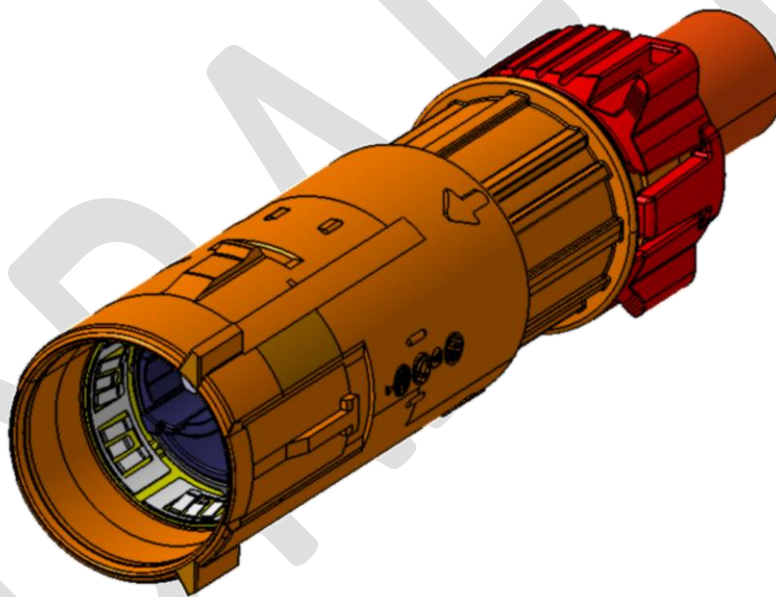


# Process Specification

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



**EVS-100139-03**  
**Version XX**



## Table of content

|          |                                                                            |           |
|----------|----------------------------------------------------------------------------|-----------|
| <b>1</b> | <b>General</b>                                                             | <b>4</b>  |
| 1.1      | General information and requirements                                       | 4         |
| 1.2      | Introduction                                                               | 5         |
| 1.3      | Applicable documents                                                       | 6         |
| 1.4      | Customer release                                                           | 7         |
| <b>2</b> | <b>Product structure (single components)</b>                               | <b>8</b>  |
| 2.1      | “Europe” configuration                                                     | 8         |
| 2.2      | “China” configuration                                                      | 9         |
| 2.3      | Shielded-Cable 6mm <sup>2</sup> and 4mm <sup>2</sup>                       | 10        |
| 2.4      | HCT4short male (Hirschmann Automotive)                                     | 11        |
| 2.5      | Stress-Relief HPS40-2 (Hirschmann Automotive)                              | 12        |
| 2.6      | ASSY Shield-Sleeve (Hirschmann Automotive)                                 | 13        |
| 2.7      | Cover-Cap (Hirschmann Automotive)                                          | 14        |
| 2.8      | Wire-Seal (Hirschmann Automotive)                                          | 15        |
| 2.9      | ASSY Contact-Holder HPS40-2 PLUS (Hirschmann Automotive)                   | 16        |
| 2.10     | Plastic-Housing (Hirschmann Automotive)                                    | 17        |
| 2.11     | Transport-Protection-Cap (Hirschmann Automotive)                           | 18        |
| <b>3</b> | <b>Processing steps</b>                                                    | <b>19</b> |
| 3.1      | Cut shielded cable                                                         | 19        |
| 3.2      | Assembly single components                                                 | 21        |
| 3.3      | Strip off the Shielded-Cable                                               | 22        |
| 3.4      | Assemble the stress relief, remove the foil and shorten the shielding      | 23        |
| 3.5      | Reverse the shield backwards, hold the shield with tape and remove filling | 25        |
| 3.6      | Crimp the HCT4short male                                                   | 27        |



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|          |                                                                                              |           |
|----------|----------------------------------------------------------------------------------------------|-----------|
| 3.7      | Assembly.....                                                                                | 29        |
| 3.8      | Push the ASSY Shield-Sleeve onto ASSY Contact-Holder .....                                   | 32        |
| 3.9      | Assemble ASSY Contact-Holder with wires into ASSY Shield-Sleeve .....                        | 33        |
| 3.10     | Rotative orientation .....                                                                   | 34        |
| 3.11     | Press ASSY Shield-Sleeve .....                                                               | 35        |
| 3.11.1   | Shield pressing by two half-shells .....                                                     | 37        |
| 3.12     | Positioning of the male locking device unit.....                                             | 42        |
| 3.13     | Assemble Wire-Seal and Cover-Cap.....                                                        | 44        |
| 3.14     | Assemble transport protection cap (optional) .....                                           | 46        |
| 3.15     | Technical cleanliness .....                                                                  | 47        |
| <b>4</b> | <b>Appendix.....</b>                                                                         | <b>48</b> |
| 4.1      | Double stroke crimping machine (see chapter 3.6) .....                                       | 48        |
| 4.2      | Assemble ASSY Male-Contact-holder with wires into ASSY Shield-sleeve (see chapter 3.9) ..... | 49        |
| 4.3      | Pressing device (see chapter 3.11) .....                                                     | 49        |
| 4.4      | Assembly device Plastic-housing (see chapter 3.12) .....                                     | 49        |
| 4.5      | Auxiliary measuring devices.....                                                             | 50        |
| <b>5</b> | <b>Change History.....</b>                                                                   | <b>51</b> |

## **1 General**

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

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

## 1.2 Introduction

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

**Table 1: HPS40-2 In-Line PLUS**

|               |                                          |               |                      |                       |                   |
|---------------|------------------------------------------|---------------|----------------------|-----------------------|-------------------|
| 85E.973.802   | 810-480-501                              | A             | 6mm <sup>2</sup>     | HCT4                  | Europe            |
| 85E.973.802.A | 810-480-511                              | A             | 4mm <sup>2</sup>     |                       |                   |
| 85D.973.802   | 810-133-501                              | A             | 6mm <sup>2</sup>     |                       | China             |
| <b>VW-No.</b> | <b>Hirschmann<br/>Automotive<br/>No.</b> | <b>Coding</b> | <b>Cross section</b> | <b>Terminalsystem</b> | <b>Assignment</b> |

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

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



### 1.3 Applicable documents

**Table 2: Applicable Documents**

|   |                                                           |                                                     |
|---|-----------------------------------------------------------|-----------------------------------------------------|
| A | Product drawing                                           | VW-Nr.: 85E.973.802 (Europe)<br>85D.973.802 (China) |
| B | Product specification                                     | HA-Nr. EPS-100140-03                                |
| C | Interface drawing                                         | VW-Nr. 85E.900.962.M                                |
| D | HCT4 Process specification (Ag)                           | EVS-100068                                          |
| E | Data sheet 2x6mm <sup>2</sup> shielded cable of Coroplast | Coroplast Nr.: 9-2641 (2x6mm <sup>2</sup> )         |
| F | Data sheet 2x4mm <sup>2</sup> shielded cable of Coroplast | Coroplast Nr.: 9-2641 (2x4mm <sup>2</sup> )         |
| G | Data sheet 2x6mm <sup>2</sup> shielded cable of Cablena   | Cablana Nr.: 109.206.001.7 (2x6mm <sup>2</sup> )    |
| H | Data sheet 2x4mm <sup>2</sup> shielded cable of Cablena   | Cablana Nr.: 109.204.001.7 (2x4mm <sup>2</sup> )    |
| I | Data sheet 2x6mm <sup>2</sup> shielded cable of Hengtong  | Hengtong Nr.: FHLR2GCB2G (2x6mm <sup>2</sup> )      |

## 1.4 Customer release

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

**Table 3: Special Characteristics**

| Special Characteristics |    |                                              |                                              |                         |      |
|-------------------------|----|----------------------------------------------|----------------------------------------------|-------------------------|------|
| S                       | F  | Characteristic                               | Specific Purpose                             | Place of implementation | Page |
| -                       | F1 | Embossing height d                           | Stress-Relief, elec. shield contacting - EMC | Tier 1                  | 39   |
| -                       | F2 | L12 Assembly position of the Plastic-Housing | Pluggability                                 | Tier 1                  | 41   |
| -                       | F3 | Crimp-height HCT4 acc. EVS-100068            | Elec. contacting main conductor              | Tier 1                  | 28   |

Legend:

