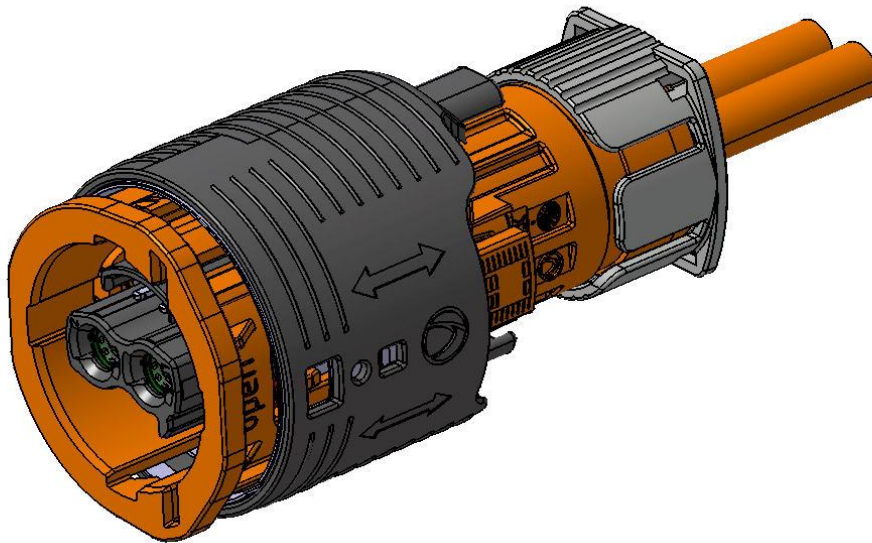


# Process Specification

## HIRSCHMANN PowerStar 40-2 HCT4 4,0mm<sup>2</sup> Shielded Single-Core Cable



**EVS-100101**  
Edition December 2020



## 1. Table of content

<b>1. General</b>	<b>3</b>
1.1. Introduction	3
1.2. Documentation of change	4
1.3. Other current documents	4
<b>2. Product structure (single components)</b>	<b>5</b>
2.1. Shielded cable 4,0mm <sup>2</sup> see table	5
2.2. HCT4 Female terminal (Hirschmann)	6
2.3. Crimp ferrule HPS40-2 SCC (Hirschmann)	7
2.4. Shielding sleeve HPS40-2 SCC (Hirschmann)	8
2.5. Cover cap HPS40-2 (Hirschmann)	9
2.6. Seal HV (Hirschmann)	10
2.7. Terminal holder HPS40-2 (Hirschmann)	11
2.8. Female locking device unit HPS40-2 (Hirschmann)	12
<b>3. Processing steps</b>	<b>13</b>
3.1. Cut the shielded cable	13
3.2. Assemble	14
3.3. Strip off the shielded cables	14
3.4. Crimp the crimp ferrule	15
3.5. Reverse the shield backwards, hold the shield with tape	19
3.6. Crimp the HCT4 female terminal	20
3.7. Assembly	23
3.8. Push shielding sleeve onto contact holder	26
3.9. Press shield sleeve	27
3.9.1. Shield pressing by two half-shells	29
3.9.2. Pressing contact holder	34
3.10. Taping of the wires	37
3.11. Positioning of the female locking device unit	38
3.12. Assemble seal and cover cap	40
3.13. Stacking of produced harnesses	42
3.14. Technical cleanliness	42
3.15. Degree of automation	42
3.16. General requirements	42

## 1. General

### 1.1. Introduction

This process specification is valid for all variants mentioned in chapter 3.ff, and describes the product structure as well as the assembly of the Hirschmann PowerStar 40-2 plug connection.

809-886-501	A	4,0mm <sup>2</sup>	HCT4 + HVIL
809-886-502	B		HCT4 + HVIL
809-886-503	C		HCT4 + HVIL
809-886-504	D		HCT4 + HVIL
809-886-507	Z		HCT4 + HVIL
<b>Hirschmann No.</b>	<b>Coding</b>	<b>Cross section</b>	<b>Note</b>

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

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



## 1.2. Documentation of change

Date of issue	Change	Editor
July 2018	First edition (Draft)	Hoor R.
November 2018	Changed to FCA-specific design	Hoor R.
February 2019	Added Shield-crimping geometry	Hoor R.
April 2019	Added taping step; updated shield-crimping geometry	Hoor R.
June 2019	Changed dimension "f"	Hoor R.
June 2019	Defined dimension "d" / Updated dimension "f" / redefined requirement for pull-off force (shield)	Hoor R.
January 2020	Updated Crimping-geometry for shielding; Updated L10 due to wider anvil/crimper	Hoor R.
February 2020	Added alternative crimping geometry for shielding	Hoor R.
December 2020	Document number changed to <b>EVS-100101</b> Numerical error fixed (809-887... replaced by 809-886...)	Hoor R.

## 1.3. Other current documents

A	HCT4 Process specification (Ag)	EVS-100068
B	Datasheet Shielded SCC 4,0mm <sup>2</sup> Huber & Suhner	12582674



## 2. Product structure (single components)

### 2.1. Shielded cable 4,0mm<sup>2</sup> see table



<b>Huber &amp; Suhner</b>	FLR91XC33X 1x4 T150 1x4mm <sup>2</sup> RADOX 155S FLR
<b>Wire Manufacturer</b>	<b>4,0mm<sup>2</sup></b>
	<b>Wire cross-section</b>

**Table 1:** shielded 4,0mm<sup>2</sup> cable

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

## 2.2. HCT4 Female terminal (Hirschmann)



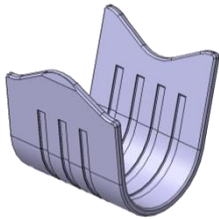
709-427-504	4,0mm <sup>2</sup>	Female terminal HCT4
<b>Hirschmann No.</b>	<b>Wire cross section (construction of conductor)</b>	<b>Product description</b>

**Table 2:** Hirschmann female terminal HCT4

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



### 2.3. Crimp ferrule HPS40-2 SCC (Hirschmann)



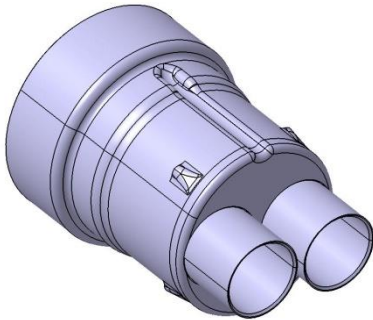
710-195-502	4,0mm <sup>2</sup>	Crimp ferrule 4mm <sup>2</sup>
<b>Hirschmann No.</b>	<b>Wire cross section (construction of conductor)</b>	<b>Product description</b>

**Table 3:** Hirschmann crimp ferrule

On the product drawing (Hirschmann No. 807-655-...00), you can find the released cables for each crimp ferrule.

The crimp ferrules are delivered on coils.

## 2.4. Shielding sleeve HPS40-2 SCC (Hirschmann)



710-161-501	4,0mm <sup>2</sup>	Shielding sleeve HPS40-2 SCC
<b>Hirschmann No.</b>	<b>Wire cross section (construction of conductor)</b>	<b>Product description</b>

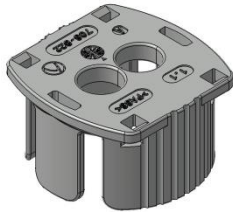
**Table 4:** Hirschmann shielding sleeve

The shield sleeves are delivered as bulk goods.





## 2.5. Cover cap HPS40-2 (Hirschmann)



4,0mm<sup>2</sup>

706-822-503	4,0mm <sup>2</sup>	grey	Cover cap HPS40-2 SCC
<b>Hirschmann No.</b>	<b>Wire cross section (construction of conductor)</b>	<b>Colour</b>	<b>Product description</b>

**Table 5:** Hirschmann cover cap

On the product drawing (Hirschmann No. 807-655-...00), you can find the released cables for each cover cap.

The cover caps are delivered as bulk goods.

