzeug- und Sondermaschinenbau GmbH
Dr.-Alfred-Weckesser-Str. 6
76669 Bad Schoenborn-La, Deutschland
Tel: +49 7253 9421-0
Fax: +49 7253 9421-94
www.schaefer.biz

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.

- **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.

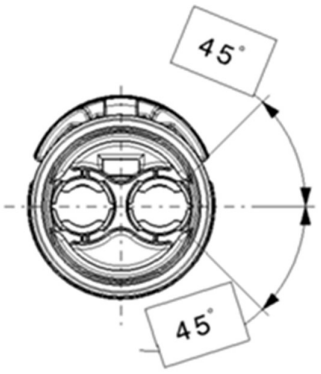
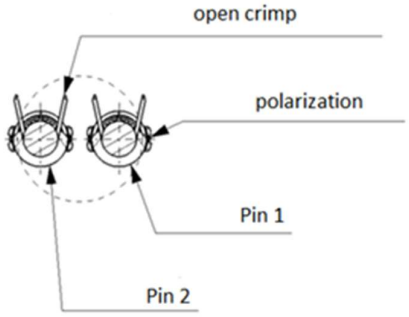


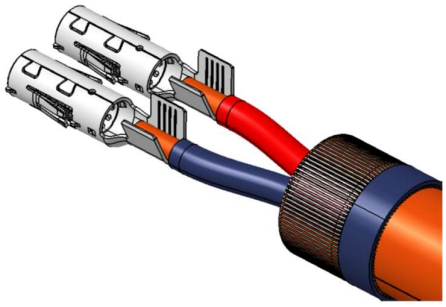
L5 = 38.1 ± 1
L6 = 54.5 +0.2 -1.5
L7 = max.67.0

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.

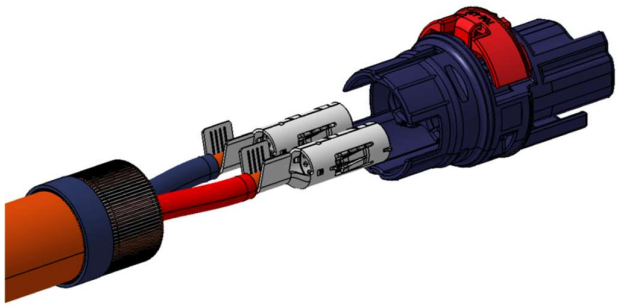
Angled insert catches HPS40-2 female contact holder	Nominal position of the HCT4 female terminals to the cable
	



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.

5.7 Assembly I

Assemble HCT4 female terminals into the contact holder (1).		
	**Pín**	**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.

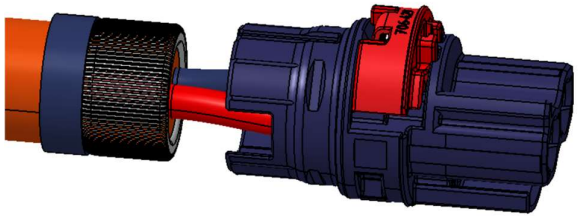
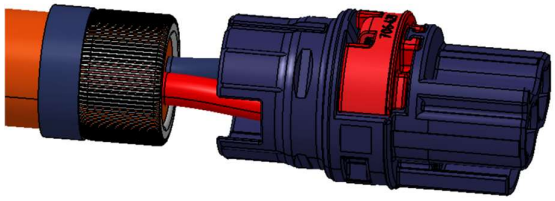
The mounting force of the female terminals into the contact holder must be proven if the crimping machine of the company “Schaefer” is not used or if the terminals are mounted fully automated inside the contact holder.

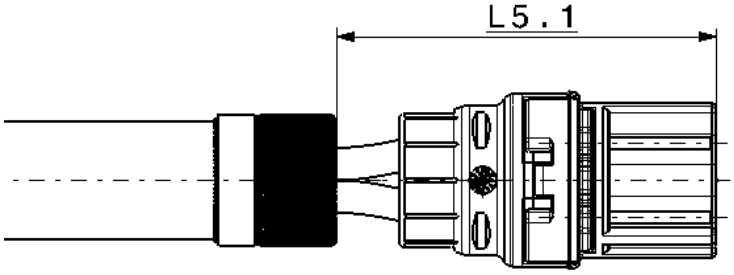
Wire manufacturer	Wire cross section		
	2.5 mm²	**4.0 mm²**	**6.0 mm²**
Kroschu	FHLR2G2GCB2G 600/1000V T180		
	64996918	64997293	64995979 64997213
	24 N	30 N	36 N
Leoni	FHLR2G2GCB2G 600/900V T180		
	00001	00002	00003
	24 N	30 N	36 N
Coroplast	FHLR2G2GCB2G 600/1000V T180		
	9-2641 (2x 2.5 mm²)	9-2641 (2x 4.0 mm²)	9-2641 (2x 6.0 mm²)
	24 N	30 N	36 N
NBKBE	FHLR2G2GCB2G 600/1000V T180		
	-	818-00001 (2x 4.0 mm²)	818-00011 (2x 6.0 mm²)
	-	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

5.8 Assembly II

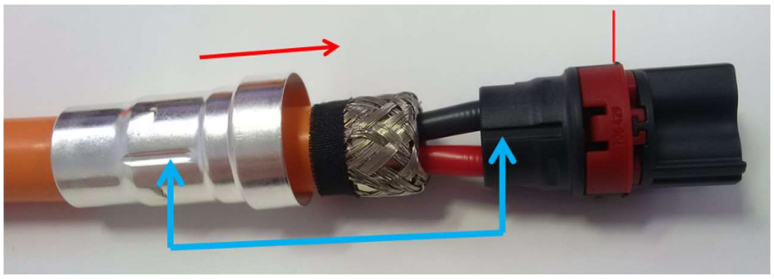
Assembly of the secondary lock (2).

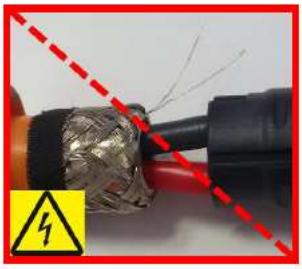
The secondary locking can only be assembled if the terminals are in the end position. A visible difference of the terminals to each other can be possible in the contact cavity. Because of the position of the contacts on the wire, and the play of the contacts in the contact cavity it is possible and acceptable.

Secondary lock pre-locking/ HV terminals primary locked	Secondarey lock end position
	

	L5.1 = 39.3 ±1
As mentioned at point 4.6 it is allowed to prove L5.1 instead of L5.	