S - Safety

F - Function

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

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

## 2 Product structure (single components)

### 2.1 “Europe” configuration

**Table 4: Hirschmann Automotive PowerStar 40-2 In-Line PLUS 4mm<sup>2</sup> un 6mm<sup>2</sup> Europe**

| Part Information                   |              | Quantity per Version         |                              |
|------------------------------------|--------------|------------------------------|------------------------------|
|                                    |              | Coding A<br>6mm <sup>2</sup> | Coding A<br>4mm <sup>2</sup> |
|                                    |              | 85E.973.802                  | 85E.973.802.A                |
| Description/ Naming                | HA-Order-No. | 810-480-501                  | 810-480-511                  |
| Plastic-Housing                    | 706-880-503  | 1                            | 1                            |
| ASSY Contact-Holder                | 810-478-511  | 1                            | 1                            |
| ASSY Shield-Sleeve                 | 810-481-501  | 1                            | 1                            |
| Stress-Relief DDP 6mm <sup>2</sup> | 712-492-503  | 1                            | -                            |
| Stress-Relief DDP 4mm <sup>2</sup> | 712-492-502  | -                            | 1                            |
| Wire-Seal 6mm <sup>2</sup>         | 709-113-506  | 1                            | -                            |
| Wire-Seal 4mm <sup>2</sup>         | 709-113-505  | -                            | 1                            |
| Cover-Cap 6mm <sup>2</sup>         | 706-430-503  | 1                            | -                            |
| Cover-Cap 4mm <sup>2</sup>         | 706-430-502  | -                            | 1                            |
| HCT4short 6mm <sup>2</sup>         | 709-633-506  | 2                            | -                            |
| HCT4short 4mm <sup>2</sup>         | 709-633-505  | -                            | 2                            |



## 2.2 “China” configuration

**Table 5: Hirschmann Automotive PowerStar 40-2 PLUS In-Line 6mm<sup>2</sup> China**

| Part Information                         |              | Quantity per Version         |
|------------------------------------------|--------------|------------------------------|
|                                          |              | Coding A<br>6mm <sup>2</sup> |
|                                          |              | 85D.973.802                  |
| Description/ Naming                      | HA-Order-No. | 810-480-501                  |
| Plastic-housing                          | 706-880-553  | 1                            |
| ASSY Contact-carrier coding A            | 810-478-511  | 1                            |
| ASSY Shield-sleeve                       | 810-481-501  | 1                            |
| Stress-Relief DDP 6mm <sup>2</sup>       | 712-492-503  | 1                            |
| Wire-seal 6mm <sup>2</sup>               | 709-113-506  | 1                            |
| Cover-cap 6mm <sup>2</sup>               | 706-430-503  | 1                            |
| HCT4short male terminal 6mm <sup>2</sup> | 709-633-506  | 2                            |

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



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



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

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

|                                 |                                                           |                                     |
|---------------------------------|-----------------------------------------------------------|-------------------------------------|
| <b>Coroflex<br/>(Coroplast)</b> | FHLR2GCB2G<br>600/1000V T180                              | FHLR2GCB2G<br>600/1000V T180        |
|                                 | 9-2641 (2x6mm <sup>2</sup> )                              | 9-2641 (2x4mm <sup>2</sup> )        |
| <b>Cablana<br/>(Conduxmex)</b>  | FHLR2GCB2G<br>600/1000V T180                              | FHLR2G2GCB2G<br>600/1000V T180      |
|                                 | 109.206.001.7 (2x6mm <sup>2</sup> )                       | 109.204.001.7 (2x4mm <sup>2</sup> ) |
| <b>Hengtong</b>                 | FHLR2GCB2G<br>600/1000V T180                              | -                                   |
|                                 | t.b.d.                                                    | -                                   |
| <b>Wire<br/>manufacturer</b>    | <b>6mm<sup>2</sup></b>                                    | <b>4mm<sup>2</sup></b>              |
|                                 | <b>Wire cross section<br/>(construction of conductor)</b> |                                     |

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

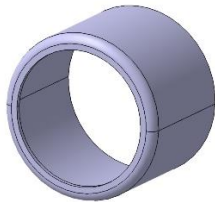
## 2.4 HCT4short male (Hirschmann Automotive)

**Figure 3: HCT4short 6mm<sup>2</sup>****Figure 4: HCT4short 4mm<sup>2</sup>****Table 7: Hirschmann Automotive male terminal HCT4**

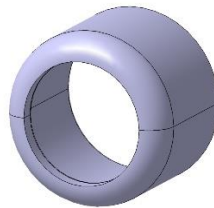
|               |                                  |                                                       |                                 |
|---------------|----------------------------------|-------------------------------------------------------|---------------------------------|
| N.108.777.01  | 709-633-506                      | 6mm <sup>2</sup>                                      | HCT4short male 6mm <sup>2</sup> |
| N.108.936.01  | 709-633-505                      | 4mm <sup>2</sup>                                      | HCT4short male 4mm <sup>2</sup> |
| <b>VW-No.</b> | <b>Hirschmann Automotive No.</b> | <b>Wire cross section (construction of conductor)</b> | <b>Product description</b>      |

The HCT4short male are delivered reeled on a spool.

## 2.5 Stress-Relief HPS40-2 (Hirschmann Automotive)



**Figure 5: Stress-Relief DDP 6mm²**  
**712-492-503**



**Figure 6: Stress-Relief DDP 4mm²**  
**712-492-502**

**Table 8: Hirschmann Automotive stress relief**

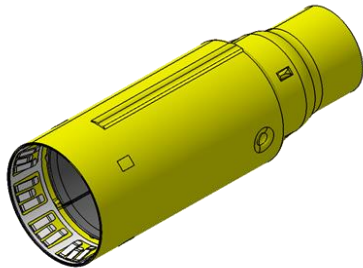
|                                      |                                                               |                            |
|--------------------------------------|---------------------------------------------------------------|----------------------------|
| 712-492-503                          | 6mm²                                                          | Stress-Relief 6mm² DDP     |
| 712-492-502                          | 4mm²                                                          | Stress-Relief 4mm² DDP     |
| <b>Hirschmann<br/>Automotive No.</b> | <b>Wire cross section<br/>(construction of<br/>conductor)</b> | <b>Product description</b> |

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

VW/Audi - No.: 85E.973.802 / 85D.973.802

The Stress-Reliefs are delivered as bulk goods.

## 2.6 ASSY Shield-Sleeve (Hirschmann Automotive)



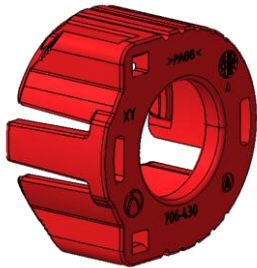
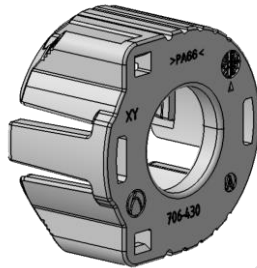
**Figure 7: ASSY Shield-Sleeve**

**Table 9: Hirschmann Automotive ASSY Shield-Sleeve**

|                                      |                            |
|--------------------------------------|----------------------------|
| 810-481-501                          | ASSY Shield-Sleeve         |
| <b>Hirschmann<br/>Automotive No.</b> | <b>Product description</b> |

The ASSY Shield-Sleeve are delivered as bulk goods.

## 2.7 Cover-Cap (Hirschmann Automotive)

**Figure 8: Cover-Cap 6mm²****Figure 9: Cover-Cap 4mm²****Table 10: Hirschmann Automotive Cover-Cap**

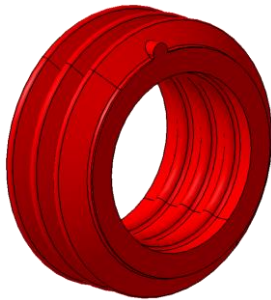
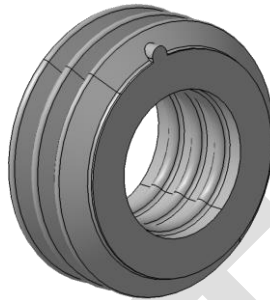
|                                  |                                                       |              |                            |
|----------------------------------|-------------------------------------------------------|--------------|----------------------------|
| 706-430-503                      | 6mm²                                                  | red          | Cover-Cap 6mm²             |
| 706-430-502                      | 4mm²                                                  | grey         | Cover-Cap 4mm²             |
| <b>Hirschmann Automotive No.</b> | <b>Wire cross section (construction of conductor)</b> | <b>Color</b> | <b>Product description</b> |

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

VW/Audi - No.: 85E.973.802 / 85D.973.802

The Cover-caps are delivered as bulk goods.

## 2.8 Wire-Seal (Hirschmann Automotive)

**Figure 10: Wire-Seal 6mm<sup>2</sup>****Figure 11: Wire-Seal 4mm<sup>2</sup>****Table 11: Hirschmann Automotive Wire-Seal**

|                                      |                                                           |              |                            |
|--------------------------------------|-----------------------------------------------------------|--------------|----------------------------|
| 709-113-506                          | 6mm <sup>2</sup>                                          | red          | Wire-Seal 6mm <sup>2</sup> |
| 709-113-505                          | 4mm <sup>2</sup>                                          | grey         | Wire-Seal 4mm <sup>2</sup> |
| <b>Hirschmann<br/>Automotive No.</b> | <b>Wire cross section<br/>(construction of conductor)</b> | <b>Color</b> | <b>Product description</b> |

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

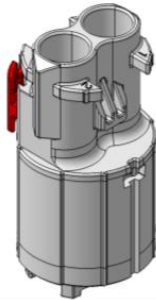
VW/Audi - No.: 85E.973.802 / 85D.973.802

The Wire-Seals are delivered as bulk goods.