## 2.6. Seal HV (Hirschmann)



4,0mm<sup>2</sup>

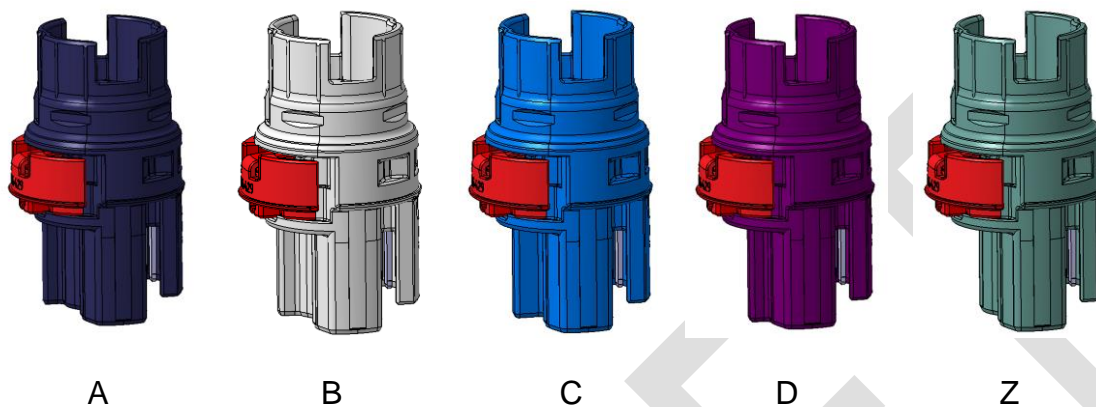
709-972-502	4,0mm <sup>2</sup>	grey	Seal HV SCC
<b>Hirschmann No.</b>	<b>Wire cross section (conductor construction)</b>	<b>Colour</b>	<b>Product description</b>

**Table 6:** Hirschmann seal HV

On the product drawing (Hirschmann No. 807-655-...00), you can find the released cables for each seal.

The seals are delivered as bulk goods.

## 2.7. Terminal holder HPS40-2 (Hirschmann)

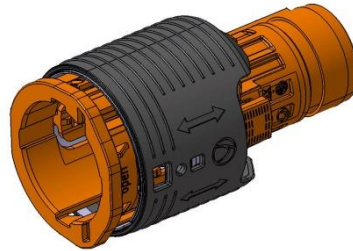


807-657-551	A	black	yes	4,0mm <sup>2</sup>	V-0	Terminal holder HPS40-2
807-657-552	B	natural/ white	yes		V-0	Terminal holder HPS40-2
807-657-553	C	blue	yes		V-0	Terminal holder HPS40-2
807-657-554	D	purple	yes		V-0	Terminal holder HPS40-2
807-657-557	Z	water blue	yes		V-0	Terminal holder HPS40-2
<b>Hirschmann No.</b>	<b>Cod.</b>	<b>Colour</b>	<b>HVIL bridge</b>	<b>Wire cross section (construction of conductor)</b>	<b>Flammability according to UL94</b>	<b>Product description</b>

**Table 7:** Hirschmann terminal holder

The terminal holders are delivered as bulk goods.

## 2.8. Female locking device unit HPS40-2 (Hirschmann)



with CPA-Cover  
for one-sided operating

807-656-503	4,0mm <sup>2</sup>	Female locking device unit HPS40-2 CPA-Cover
<b>Hirschmann No.</b>	<b>Wire cross section (construction of conductor)</b>	<b>Product description</b>

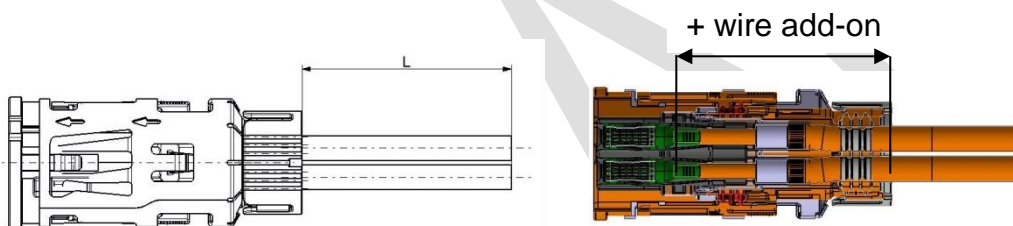
**Table 8:** Hirschmann female locking device unit

The female locking device units are delivered as bulk goods.

### 3. Processing steps

Use the following described processing steps as necessary for the wire cross sections 3mm<sup>2</sup>, 4mm<sup>2</sup>, 5mm<sup>2</sup>, 6mm<sup>2</sup>

#### 3.1. Cut the shielded cable



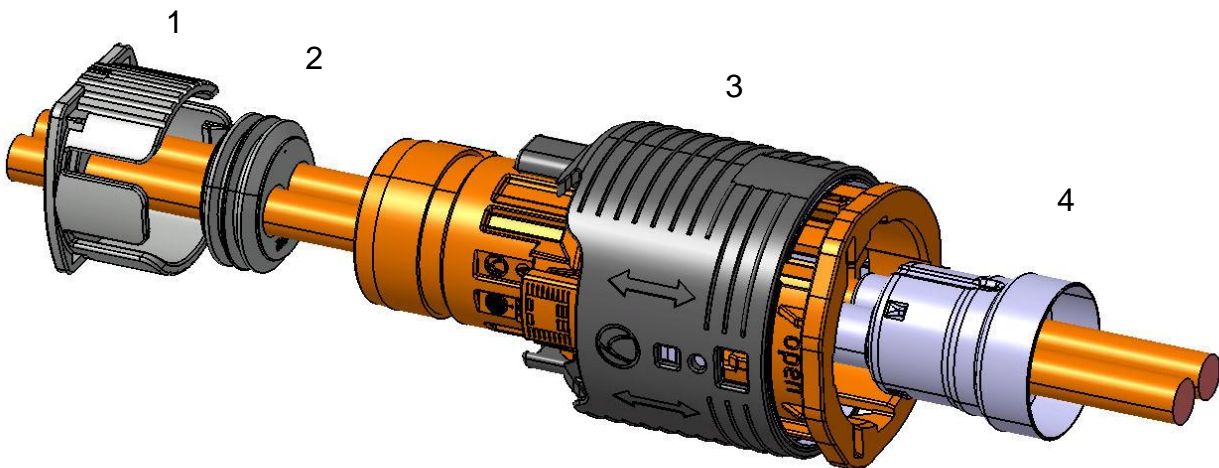
Add the following lengths for the Hirschmann HPS40-2 female connector:

4,0mm <sup>2</sup>	L + 50	L + 54
<b>Wire cross section (construction of conductor)</b>	<b>Dimension L after zero-cut (mm)</b>	<b>Dimension L for the Hirschmann HCT4 terminal incl. zero-cut (mm)</b>

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

### 3.2. Assemble

Slide the cover cap (1), the seal (2), the female locking device unit (3) and the shielding sleeve (4) onto the shielded cables. Seal, cover cap and shielding sleeve are 180° symmetrical and can be assembled either way.



Note: The locking device unit (3) and shielding sleeve (4) may as well be assembled onto the cable after step 4.6 (crimping of HCT4-female terminals).

### 3.3. Strip off the shielded cables

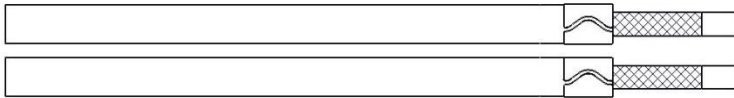
- Stripping length



4,0mm <sup>2</sup>	18±1	22±1
<b>Wire (cross section)</b>	<b>Dimension L1 after zero-cut (mm)</b>	<b>Dimension L1 for the Hirschmann HCT4 terminal incl. zero-cut (mm)</b>

- Do not damage the shielding during the processing operation.

### 3.4. Crimp the crimp ferrule



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

- Crimp the crimp ferrule
- Remove the foil.
- Shorten the shielding.

In this processing specification, the recommended sequence is shown.

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- **Single stroke crimping machine**

For the positioning and the crimping process of the crimp ferrules, the crimping machine of the company "Schaefer" can be used:

**Name of the device: Crimp-Device Crimp-Ferrule HPS40-2 SCC**  
**Article number: EPS2001-HPS40-2-SCC**

The device was designed and implemented by the processing guidelines of Hirschmann.