5.9 Push shielding sleeve onto contact carrier





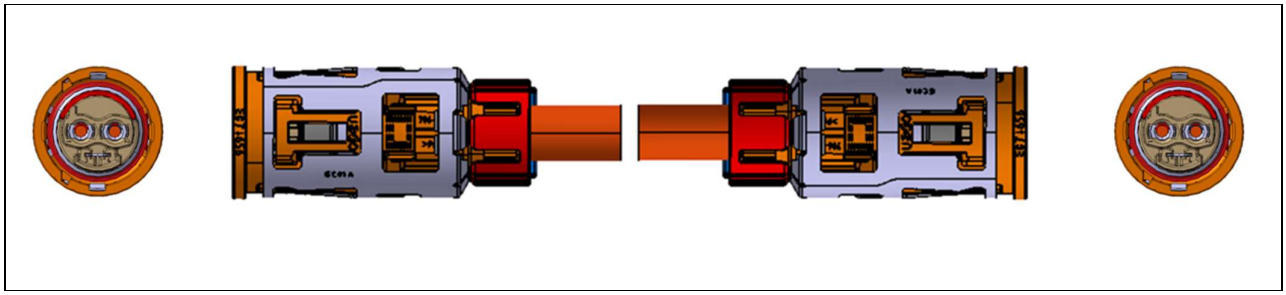
- The shielding sleeve needs to be assembled onto the contact holder in the correct position. It can only be turned by 180°.
- Do not damage the shielding sleeve during the assembly.
- The shielding sleeve must be assembled until the end position is reached.
- The fixing tape must come out of the shield 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!

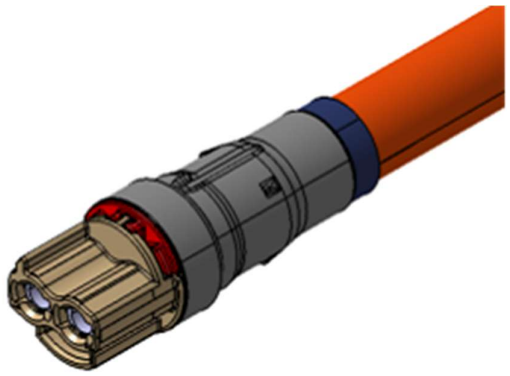
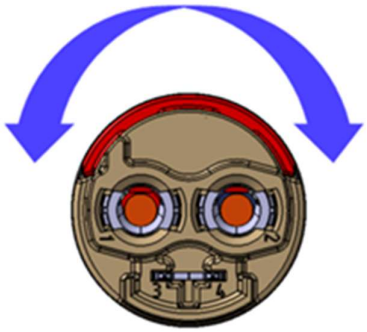
5.10 Rotative orientation

- **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.
	

A maximum rotation of up to ± 180° 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.

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:

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

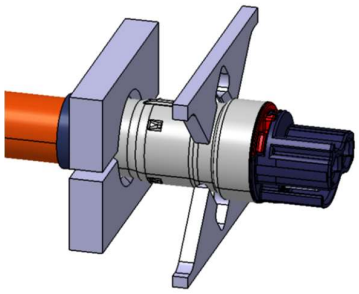
Based on the processing guidelines of Hirschmann Automotive, the device was designed and produced. The details of the commissioning, handling and the process guideline of the device can be requested directly at the supplier:

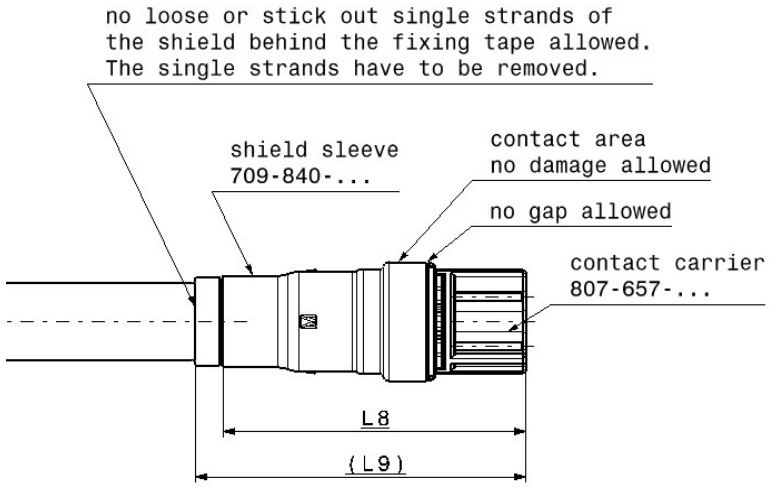
Schäfer Werkzeug- und Sondermaschinenbau GmbH
Dr.-Alfred-Weckesser-Str. 6
76669 Bad Schoenborn-La, Deutschland
Tel: +49 7253 9421-0
Fax: +49 7253 9421-94
www.schaefer.biz

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

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

	L8 = 49.7 ± 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.

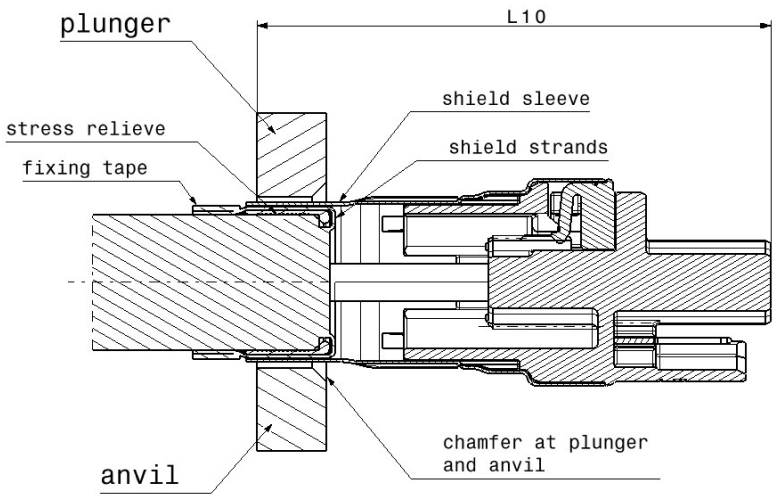
- Insulation of the wire
- Insulation of the single wires
- Stress relief
- Shield sleeve
- Shield strands of the wire

5.11.1 Shield pressing by two half-shells

- **Embossing position**

The exact geometry of the plunger and anvil is given. The position of the plunger and the anvil must be revered 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.