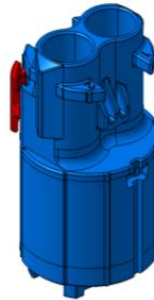
## 2.9 ASSY Contact-Holder HPS40-2 PLUS (Hirschmann Automotive)



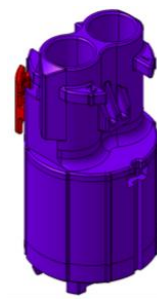
**Figure 12: ASSY  
Contact-Holder PLUS  
Cod. A**



**Figure 13: ASSY  
Contact-Holder PLUS  
Cod. B**



**Figure 14: ASSY  
Contact-Holder PLUS  
Cod. C**



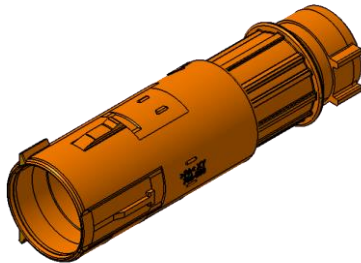
**Figure 15: ASSY  
Contact-Holder PLUS  
Cod. D**

**Table 12: Hirschmann Automotive ASSY Male-Terminal-Holder HPS40-2 PLUS**

|                                      |             |               |                                   |
|--------------------------------------|-------------|---------------|-----------------------------------|
| 810-478-511                          | A           | black         | ASSY Contact-Holder PLUS Coding A |
| 810-478-512                          | B           | nature/ white | ASSY Contact-Holder PLUS Coding B |
| 810-478-513                          | C           | blue          | ASSY Contact-Holder PLUS Coding C |
| 810-478-514                          | D           | purple        | ASSY Contact-Holder PLUS Coding D |
| <b>Hirschmann<br/>Automotive No.</b> | <b>Cod.</b> | <b>Color</b>  | <b>Product description</b>        |

The ASSY Male Contact-holder HPS40-2 PLUS are delivered in blister packaging.

## 2.10 Plastic-Housing (Hirschmann Automotive)



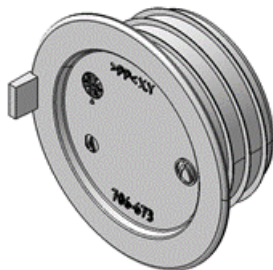
**Figure 16: Plastic-Housing**

**Table 13: Hirschmann Automotive Plastic housing**

|                                      |                            |                        |
|--------------------------------------|----------------------------|------------------------|
| 706-880-503                          | Plastic housing            | "Europe" configuration |
| 706-880-553                          | Plastic housing            | "China" configuration  |
| <b>Hirschmann<br/>Automotive No.</b> | <b>Product description</b> | <b>Assignment</b>      |

The Plastic-housing are delivered as bulk goods.

## 2.11 Transport-Protection-Cap (Hirschmann Automotive)



**Figure 17: Transport-Protection-Cap**

**Table 14: Hirschmann Automotive Transport-Protection-Cap**

|                                      |                                  |                |
|--------------------------------------|----------------------------------|----------------|
| 706-673-501                          | Transport-Protection-Cap HPS40-2 | optional       |
| <b>Hirschmann<br/>Automotive No.</b> | <b>Product description</b>       | <b>comment</b> |

The transport protection cap is delivered as bulk good.

### 3 Processing steps

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

As a reference sample, the ASSY Contact-holder Coding A and a 2x6mm<sup>2</sup> cable are used.

#### 3.1 Cut shielded cable



Figure 18: Symbolic representation of the Shielded-Cable

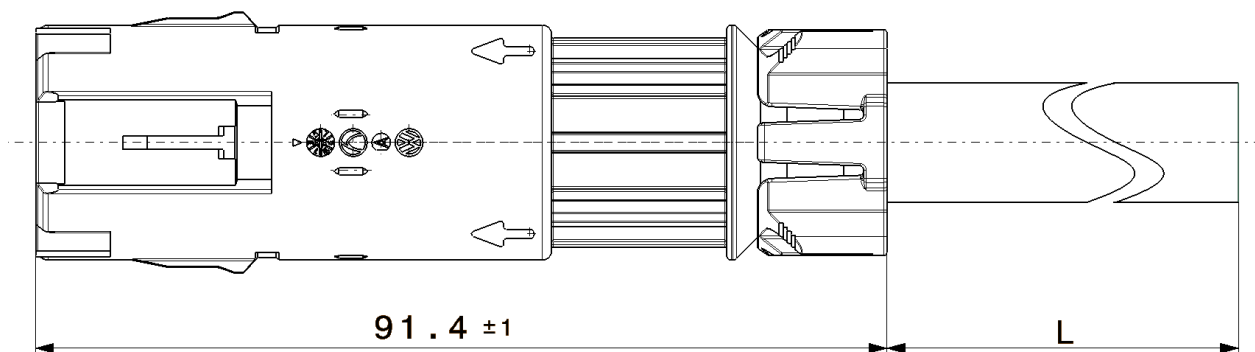
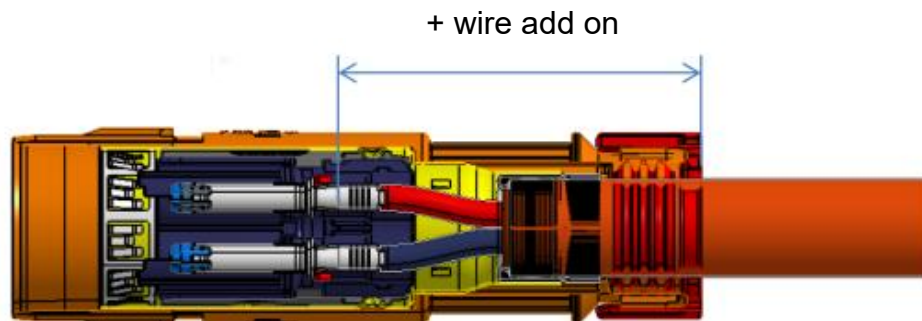


Figure 19: Cable-length add-on

**Figure 20: Wire add-on inside the HPS40-2 In-Line PLUS**

Add the following lengths for the Hirschmann Automotive HPS40-2 In-Line PLUS connector:

**Table 15: additional wire length**

|                             |                                        |
|-----------------------------|----------------------------------------|
| 6mm <sup>2</sup>            | L + 48                                 |
| 4mm <sup>2</sup>            | L + 48                                 |
| <b>Wire (cross section)</b> | <b>Dimension L after zero-cut (mm)</b> |

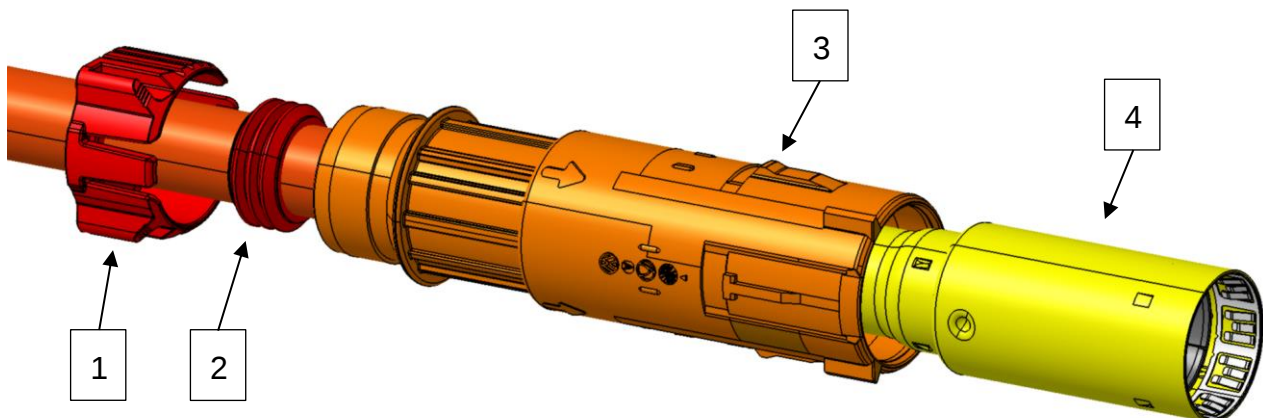
These dimensions have to be added to the planned length at the cutting process of the wire for each connector.