The individual details referring to commissioning, handling and process description of the device can be requested directly at the supplier:

**Schaefer 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)

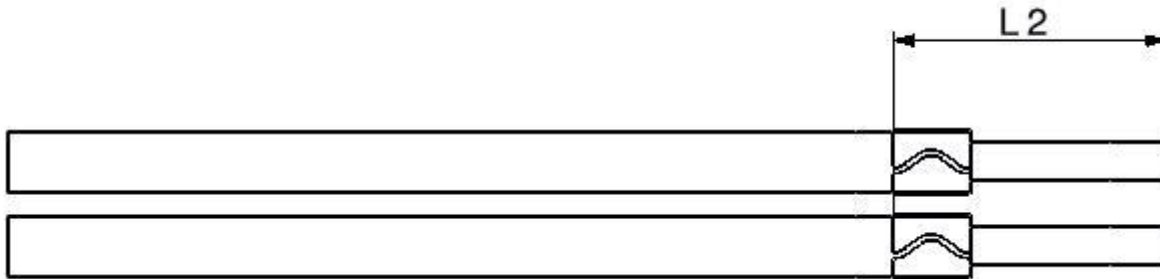
The commissioning of the crimping device has to be done through the manufacturer.

In this edition you can only find the information of the crimping and positioning of the crimping process.

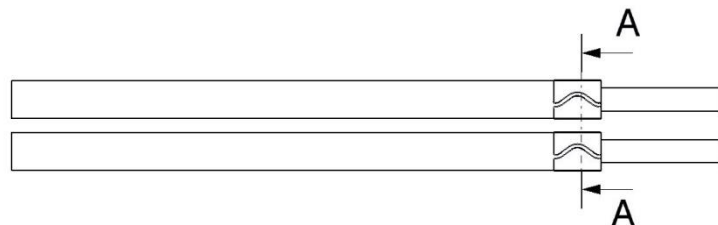
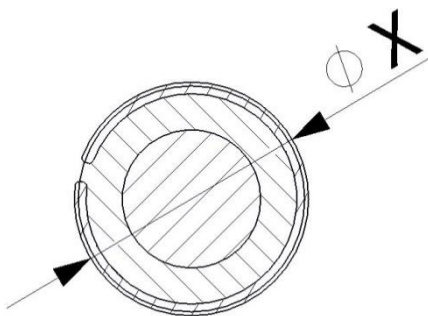


**Process data**

a) The crimp ferrules need to be crimped in relation to the single wires.

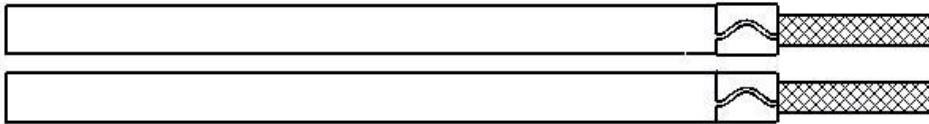


L2 = max. 25,5 mm after zero-cut  
 max. 29,5 mm incl. zero-cut

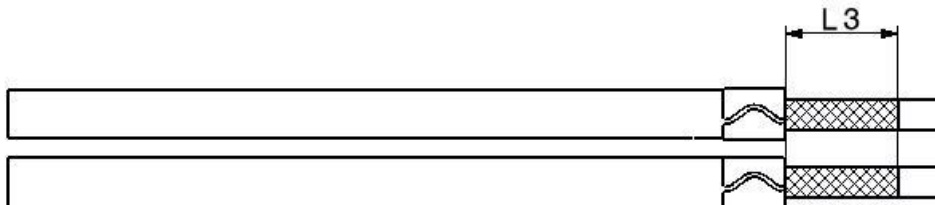


4,0mm <sup>2</sup>	6,1±0,1
<b>Wire (cross section)</b>	<b>Dimension X</b>

An overlap of the foil in the area of the crimp like small edges is allowed.



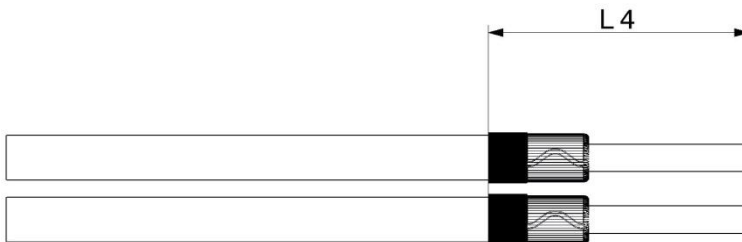
- Dimension of the shielding:



Depending on the production method of each manufacturer, the dimension L3 can vary.

- After cutting the shielding, there are no wire residues or parts of the shielding allowed on the cable. This has to 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 crimp 100%.

### 3.5. Reverse the shield backwards, hold the shield with tape



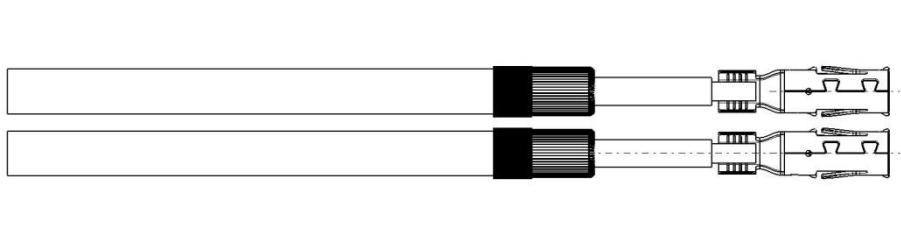
- 100% of the shield has to be turned over the crimp.  
A targeted unbraiding of the shield is not necessary. By turning over the shield, a process related unbraiding is possible.  
After this the shield has to be fixed with a fixing device after the crimp.  
(for example: tape)
- The fixing tape needs to stay on, until the pressing procedure is done and can be left inside the connector. The max. width of the tape is **5mm**.  
The fixing tape has to be positioned immediately after the crimp, and must not reach the crimp.  
No shielding is allowed outside the fixing tape.  
The max. position of the tape is showed with the dimension L4.  
L4 = max. 33 mm after zero-cut  
max. 37 mm incl. zero-cut

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

It is possible to use another product to fix the shield. The max. outer diameter after assembling is  $\varnothing 6,5$  and the shield sleeve must be able to be mounted easily.  
The product must have min. 150°C thermal resistance.

- Single strands of the shield which are not fixed with the tape and stick out have to be removed before further process steps.
- Do not damage the single wires during the complete processing operation.

### 3.6. 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 "Schaefer" can be used:

**Name of the device:** HPS40-2 Double stroke crimping machine  
**Order number:** EPS2001-HPS40-2

**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.

The individual details referring to commissioning, handling and process description of the device can be requested directly at the supplier:

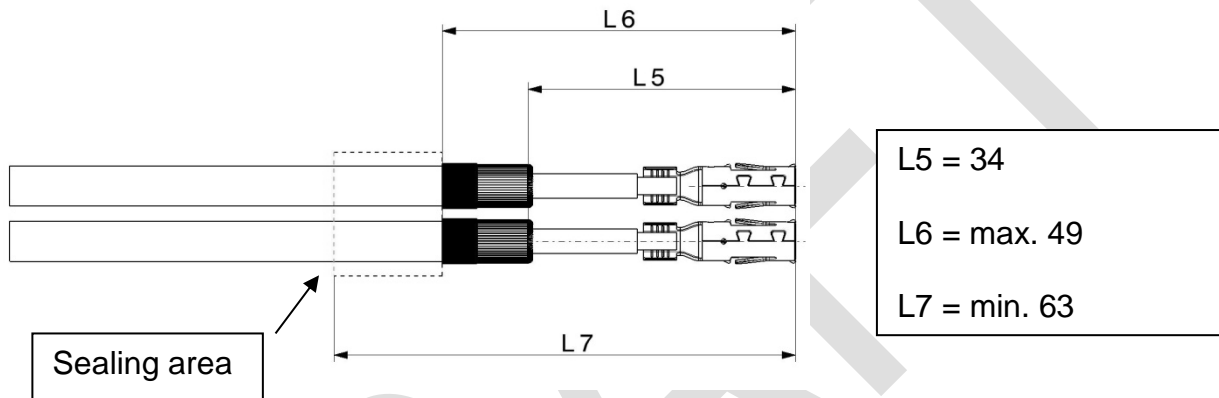
**Schaefer Werkzeug- und Sondermaschinenbau GmbH**  
**Dr.-Alfred-Weckesser-Str. 6**  
**76669 Bad Schoenborn-La, Deutschland**  
**Tel: +49 7253 9421-0**  
**Fax: +49 7253 9421-94**  
[www.schaefer.biz](http://www.schaefer.biz)

The commissioning of the crimping device has to be done through the manufacturer.

In this edition you can only find the information of the crimping and positioning of the crimping process.