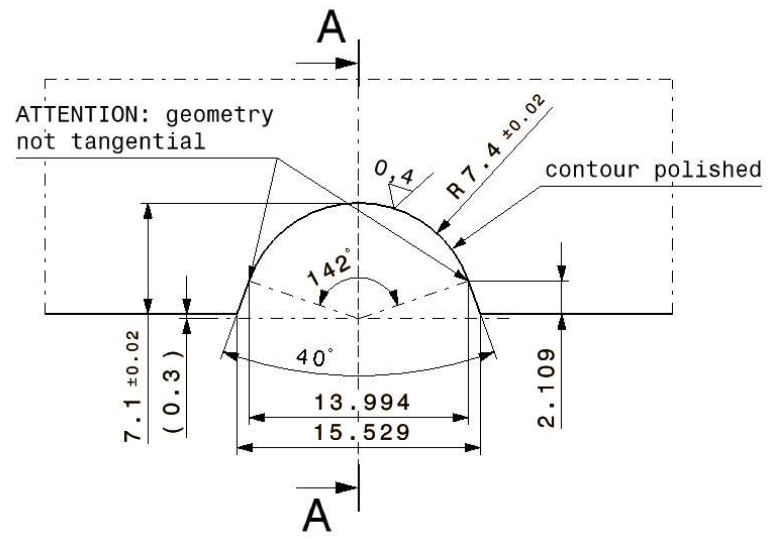


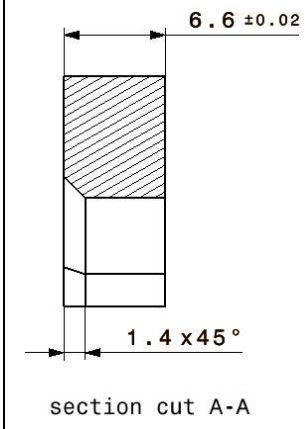
L10 = 46.53 ± 0.1

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

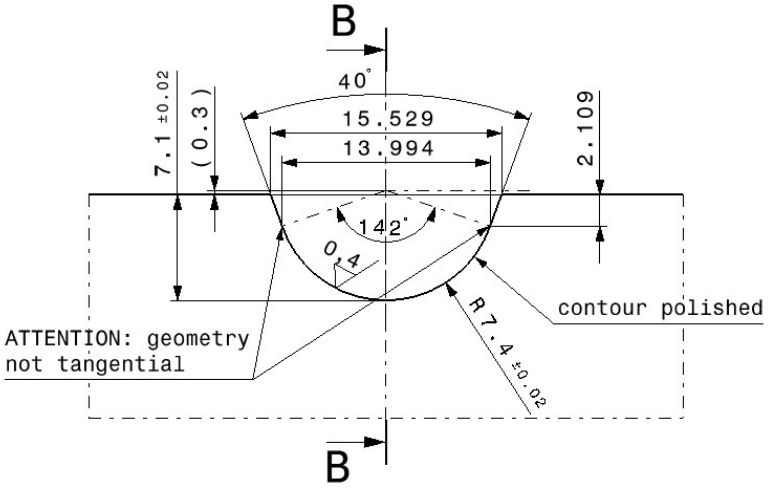
!! Not valid for H+S wire !!

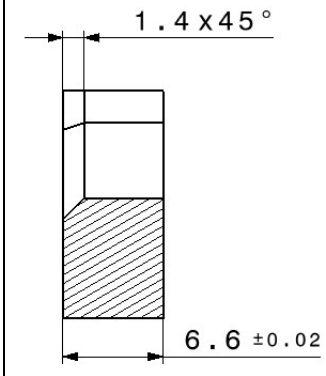
Plunger and anvil geometry of the wire shield pressing
Material: 1.2721 vacuum hardened 58hrc





Plunger and anvil geometry of the wire shield pressing
Material: 1.2721 vacuum hardened 58hrc