**Note:**

For reproducible series-production of the product, a double stroke system with zero cut should be used for production. When using equipment with a zero cut, it must be considered for the following process steps, that the correct over-length for the zero cut must be added. The exact length of the zero cut must be agreed with the equipment manufacturer and taken into account for the manufacturing process.

### 3.2 Assembly single components

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



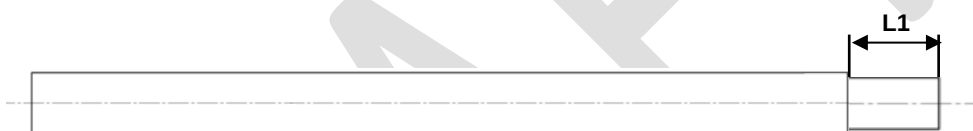
**Figure 21: Assembly of components**

### 3.3 Strip off the Shielded-Cable



**Figure 22: Strip off Shielded-Cable**

Stripping length:



**Figure 23: Stripping length L1**

**Table 16: Stripping length L1**

|                             |                                         |
|-----------------------------|-----------------------------------------|
| 6mm <sup>2</sup>            | min. 19,5                               |
| 4mm <sup>2</sup>            | min. 19,5                               |
| <b>Wire (cross section)</b> | <b>Dimension L1 after zero-cut (mm)</b> |

The dimension L1 must be more than 21.5 mm for further processing. In the case of a deviation in overlength, a zero cut, as described in chapter 3.1, must be carried out before attaching the HCT4 contacts (see chapter 3.6) to maintain dimension L5 or L5.1. The braided shield must not be damaged during processing.

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



**Figure 24: Assemble the stress relief**



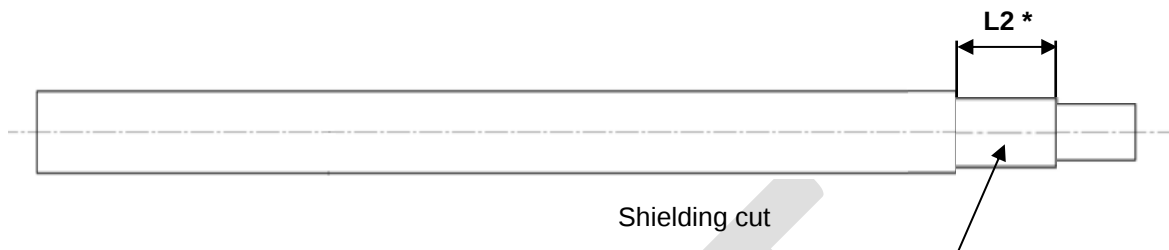
**Figure 25: remove the foil**



**Figure 26: shorten the shielding**

- The following process steps must be done, but the manufacturer can choose the sequence:
  - a) Assemble the Stress-Relief (712-492-...) see Table 8.
  - b) The foil needs to be removed.
  - c) The shielding must be shortened.
- An overlap of the foil in the area of the Stress-Relief is allowed circulating up to max. 1,5mm. An overlap of the foil in the area of the Stress-Relief, like small edges is allowed up to max. 4mm.

- Dimension of the shielding:



**Figure 27: Dimension of the shielding**

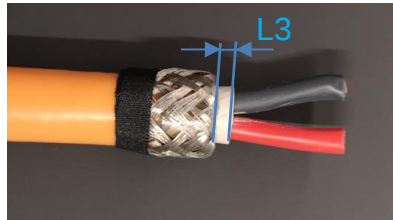
Depending on the production method of each manufacturer, the dimension L2 can vary.

- After cutting the shielding, there are no wire residues or parts of the shielding allowed on the cable. This 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

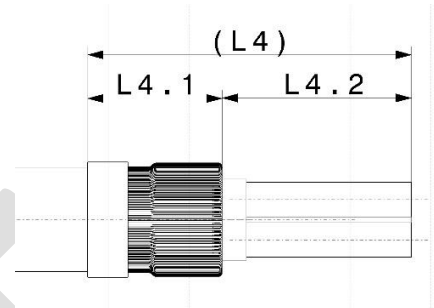
### 3.5 Reverse the shield backwards, hold the shield with tape and remove filling



**Figure 28: Fold over and fix the shielding**



**Figure 29: protrude filling material max. L3 = 3mm**



**Figure 30: Position fixing band**

- The braided shield must be pulled back completely and tautly over the strain relief. There must be no strands of the braid in the direction of the two inner conductors. The braided shield should remain as shown in Figure 28. It is not permissible to comb out the braided shield.

The pull back of the shield can lead to process-related unbundling of the shield strands.

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

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

No shielding allowed outside the fixing tape.

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

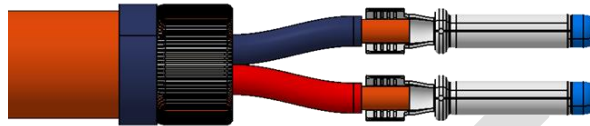
L4 = max. 39,2mm after zero-cut (measurement in straightened length)

L4.1 = max. 18,7mm

L4.2 = max. 20,5 mm after zero-cut (measurement in straightened length)

- 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-braid. The max. outer diameter after assembling is Ø 14,30mm and the Shield-Sleeve must be able to be mounted easily. The product must have min. 150°C thermal resistance.
- The filling material can protrude max. 3mm towards the outer sheath. In the area between the two single cores the filling material can be bigger than L3.
- Single strands of the shield-braid which are not fixed with the tape and stick out must be removed before further process steps.
- Do not damage the single wires during the complete processing operation.

### 3.6 Crimp the HCT4short male



**Figure 31: Crimp the HCT4 male**

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

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

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

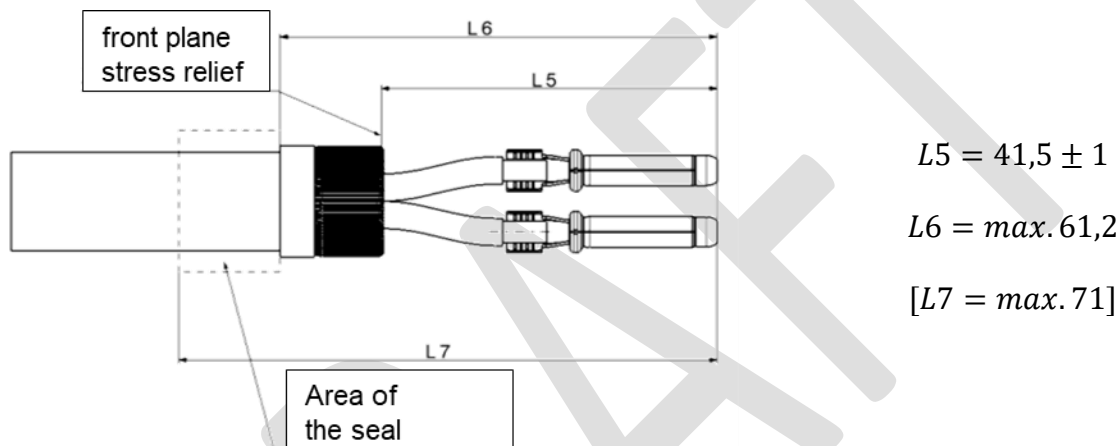
## Process data

The crimp data can be seen in the „Process specification HCT4short male EVS-100068“.

The HCT4short male terminals need to be crimped in relation to the single wires.

For a smooth assembly into the ASSY Contact-Holder, the terminals need to be crimped in the correct position (see Figure 32).

The dimensions on the following figure need to be adhered to.



**Figure 32: Compliance with dimensions after crimping**

The dimension L5 is decisive for the position of Stress-Relief.

As alternative to L5 it is allowed to prove dimension 5.1 (see point 3.7), but one of the two combinations from L4.1 and L5.1 or L4 and L5 has to be chosen. L6 is only for information and is built from L4.1 and L5. The dimensions are caused from L1, L4 and the EVS-100068.

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

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

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

### 3.7 Assembly

Assembly of the HCT4short male and the ASSY Contact-Holder (1).