## 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 and L6 are just for information. The dimensions are caused from the dimension L1, L4 and the EVS-100068.

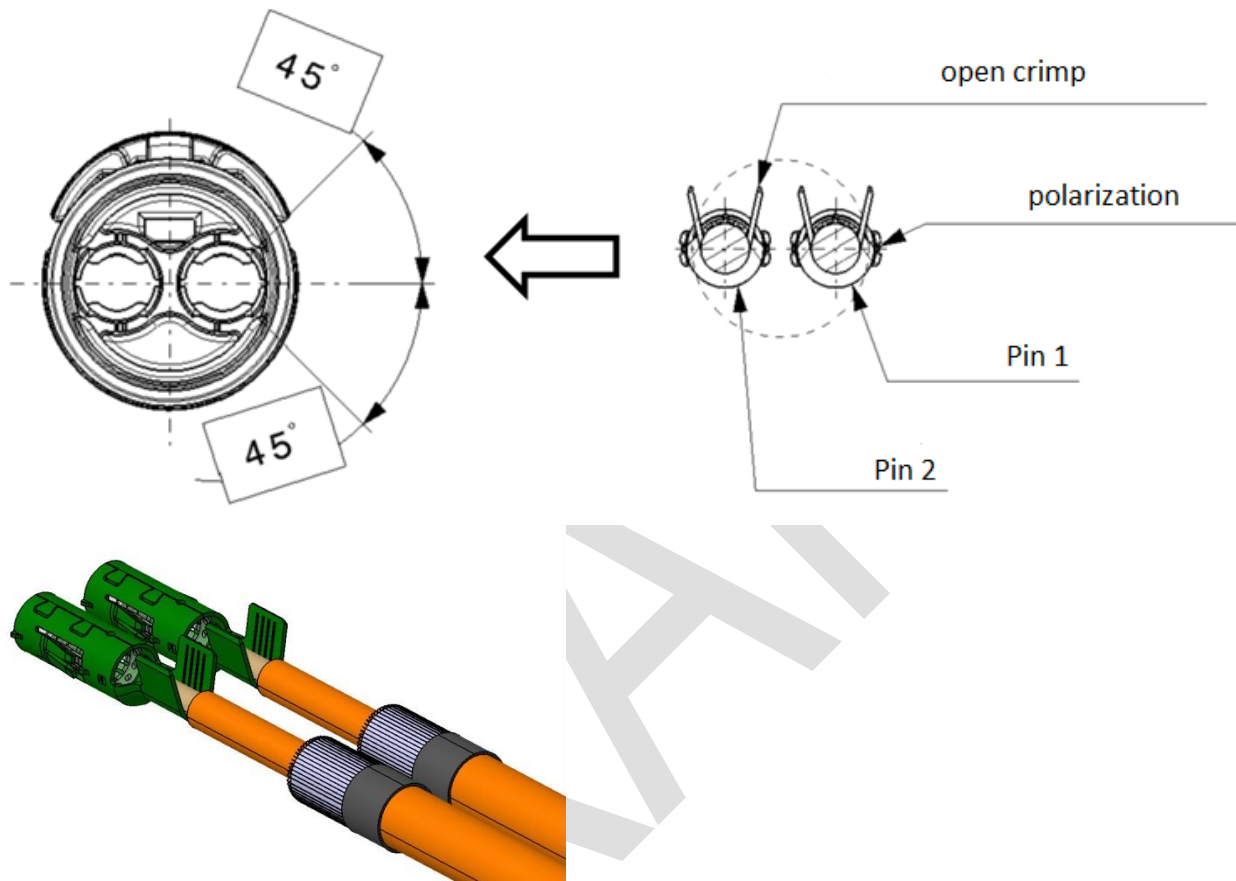
The difference of the length between the female terminals of max. 0,5mm is allowed.

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

At the area of the wire seal it is not allowed to deform or damage the outer sheath which has negative influence to the sealing function.

angled insert catches  
female contact holder HPS40-2

nominal position of the  
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.

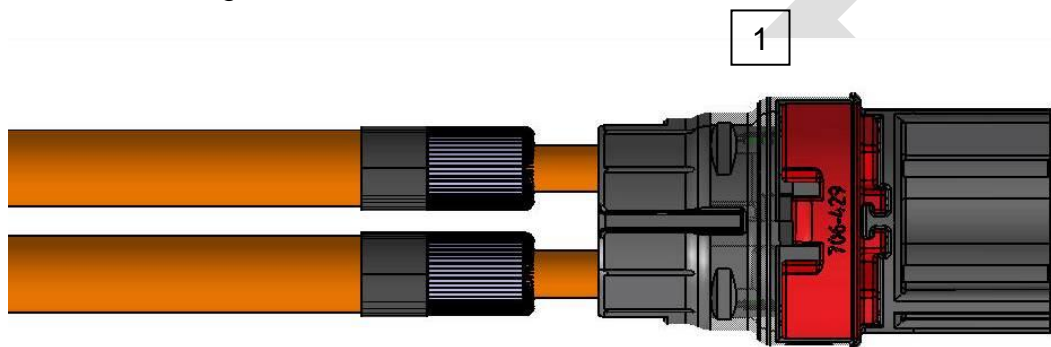
This can be checked during the assembling process. (see chapter 4.7 Assembly female terminals into the contact holder)

Note: As described in chapter 4.2, the locking device unit and shielding sleeve may as well be assembled onto the cable after step 4.6 (crimping of HCT4-female terminals).

### 3.7. Assembly

- Assemble female terminals into the contact holder (1).

When two wires with the same colour are used, the pinning has to be confirmed via electrical testing.



PIN 1 → + / PIN 2 → -

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.



<b>Huber &amp; Suhner</b>	FLR91XC33X 1x4 T150 1x4mm <sup>2</sup> RADOX 155S FLR
	30 N
<b>Wire Manufacturer</b>	<b>4,0mm<sup>2</sup></b>
	<b>Wire Cross- Section</b>

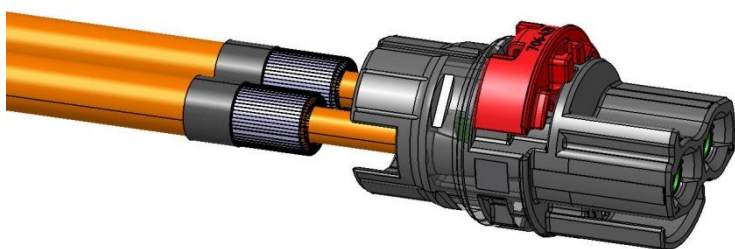
The female terminals have to be crimped.

The mounting force of the female terminals into the contact holder have to 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.

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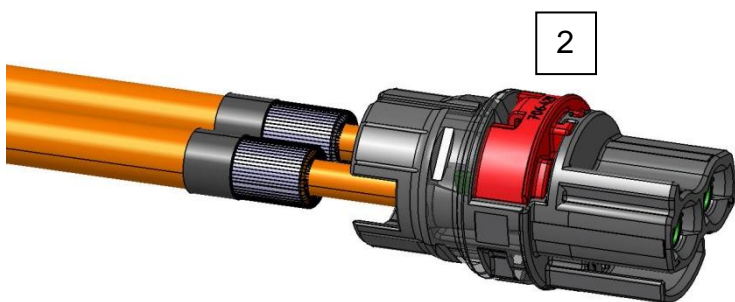