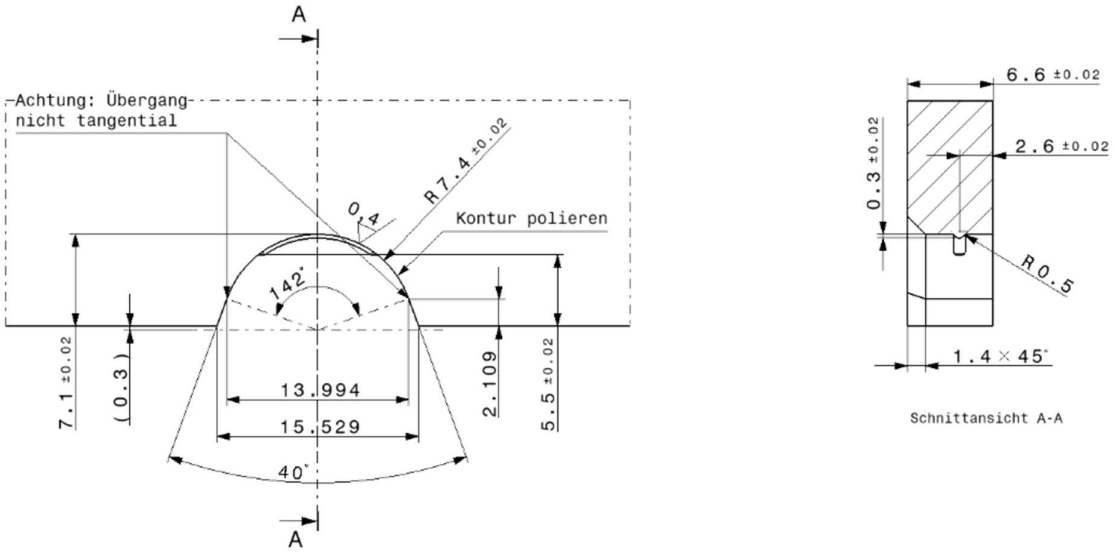




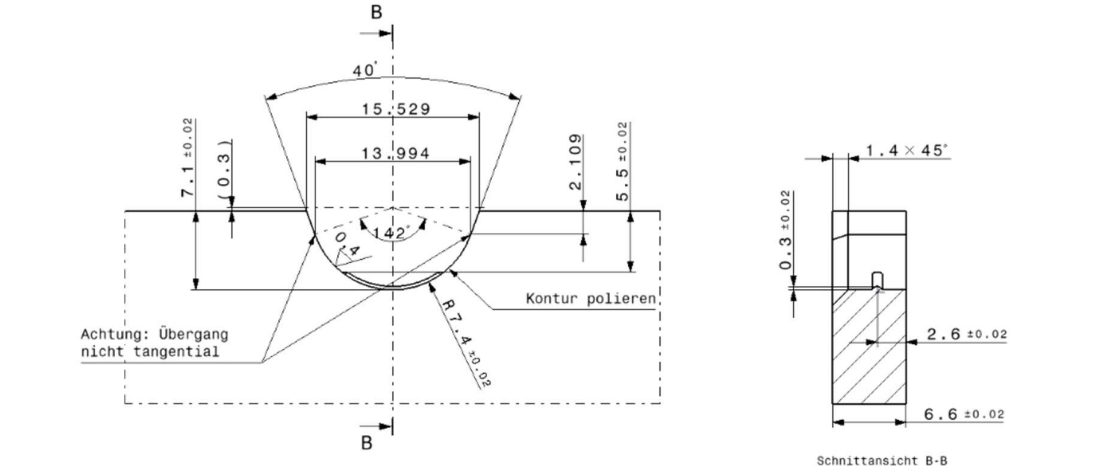
- **Plunger and anvil geometry of the wire shield pressing**

!! Valid for H+S wire 6.0 mm² !!

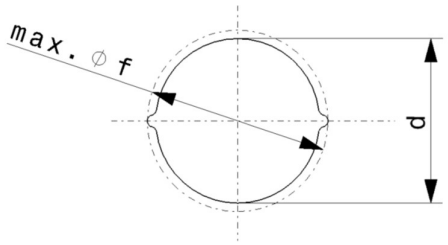
Plunger and anvil geometry of the wire shield pressing
Material: 1.2721 vacuum hardened 58hrc



Plunger and anvil geometry of the wire shield pressing
Material: 1.2721 vacuum hardened 58hrc



- **Embossing heights “d”**

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

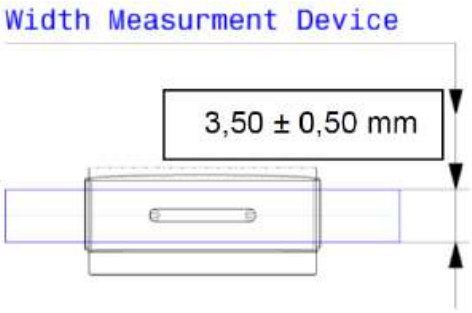
Measurement “d” in mm		
2.5 mm²	**4.0 mm²**	**6.0 mm²**
14.57 ± 0.15	14.57 ± 0.15	14.57 ± 0.15

During the pressing process a fold appears on two sides.
This fold is not allowed to be bigger than the diameter **Ø f = 16.40 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 dimensions have to be within the given tolerance.

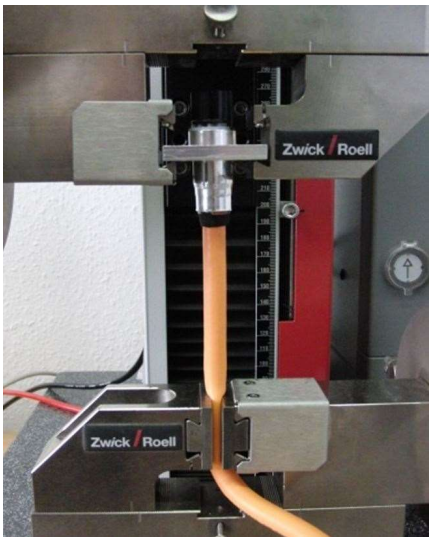
The measuring of the embossing height “d” must be done with a suitable measuring device. (e.g. Micrometeror caliper, measuring range: 0-25 mm) The gauge for the measurement must have a width of 3.50 ± 0.50mm. The measurement must be taken symmetrically to the embossing position.

- **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.

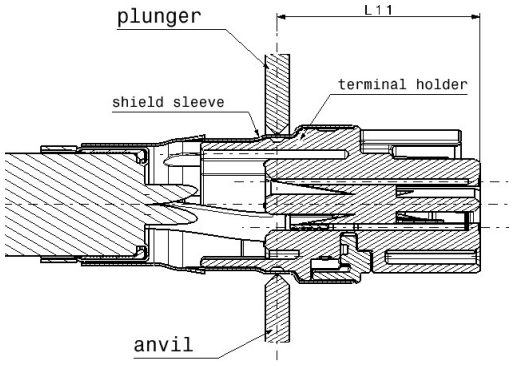
HCT4 terminals must not be installed in the test specimens, to test the shield pressing only. In this state, the figure in the table must be reached

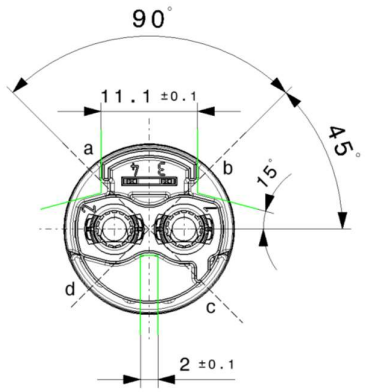


Wire cross section	Pulling force
2.5 mm²	≥ 120 N
4.0 mm²	≥ 120 N
6.0 mm²	≥ 120 N

5.11.2 Pressing contact carrier

- **Embossing position:**





L11 = 25.3 ± 0.1	

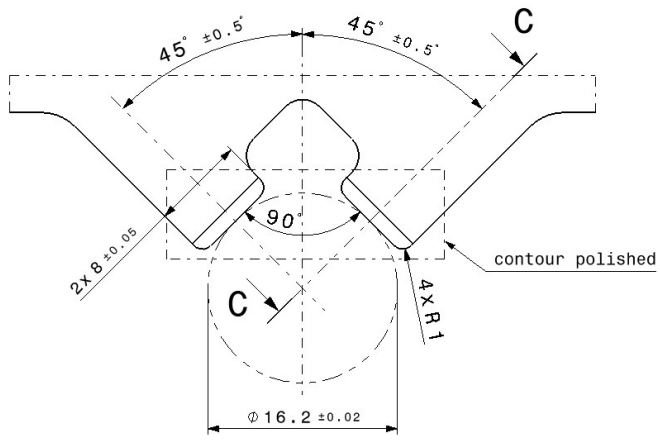
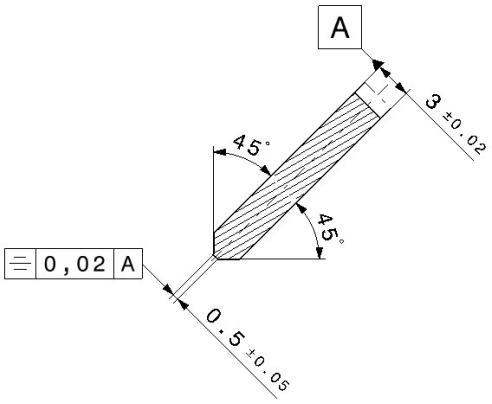
The dimension L11 describes the position of the pressing. The dimension L11 is considered as tool dimension and must be ensured in the tool.