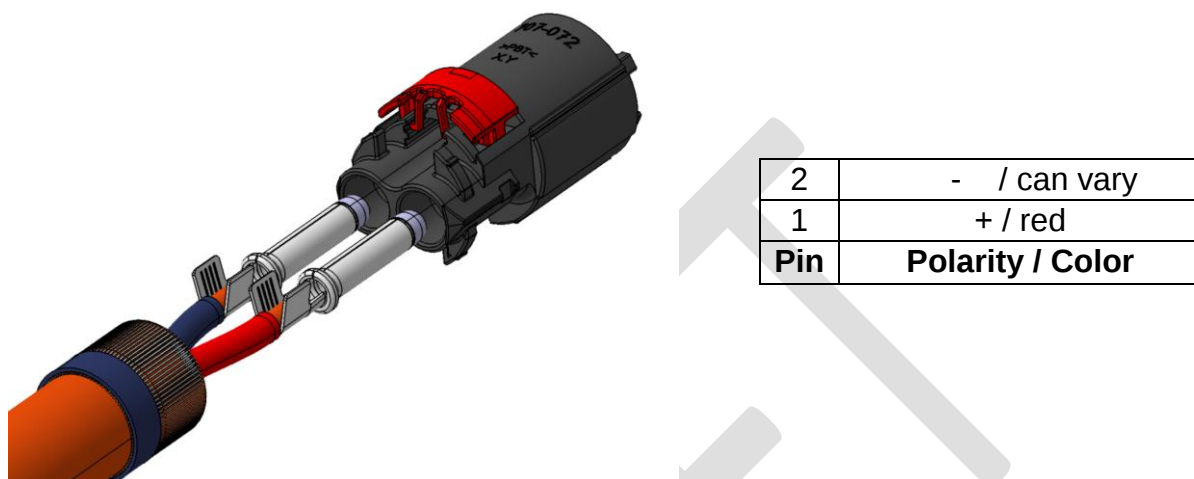


Figure 33: Assembly the HCT4short male into the ASSY Contact-Holder

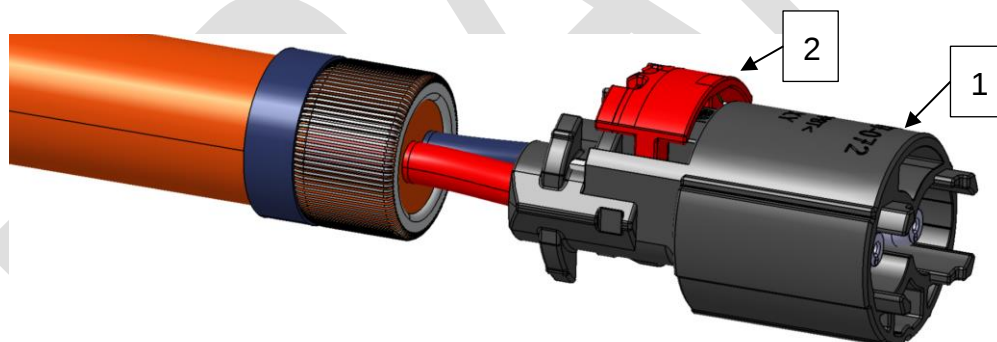
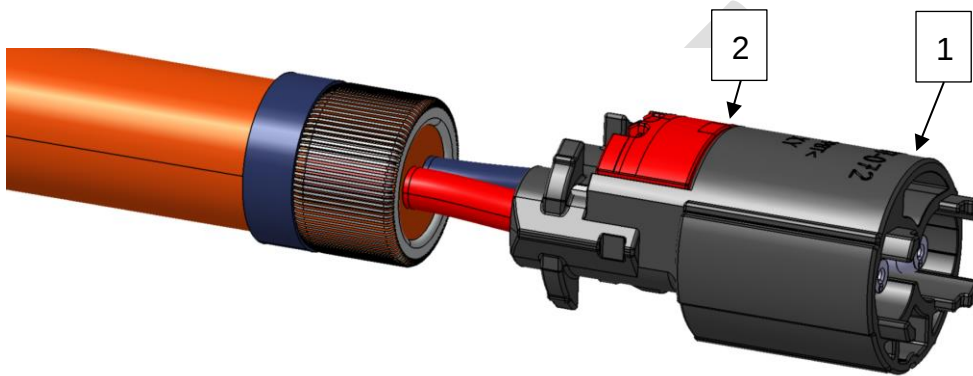


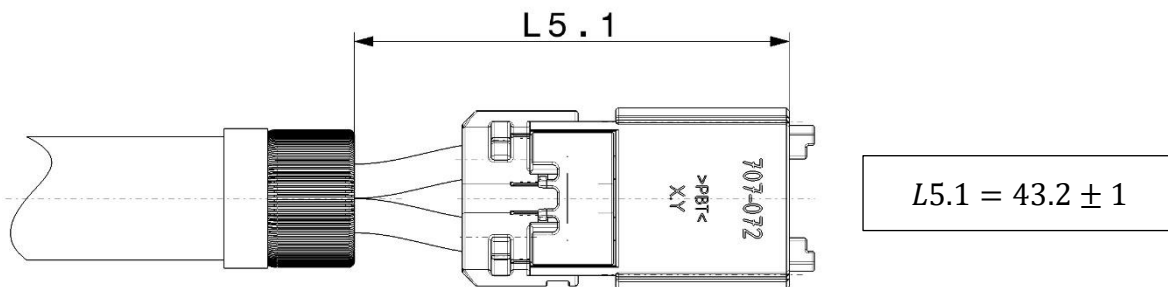
Figure 34: Sec. lock pre-locking / HV terminals primary locked

## Assembly of the Secondary-Lock (2)

The Secondary-Lock 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 terminals on the wire, and the play of the terminals in the terminal cavity it is possible and acceptable.



**Figure 35: Secondary-Lock end position**



**Figure 36: Secondary-Lock end position**

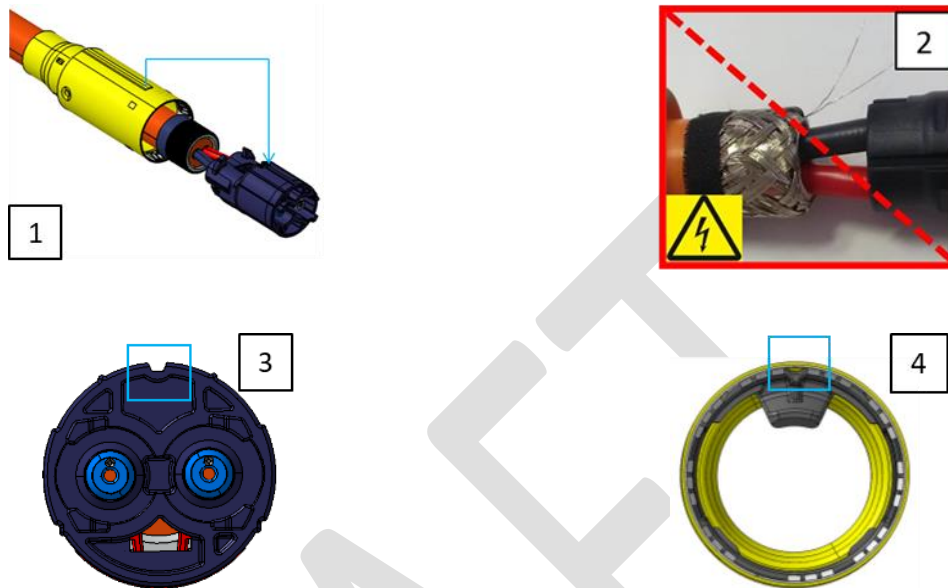
L5.1 can be used for checking as an alternative for L5 as it is described at chapter 3.6



**Table 17: Insertion Force**

|                             |                                     |                                     |
|-----------------------------|-------------------------------------|-------------------------------------|
| <b>Coroflex (Coroplast)</b> | FHLR2GCB2G<br>600/1000V T180        | FHLR2GCB2G<br>600/1000V T180        |
|                             | 9-2641 (2 x 6mm <sup>2</sup> )      | 9-2641 (2 x 4mm <sup>2</sup> )      |
| <b>Insertion Force</b>      | 36N                                 | 30N                                 |
| <b>Cablana (Condumex)</b>   | FHLR2GCB2G<br>600/1000V T180        | FHLR2G2GCB2G<br>600/1000V T180      |
|                             | 109.206.001.7 (2x6mm <sup>2</sup> ) | 109.204.001.7 (2x4mm <sup>2</sup> ) |
| <b>Insertion Force</b>      | 36N                                 | 30N                                 |
| <b>Hengtong</b>             | FHLR2GCB2G<br>600/1000V T180        | -                                   |
|                             | -                                   | -                                   |
| <b>Insertion Force</b>      | 36N                                 | 30N                                 |
| <b>Wire-Manufacturer</b>    | 6mm <sup>2</sup>                    | 4mm <sup>2</sup>                    |
|                             | <b>Wire cross section</b>           |                                     |

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



**Figure 37: (1) ASSY Shield-Sleeve, (2) Warning notice, (3) Polarization ASSY Contact-Holder, (4) Polarization ASSY Shield-Sleeve**

- The Shield-Sleeve needs to be assembled onto the ASSY Contact-Holder in the correct position. [1]+[4]
- Do not damage the ASSY Shield-Sleeve during the assembly.
- The ASSY Shield-Sleeve has to be assembled until the end position is reached.
- The fixing tape has to come out of the ASSY Shield-Sleeve completely after assembling.
- It must be ensured that no single strands of the shield stick out before the ASSY Shield-Sleeve is mounted. Demand-oriented, protruding single strands can be removed. This rework has to be clarified with each OEM.