Sec. lock pre-locking / HV terminals primary locked

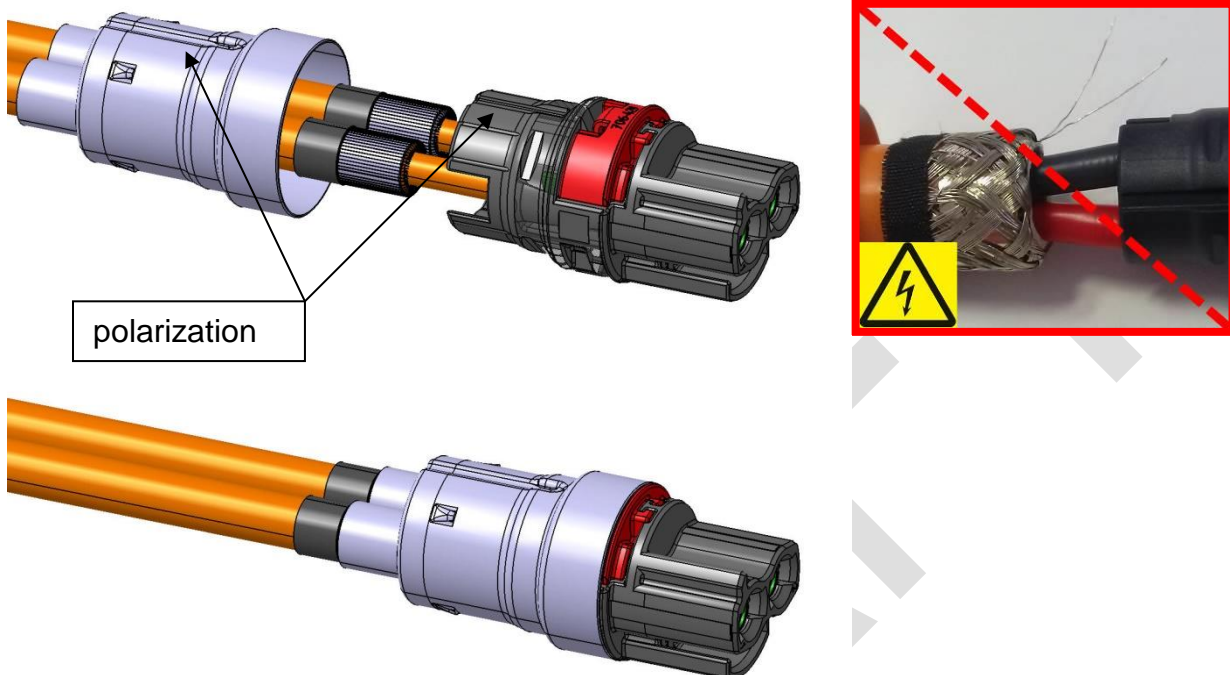


- Assemble secondary locking (2)

The secondary locking can only be assembled if the terminals are in the end position. A visible difference of the terminals to each other can be possible in the 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.



### 3.8. Push shielding sleeve onto contact holder



- Do not damage the shielding sleeve during the assembly.
- The shielding sleeve has to be assembled until the end position is reached.
- The fixing tape has to come out of the shield sleeve completely after assembling.
- It must be ensured that no single strands of the shield stick out before the shield sleeve is mounted. Demand-oriented, protruding single strands can be removed. This rework has to be clarified with each OEM.



**Risk of insulation failure.**

### 3.9. Press shield sleeve

- **Pressing device**

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

**Name: Pressing device HPS40-2 SCC**  
**Article number: EPS3000-HPS40-2**

Based on the processing guidelines of Hirschmann, 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:

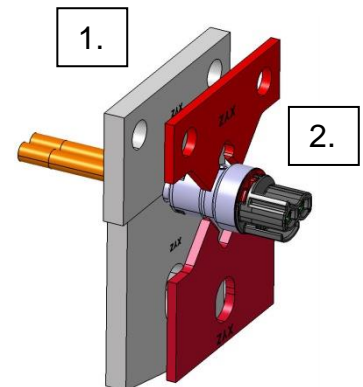
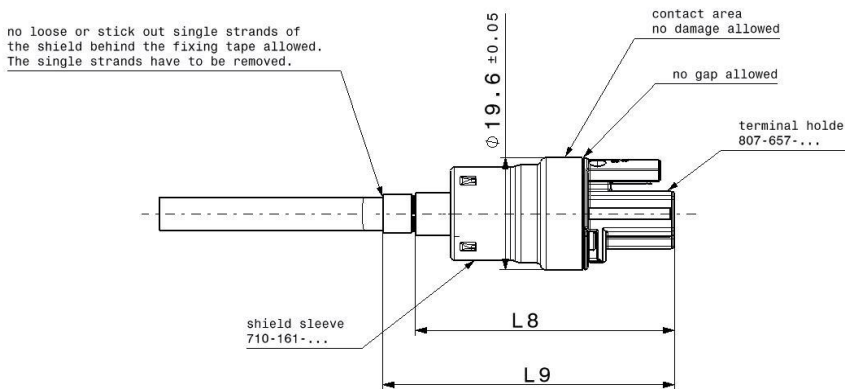
**Schaefer Werkzeug- und Sondermaschinenbau GmbH**  
**Dr.-Alfred-Weckesser-Str. 6**  
**76669 Bad Schoenborn-La, Deutschland**  
**Tel: +49 7253 9421-0**  
**Fax: +49 7253 9421-94**  
[www.schaefer.biz](http://www.schaefer.biz)

The commissioning of the pressing device has to be done through the manufacturer.

In this edition you can only find the information of the pressing data of the pressing.

• **Pressing data**

- a) The contact holder incl. the female contacts have to 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 has to stick out of the end of the shielding sleeve.
- c) The circularity of the shielding sleeve in the contact area has to be ensured.
- d) The measurements on the following drawing, have to be adhered to, before and after pressing.
- e) Two pressing actions will be done in one step
  - i. Shield pressing (shielding sleeve, shielding, stress relief and wire)
  - ii. Pressing of the contact holder (shielding sleeve and contact holder)



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

Do not damage the following parts during the pressing process.

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

$$L8 = 44,6 \pm 0,3$$

$$L9 = 49,4 \begin{matrix} +0,2 \\ -1,5 \end{matrix}$$

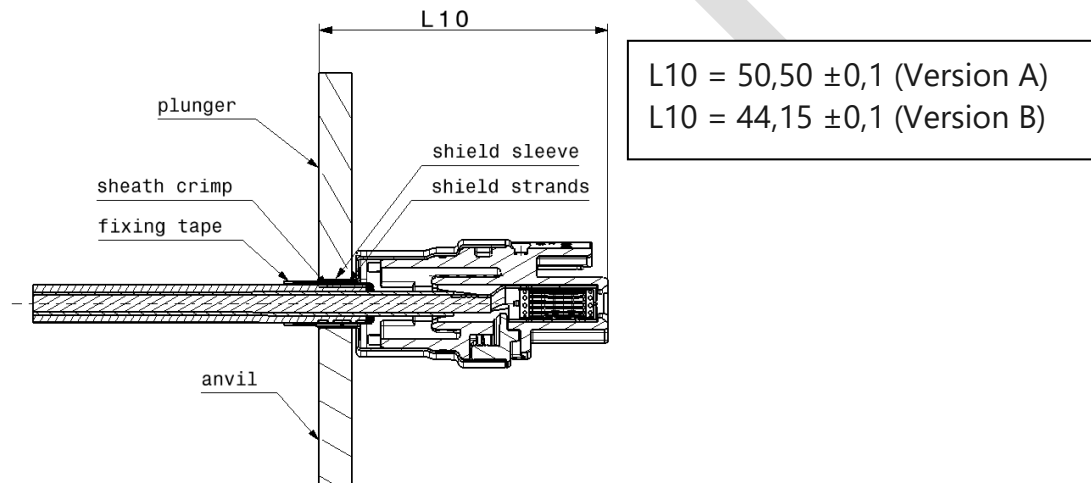
### 3.9.1. Shield pressing by two half-shells

- **Embossing position:**

The exact geometry of the plunger and anvil is given.