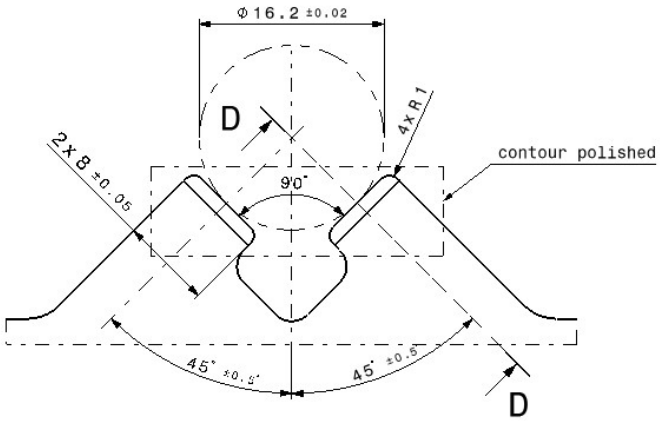
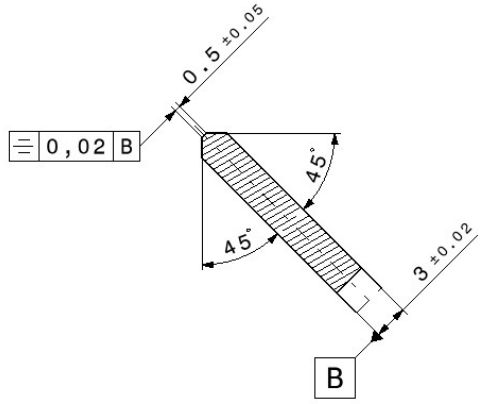
The position of the plunger and the anvil must be aligned in relation to the front plane of the terminal holder.

The four embossing positions (a-d) must be aligned in relation to the terminal holder. Therefor 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.

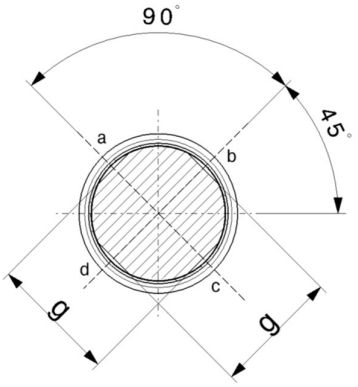
The exact geometry of the plunger and anvil is given.

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

Plunger and anvil geometry of the wire shield pressing Material: 1.2721 vaccum hardened 58hrc	
	

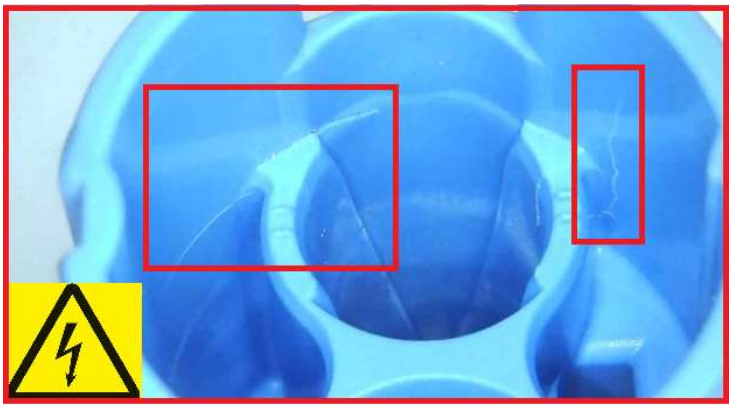
Plunger and anvil geometry of the wire shield pressing Material: 1.2721 vaccum hardened 58hrc	
	

- **Embossing height “g”**

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

The dimension g is defined as follwing:
(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”.

	**Risk of insulation failure!**
The embossing of the shield sleeve must not cause any damage to the supporting terminal holder part. It´s not allowed to go below the min. limit of the dimension “g”.	
Possible error image for over pressing (stress marks at the plastic part):	

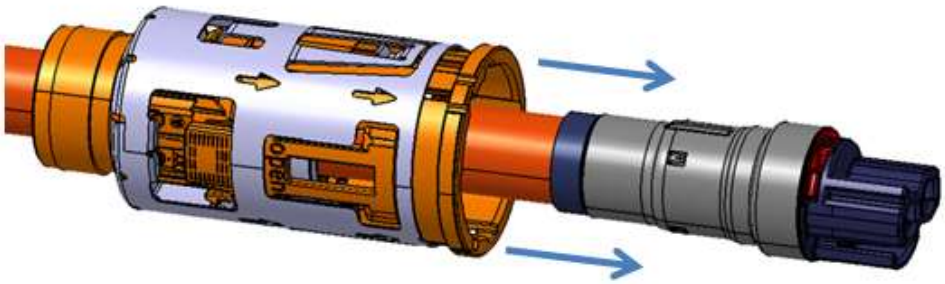
- **Check measurement of the embossing height “g”:**

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.

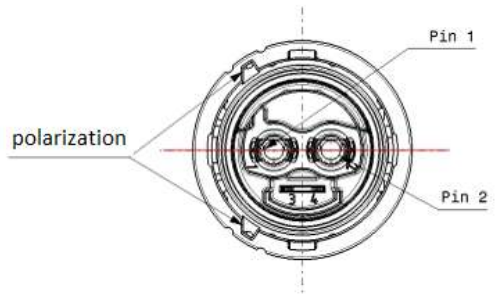
Name of the device:	Assembling device HPS40-2
Article number:	HPS40-2

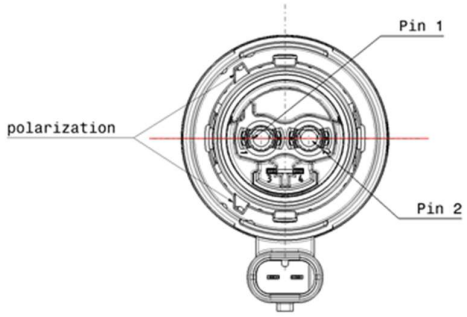
Based on the processing guidelines of Hirschmann Automotive, the device was designed and produced. The details of the commissioning, handling and the process guideline of the device can be requested directly at the supplier: Each manufacturer is responsible of the commissioning of the pressing device.