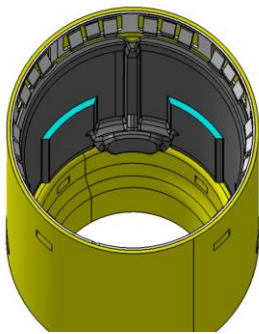
### **Risk of insulation failure**

### 3.9 Assemble ASSY Contact-Holder with wires into ASSY Shield-Sleeve

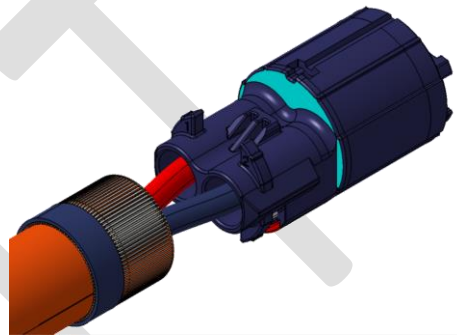
It is up to the manufacturer which device/machine is used. The pressing and positioning data described on the following pages must be observed during the pressing process.

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

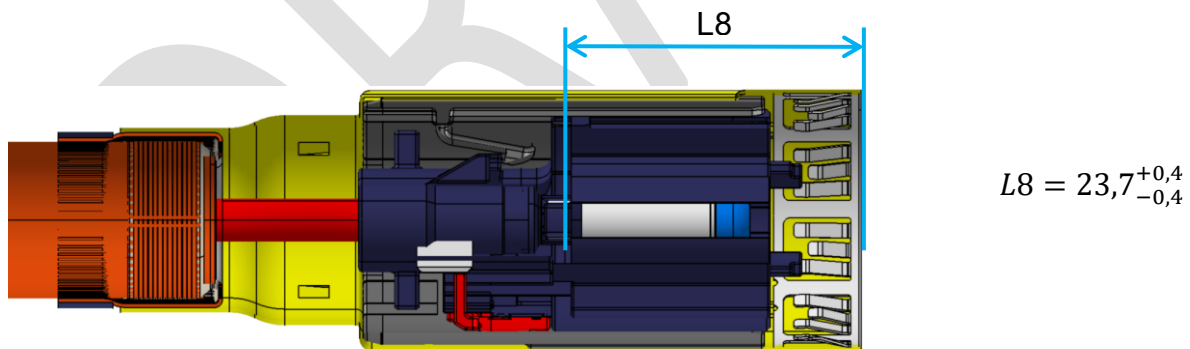
The test equipment used by Hirschmann Automotive can be found in chapter 4.



**Figure 38: End stop area ASSY Shield-sleeve**



**Figure 39: End stop area ASSY Male-Contact-holder**

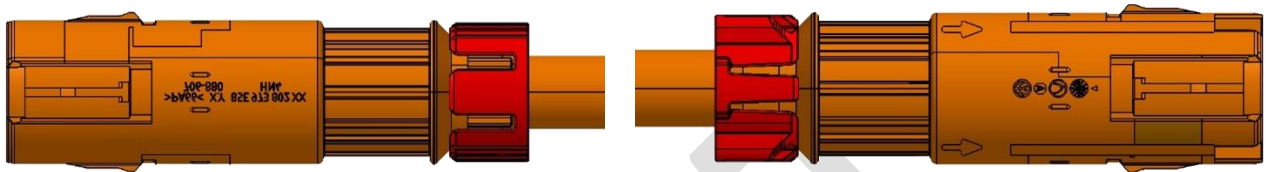


**Figure 40: Control dimension of the ASSY Male-Contact-holder with ASSY Shield-sleeve**

The ASSY Male-Contact-holder incl. wires need to be pressed into end position (L8) of the ASSY Shield-sleeve.

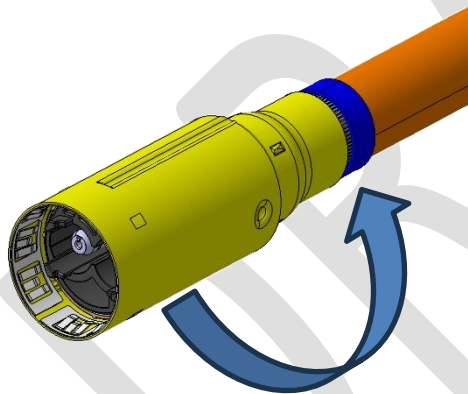
### 3.10 Rotative orientation

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

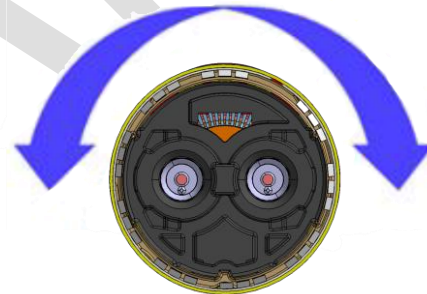


**Figure 41: Rotative Orientation for Connectors on both wire end**

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



**Figure 42: Rotation of assembled contact holder and shield sleeve in relation to the wire**



**Figure 43: The wire can be rotated in relation to the contact holder.**

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

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

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

### 3.11 Press ASSY Shield-Sleeve

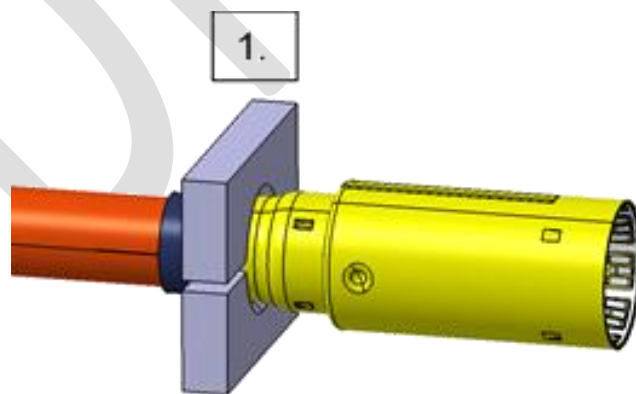
It is up to the manufacturer which device/machine is used. The pressing and positioning data described on the following pages must be observed during the pressing process.

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

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

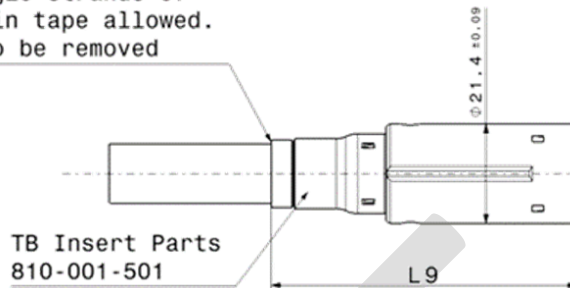
#### Pressing data

- a) The ASSY Contact-Holder incl. the male terminals have to be put into the device in the correct position (see Figure 37 [1]+[3]).
- b) Make sure, the ASSY Shield-Sleeve is on the end position of the ASSY Contact-Holder. The tape has to stick out at the end of the ASSY Shield-Sleeve (see Figure 45).
- c) The circularity of the ASSY Shield-sleeve in the contact area has to be ensured.
- d) The measurements on the following drawing, have to be adhered to, before and after pressing.
- e) Perform the pressing operation of Shield unit (ASSY Shield-Sleeve, Shielding-Braid, Stress-Relief and Cable)



**Figure 44: Symbolic representation of the pressing**

no loose or stick out single strands of  
the shield behind the fixin tape allowed.  
The single strands have to be removed



$L9 = \max. 69$

**Figure 45: Embossing position from the cable**

The dimension L9 is for information only. This dimension is resulting through the dimensions L1, L4 and L8.

Do not damage the following parts during the pressing process:

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

### 3.11.1 Shield pressing by two half-shells

#### Embossing position:

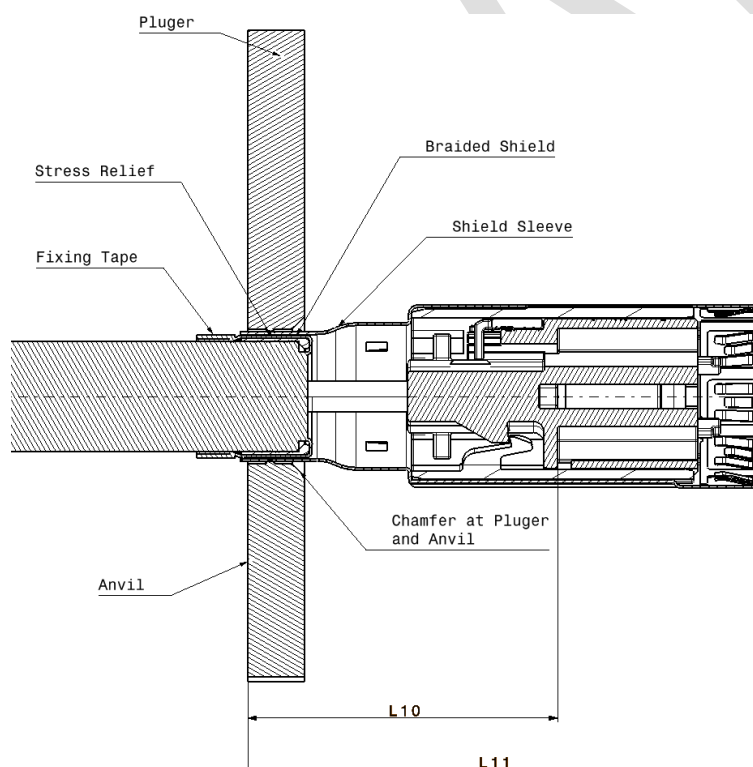
The exact geometry of the plunger and anvil is given.