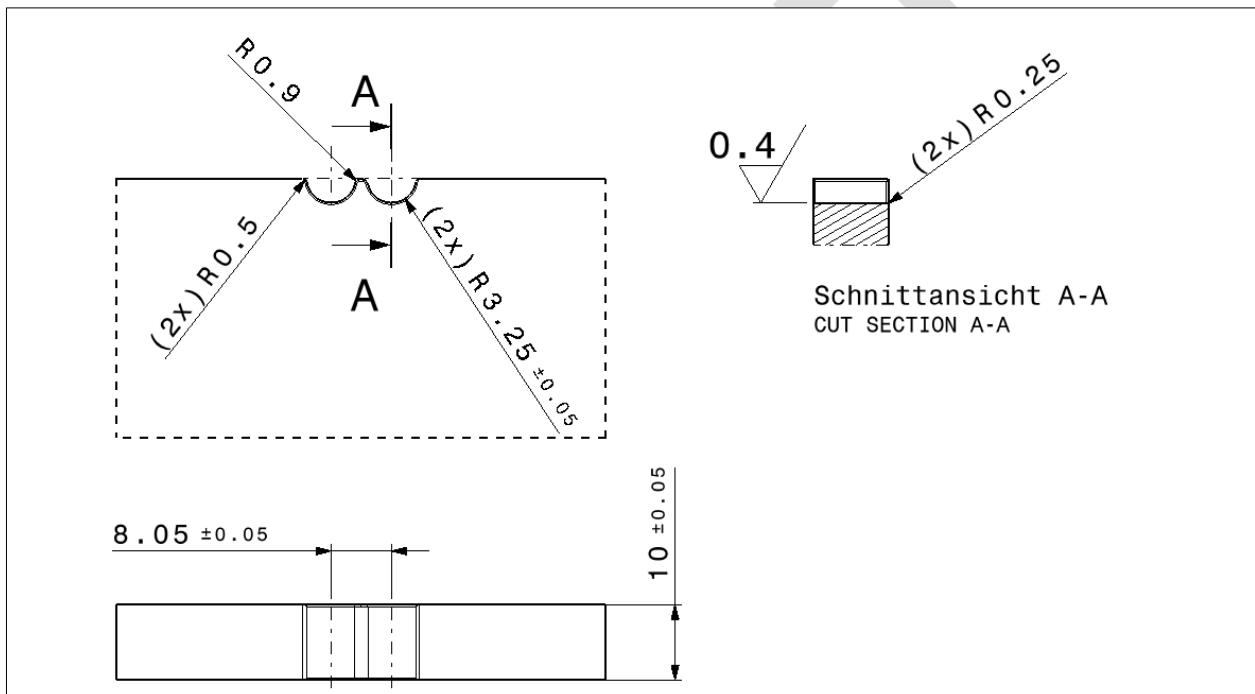
The position of the plunger and the anvil has to be reversed to the front plane of the contact holder.

The dimension L10 is the position of the plunger and the anvil.



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

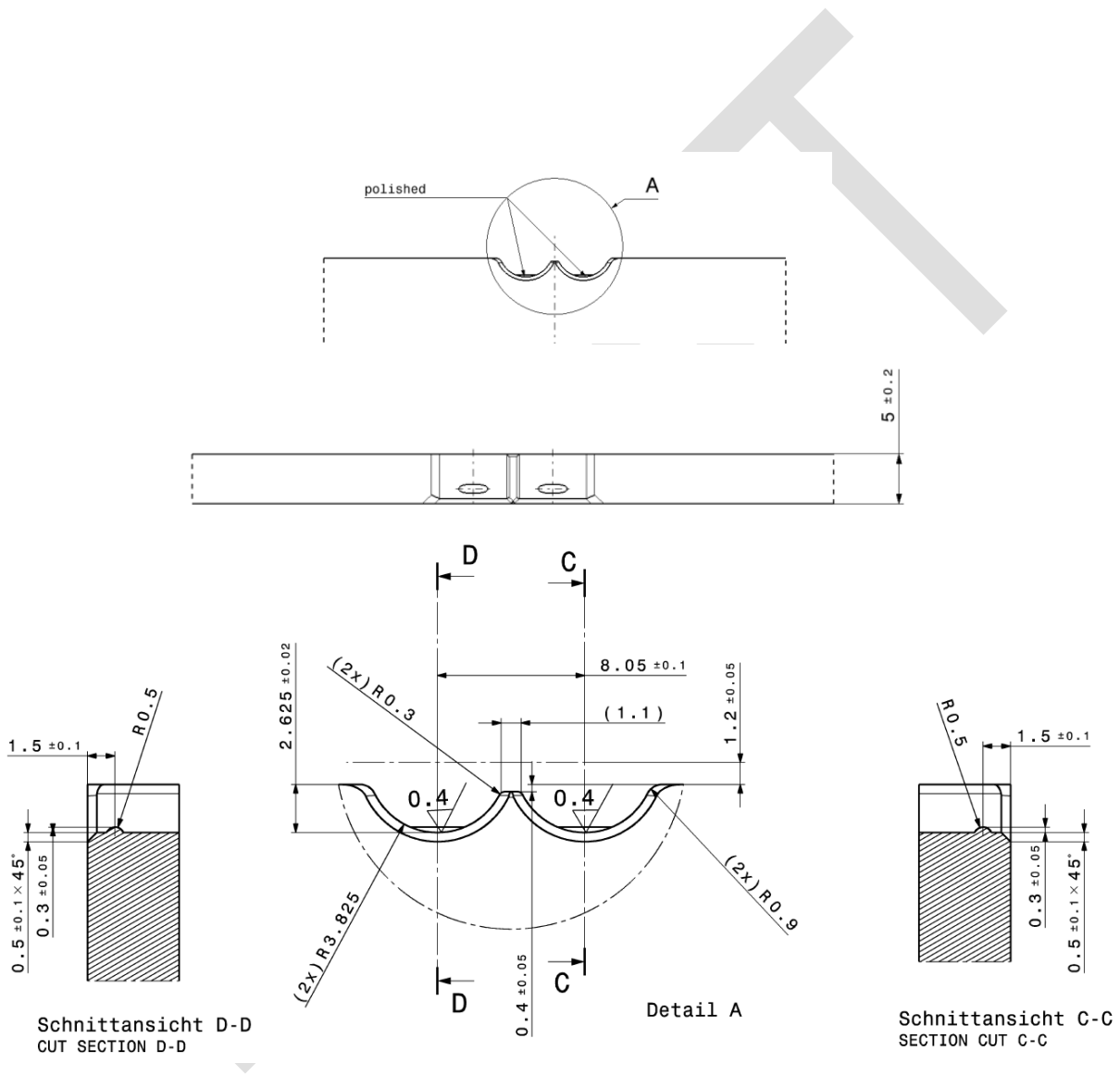
Plunger and anvil geometry of the wire shield pressing  
Material: 1.2721 vacuum hardened 58hrc





**Plunger and anvil geometry of the wire shield pressing  
 Version B – not for new applications**

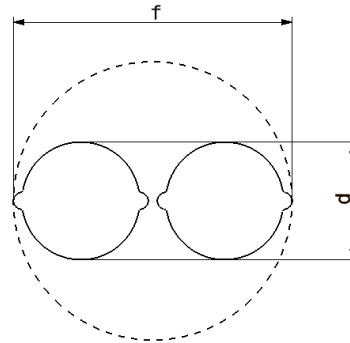
Plunger and anvil geometry of the wire shield pressing  
 Material: 1.2721 vacuum hardened 58hrc





- Embossing height:**

The plunger and anvil are pressed together to 0.2mm clearance. Due to this the dimension **d** will be given. See table of each cross section.



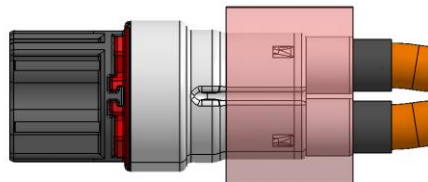
	Dimension d in mm
<b>Huber &amp; Suhner</b>	6.8 ± 0.1 (Version A)
	6.15 ± 0.1 (Version B)
Wire manufacturer	4,0mm <sup>2</sup>
	<b>Wire cross section (structure of conductor)</b>

During the pressing process a fold appears on two sides. This fold is not allowed to be bigger than the diameter  $\varnothing f = 16.9$  refer to the centerline of the connector.

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 **16.9** mm has to be used. The diameter **f** has to be respected within the entire highlighted area:



To check the dimension **d**, the height needs to be measured acc. to the drawing. All of the dimensions have to be within the given tolerance. (see spreadsheet page 64).



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



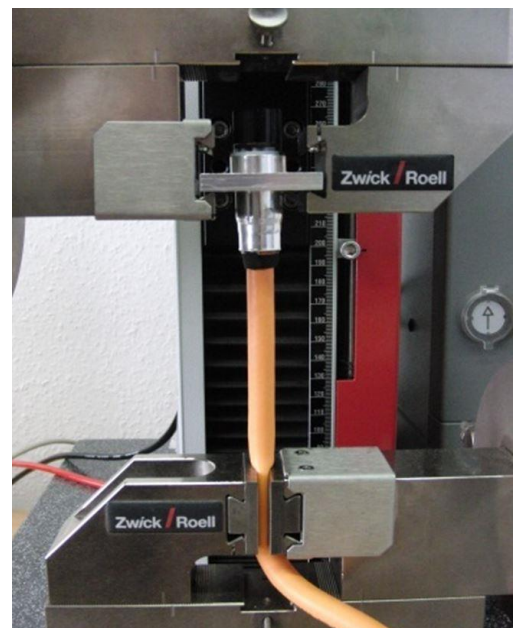
- Pulling force of the wire**

In order 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, in order to test the shield pressing only. In this state, the figure in the table must be reached.