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

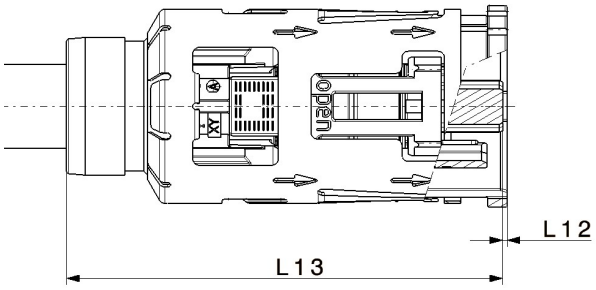
The commissioning of the pressing device must be done through the manufacturer. The manufacturer is at liberty to use a pressing device of his choice. The assembling process must meet the assembling data which are specified on the following pages.

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.

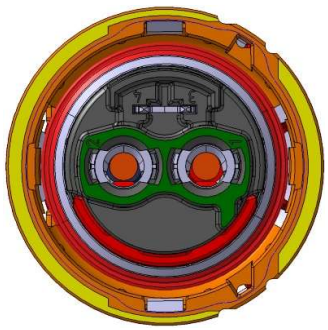


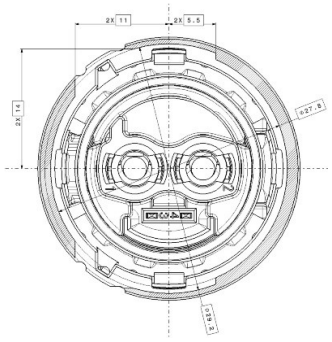


The locking sleeve must be assembled onto the shield sleeve force-assisted until the dimension L12 is reached. The reference on the terminal holder is in the middle between Pin 1 and Pin 2. The dimension L13 is only for checking purposes. During the assembling process, there are no damages allowed on 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 ± 0.1 F1
L13 = 66.7 (Info)

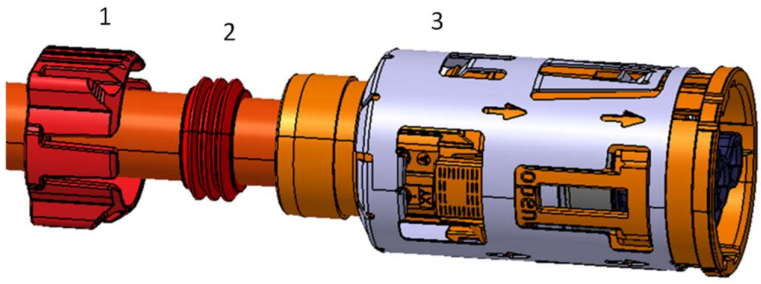




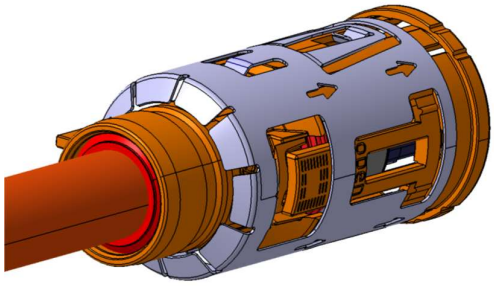
The adjustments in the processing specification with the status 08/ 2023 must be considered for new applications, but not for existing applications.

5.13 Assemble seal and cover cap

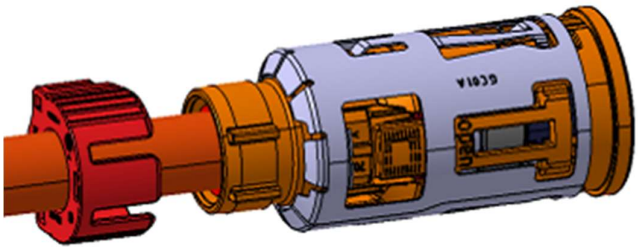
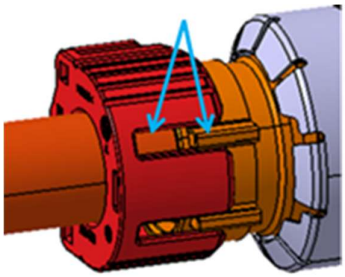
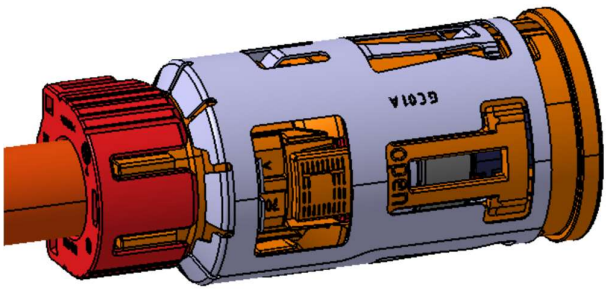
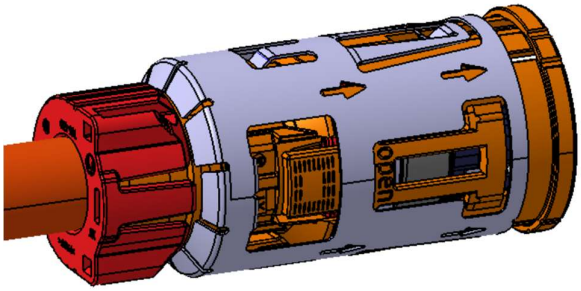
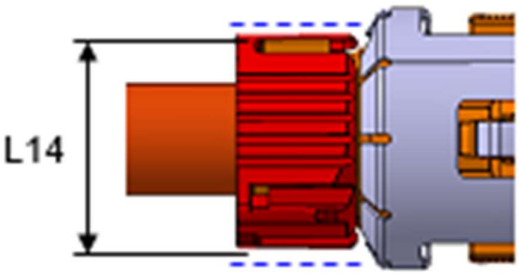
1	2	3



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.