The position of the plunger and the anvil has to be reversed to the front plane of the ASSY Contact-Holder. The chamfer at the plunger and the anvil have to be on the side to the ASSY Contact-Holder.

The dimensions L10 and L11 are defining the position of the plunger and the anvil. The dimensions L10 and L11 are considered as tool dimensions and must be ensured in the tool.

If the position point is on the base area of the ASSY Contact-Holder, the relevant dimension for the anvil and plunger is L10.

If the front area of the ASSY Shield-Sleeve is the position point, then L11 needs to be used.



$$L10 = 33,2 \pm 0,1$$

$$L11 = 57,1 \pm 0,1$$

**Figure 46: Embossing position**

## Plunger and anvil geometry of the wire shield pressing

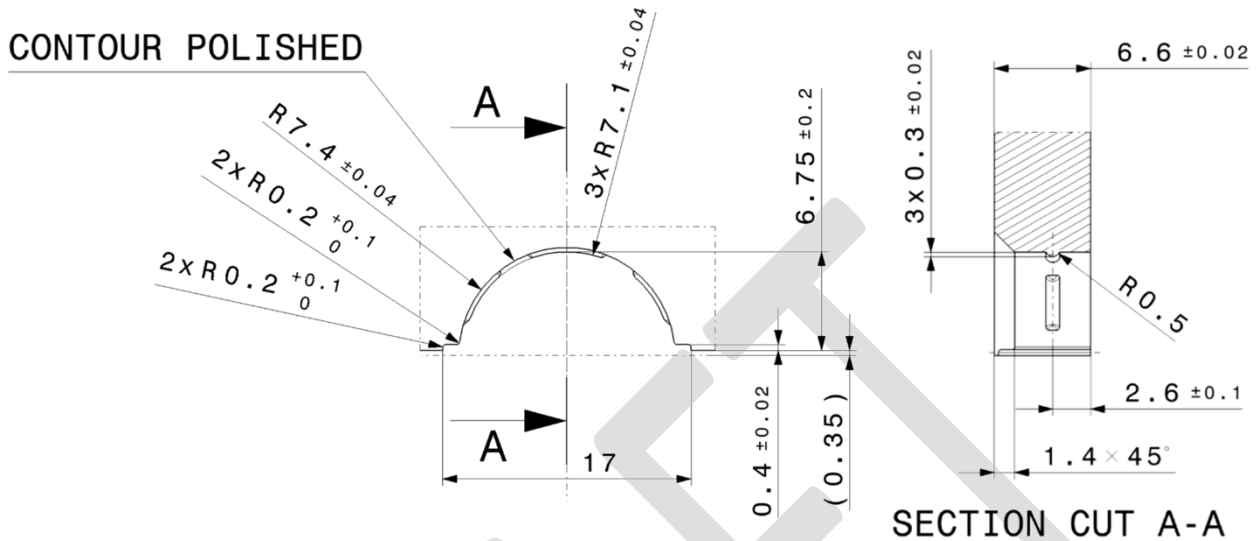


Figure 47: Plunger geometry of the wire shield pressing

## Plunger geometry of the wire shield pressing

Material: 1.2721 vacuum hardened 58hrc

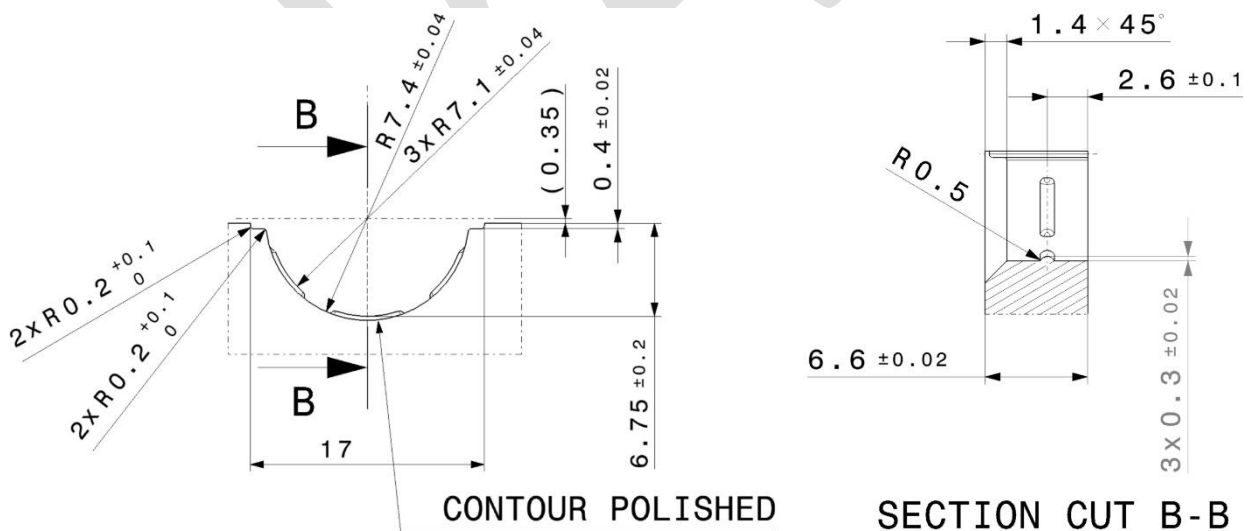


Figure 48: Plunger geometry of the wire shield pressing

## Anvil geometry of the wire shield pressing

Material: 1.2721 vacuum hardened 58hrc

## Embossing height d:

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

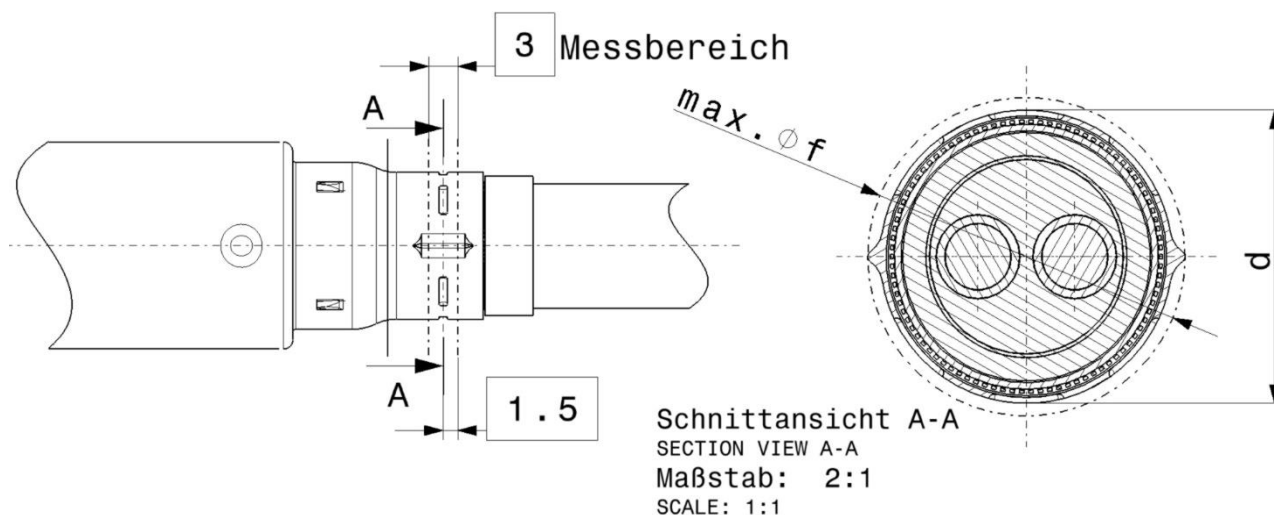


Figure 49: Drawing specification of dimension d

Table 18: press height d

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

During the pressing process a fold appears on two sides.

This fold must not be bigger than the diameter **f = Ø16,4mm** refer to the centerline of the wire. In the area of the fold the material of the ASSY Shield-Sleeve must not be cracked.