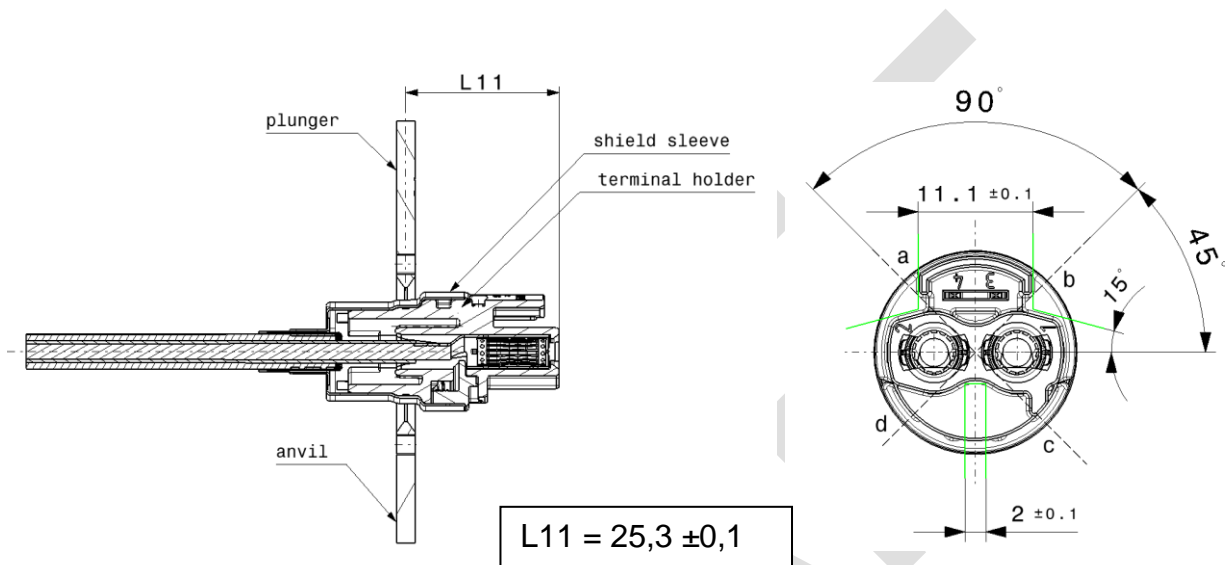
v = 50mm/min±10mm/min

4,0mm <sup>2</sup>	≥ 150N
<b>Wire cross section (structure of conductor)</b>	<b>Pulling force</b>



### 3.9.2. Pressing contact holder

- **Embossing position:**



The dimension L11 describes the position of the pressing.

The position of the plunger and the anvil has to 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.

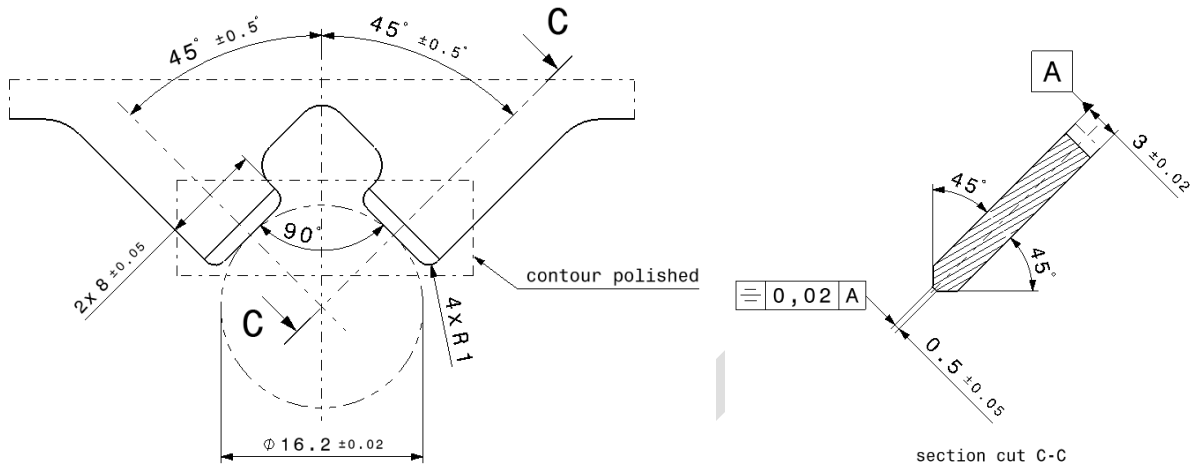
Therefore the terminal holder must be secured against rotation.

The green areas can be used as a jack for the contact holder.

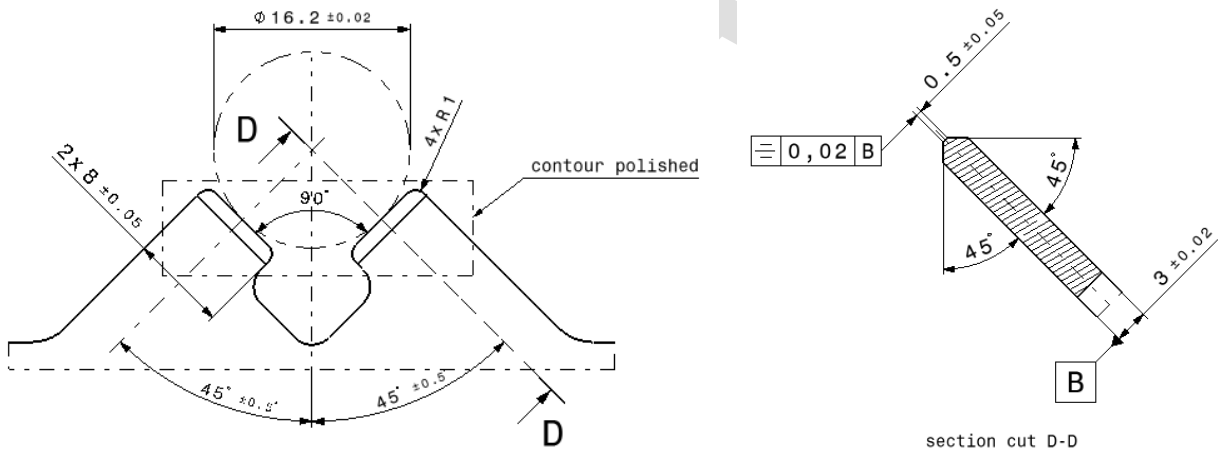
Ensure that any coding version of the terminal holder can be inserted into the jack.

The exact geometry of the plunger and anvil is given.

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



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



Anvil geometry of the terminal holder pressing  
 Material: 1.2721 vacuum hardened 58hrc

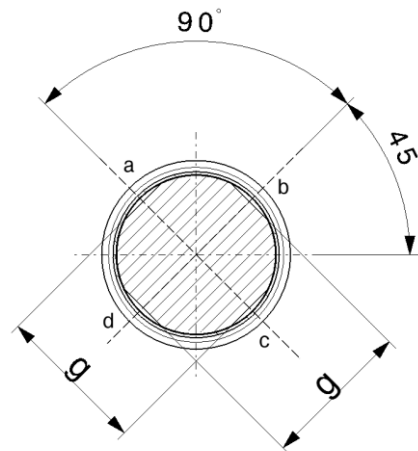


- **Embossing height g:**

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

The embossing has to be done at the same time.

dimension g = 16,40 mm ± 0,1



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

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

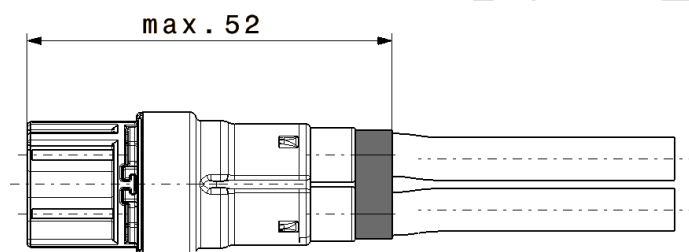
The measuring of the embossing height has to be done with a suitable measuring device. (Micrometer, measuring range: 0-25mm)  
The thickness of the measuring blades must be lower than 0,6mm.



### 3.10. Taping of the wires

To ensure that the welding of the shield-sleeve is not damaged after step 3.9, the two wires have to be taped together. In this specification the PET- fabric tape 837X (838X) 5mm of the company coroplast is used.