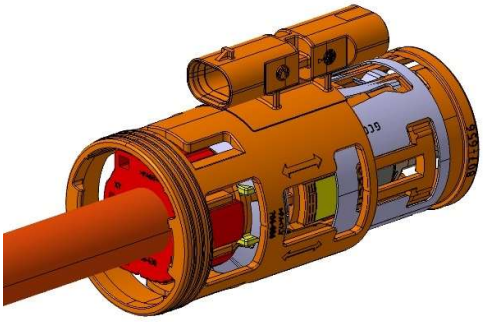
Snap the cover cap (1) into the recess of the female locking device unit (3) and consider the polarization.	
	
	
Cover cap on end position	end position (locked)
	

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 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.

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.


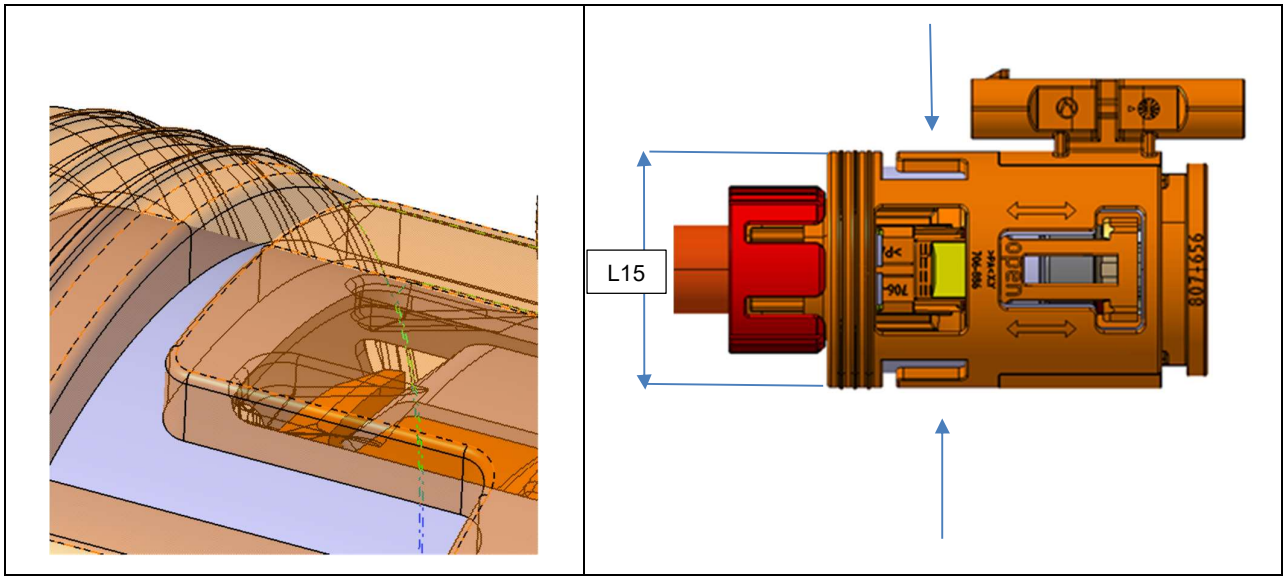
For the positioning and the assembling process of the female locking device unit onto the wire unit, the assembling device (Hand device) of the company “WKM” can be used.

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.

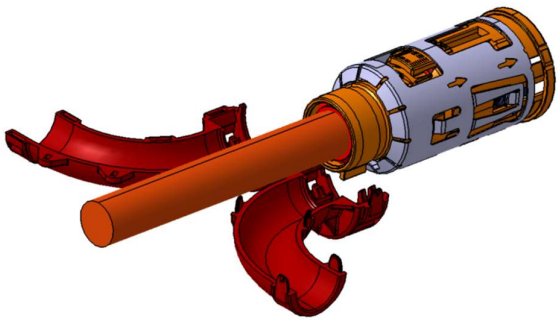
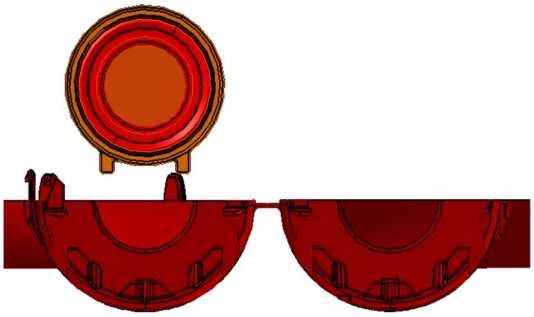


If the CPA Housing is in end position at least one of the locking hooks must about straight on the female locking device unit. They are not allowed to stay in a deflected position. They must be within the dimension L15 = max. 35.0 mm. Under certain circumstances (Tolerances) it needed to press on the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

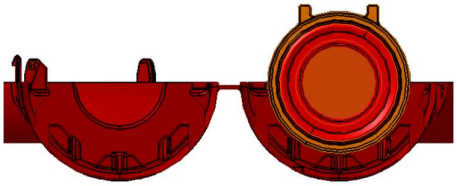
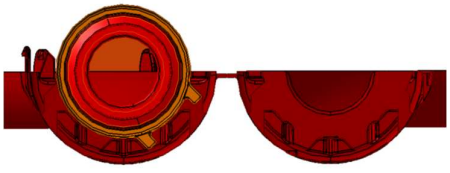
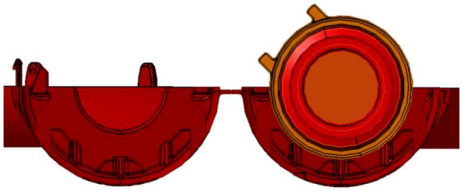
Each manufacturer is free to carry out this work step in an earlier point in production. Appropriate actions for handling the component and the influence on the equipment of previous work steps must be considered.