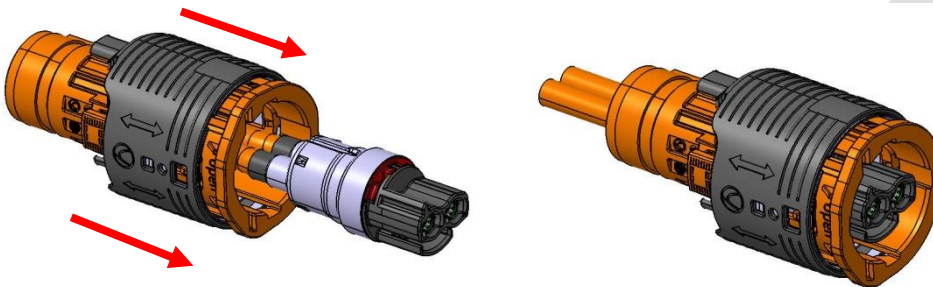
It is possible to use another product to fix the wires. The product must have min. 150°C thermal resistance.



This process step can be skipped if it is ensured that the wires are not pulled apart in a different way.

### 3.11. Positioning of the female locking device unit

The female locking device unit has to 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:** Assembling device HPS40-2 NAFTA  
**Article number:** HPS40-2

Based on the processing guidelines of Hirschmann, the device was designed and produced.

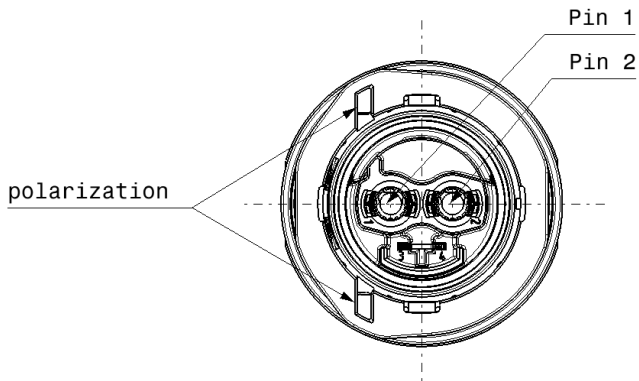
The details of the commissioning, handling and the process guideline of the device can be requested directly at the supplier:

Each manufacturer is responsible of the commissioning of the pressing device.

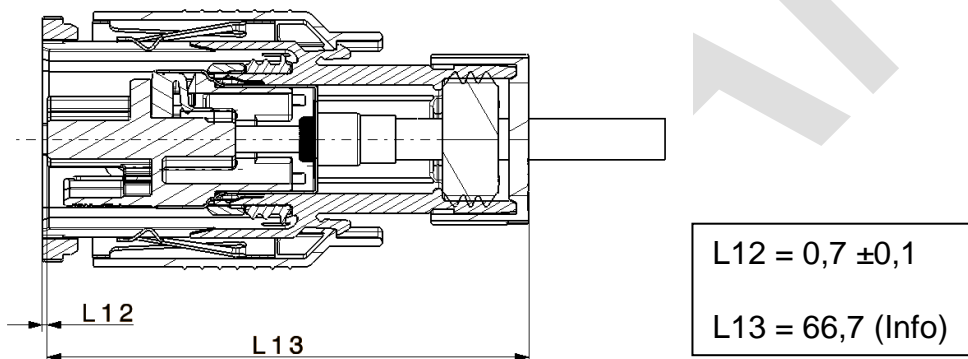
**WKM - Maschinenbau GmbH**  
**Oberes Ried 15**  
**A-6833 Klaus**  
**Tel. +43 5523 / 54907**

The commissioning of the pressing device has to be done through the manufacturer.

In this edition you can only find the assembling data of the pressing process.

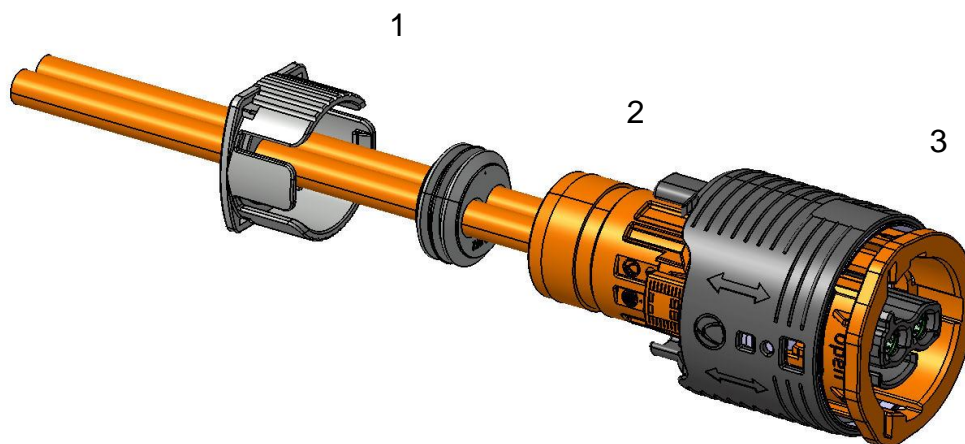


- The contact holder incl. the shield sleeve needs to be assembled into the locking device unit in the correct position.  
Both polarizations need to be symmetric to the axis in between of the centre of Pin1 and Pin2.  
Also, the polarization has to be on the side of Pin 1.

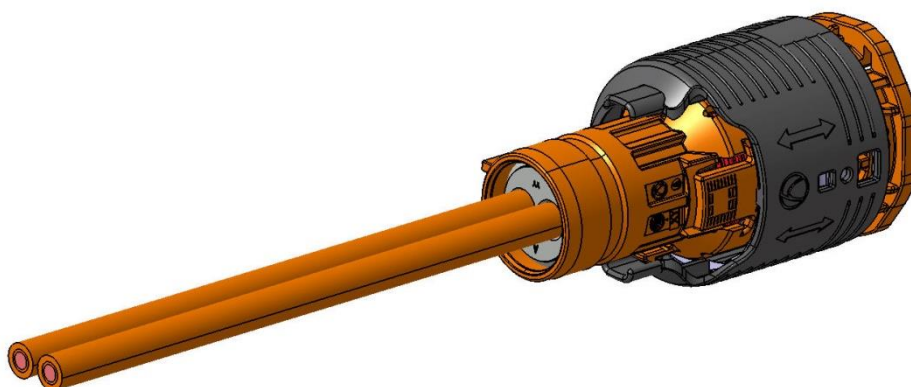


- The locking sleeve must be assembled onto the shield sleeve force-assisted until the dimension L12 is reached.  
The dimension L13 is only for checking purposes.
- During the assembling process, there are no damages allowed on the shield sleeve, the contact holder or the wire.
- There is no pull on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

### 3.12. Assemble seal and cover cap



- Push seal [2] into the female locking device unit [3]



The cable seal can be slightly widened during assembly.

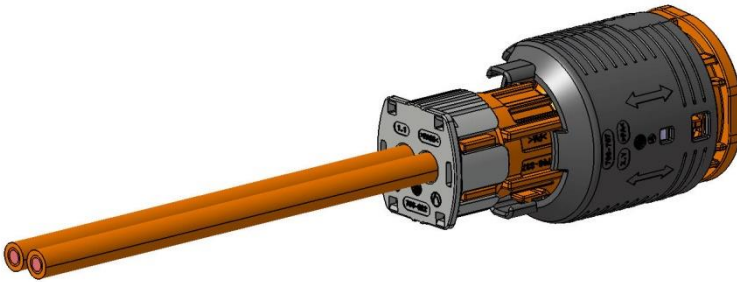
It is possible to move the seal with the cover cap on the wire but care must be taken that the seal does not twist and is not pinched or damaged.



- Snap the cover cap [1] into the recess of the female locking device unit [3].  
The cap can be assembled either way, as it is 180° symmetrical.



Cover cap on end position



- Do not damage the cover cap (1) or the seal (2) during assembly.

### 3.13. **Stacking of produced harnesses**

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

### 3.14. **Technical cleanliness**

In general, pay attention to the cleanliness on the connector and inside of the connector. Metallic particles generated during the assembly process, have to be removed with a suitable device. Inside the connector and on the connector, there are no metallic particles > 1000µm 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

### 3.15. **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.

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**

### 3.16. **General requirements**

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