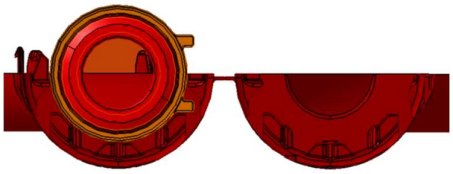
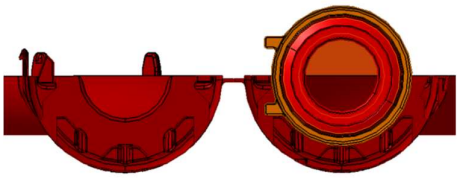
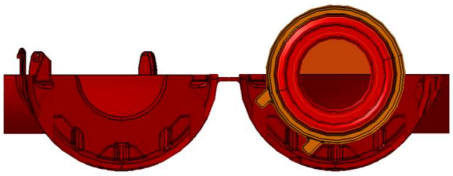
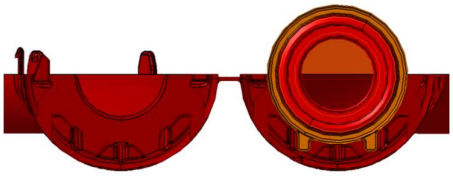
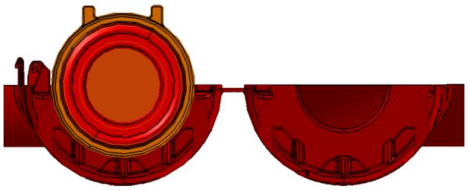
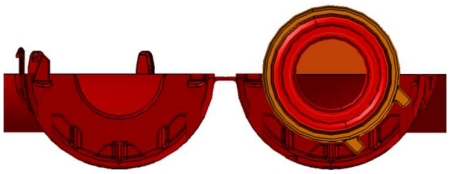
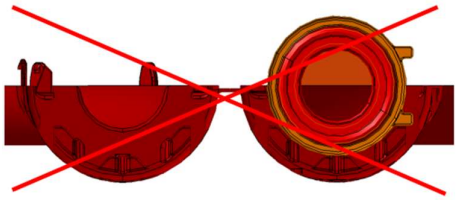
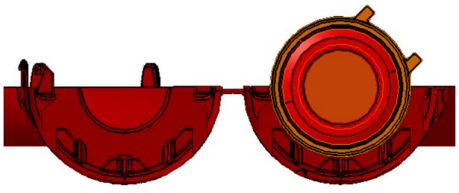
7 Processing steps (optional parts)

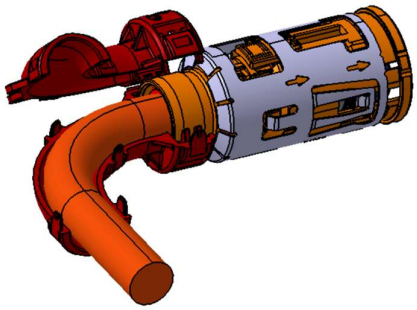
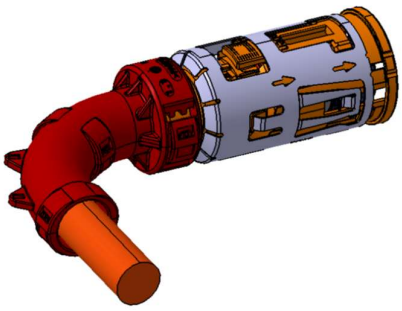
7.1 Assemble 90° angled cap

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.

0°			
45°			

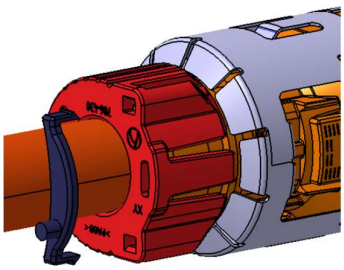
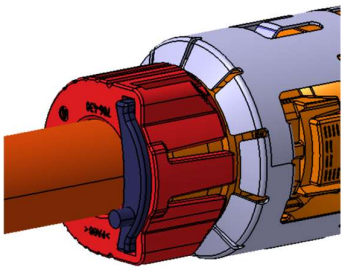
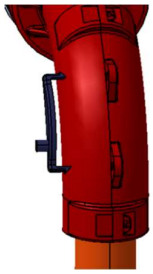
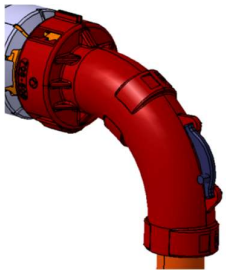
90°			
135°			
180°			
-135°			
-90°			
-45°			

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.

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.

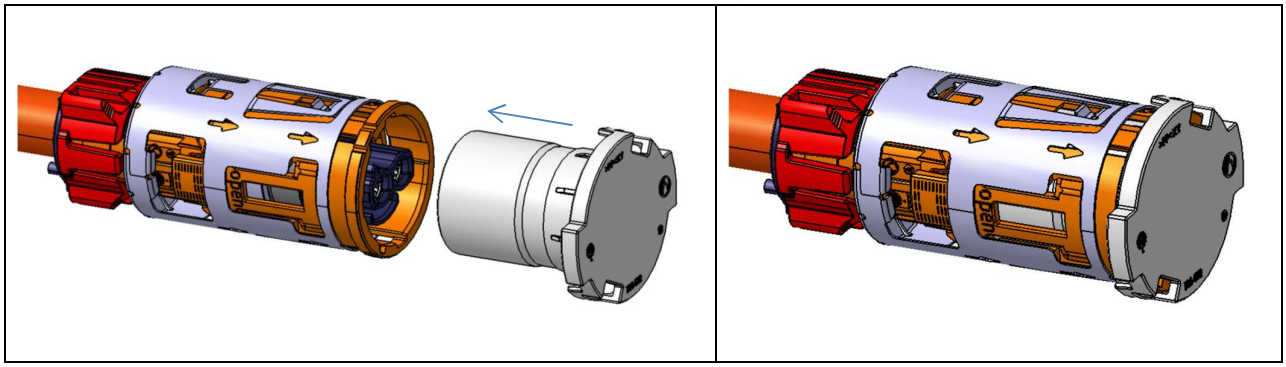
			
cover cap		90° angled cap	

Ensure that the coding / color of the coding clip matches the coding / color of the built-in contact carrier. Therefor 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.

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.

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 cm²)			
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.

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

Concept of automation HPS40-2

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= **not approved**	05/ 2020	Shaw S.
15	rotative orientation specified precisely, general comments adapted= **not approved**	01/ 2021	Bas Ü.
16	Comments and part usage for rotative orientation adapted= **not approved**	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.

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.
30	Added H&S wire 4.0 mm² / Page 61) updated text	09/ 2024	Jussel E-M.

31	Topic 1.3 + 2.1.: updated information to additional wire for supplier Aptiv (W)	01/ 2025	Jussel E-M.
32	Topic 4.5 + 5.5.: update of text about shielding	01/ 2025	Jussel E-M.
33	Topic 4.3: update of text and dimension	01/ 2025	Jussel E-M.
34	Topic 1.3/ row “T” added comment (under development) Topic 2.1/ Aptiv 4 mm² added comment (under development)	02/ 2025	Jussel E-M.