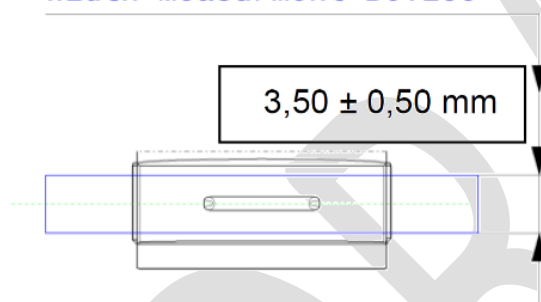
**Check measurement of the embossing height d and the max. diameter f:**

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

To check the dimension "d", measure the height in measuring plane 1 and 2 as shown in Figure 49. All the dimensions have to be within the given tolerance. (see Table 18).

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

Breite Messmittel  
Width Measurement Device



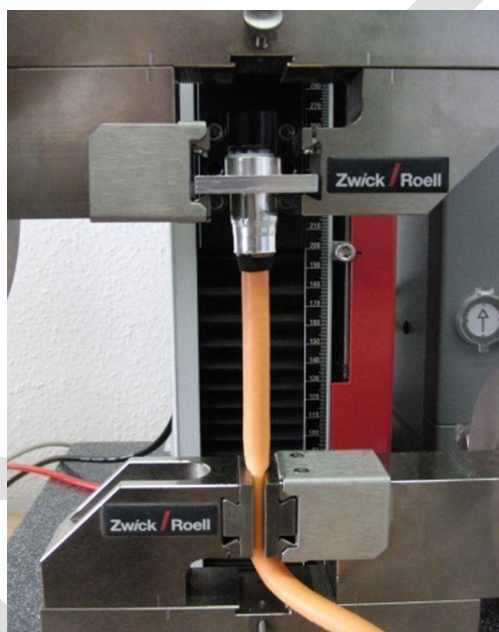
**Figure 50: schematic representation of the measuring device**



**Figure 51: schematic representation of the measurement of the pressing height**

## 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 70mm. The connector must be fixed on the ASSY Shield-Sleeve at the transition between the largest and the second largest diameter.



**Figure 52: Test setup pulling force of shield pressing**

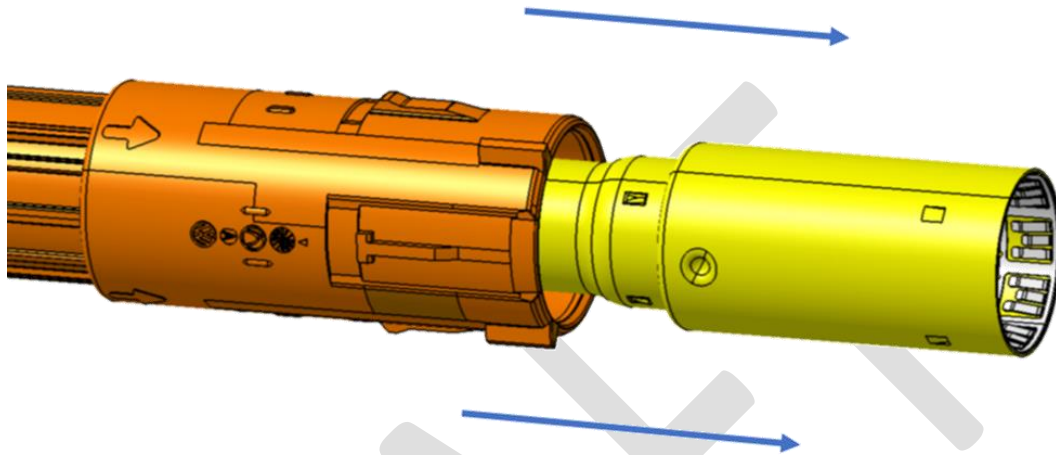
The HCT4short must not be installed in the test specimens, to test the shield pressing only. In this state, the figure in the Table 19 must be reached.

**Table 19: Pulling force for the several wire cross section (see VW 80332 PG10)**

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

### **3.12 Positioning of the male locking device unit**

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



**Figure 53: Mounting direction of the Plastic-Housing**

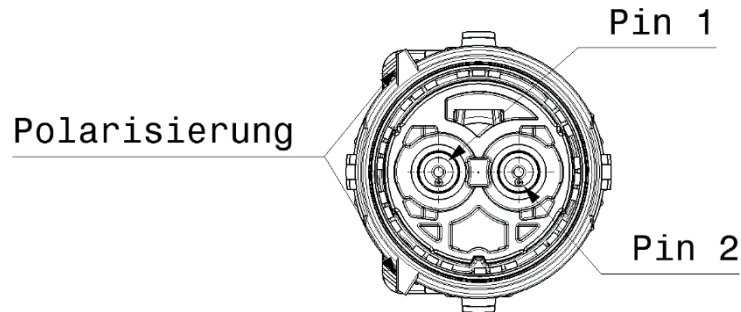
For the positioning and the assembling process of the Plastic-Housing unit onto the wire unit, an assembling device (Hand device) can be used.

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

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

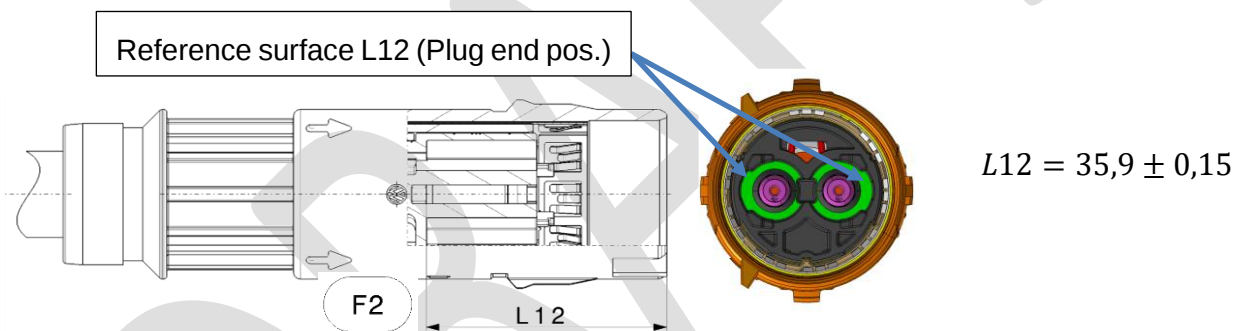
The order of an assembly device is the responsibility of the manufacturer.

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



**Figure 54: Position of the polarization of the Plastic-Housing**

The ASSY Contact-holder incl. the ASSY Shield-Sleeve needs to be assembled into the Plastic-Housing into the correct position. Both polarizations need to be symmetrical to the axis in between of the center of Pin 1 and Pin 2. Additionally, the polarization has to be on the side of Pin 1.



**Figure 55: Assembly position of the Plastic-Housing**

- The Plastic-Housing must be assembled onto the ASSY Shield-Sleeve force-assisted, until the dimension L12 is reached. L12 is decisive for the pluggability. It is recommended to use L12 as a control dimension for the assembly process.
- It is recommended to mount the contact-holder and the Plastic-housing with an appropriate mounting mask.
- Loads via the sheathed cable should be avoided when mounting the Plastic-housing. High loads on the cable can damage the shield transition.
- During the assembling process, there are no damages allowed on the ASSY Shield-Sleeve, the ASSY Contact-Holder, or the cable.

### 3.13 Assemble Wire-Seal and Cover-Cap

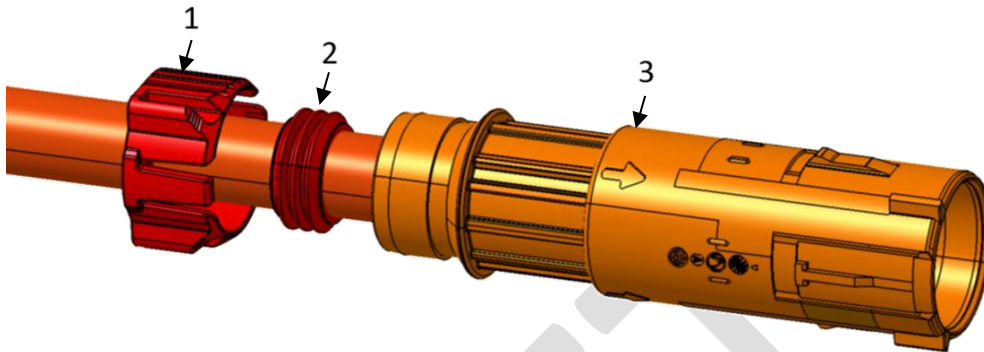


Figure 56: Assemble seal and Cover-Cap

- Push Wire-Seal [2] into the Plastic-housing [3]

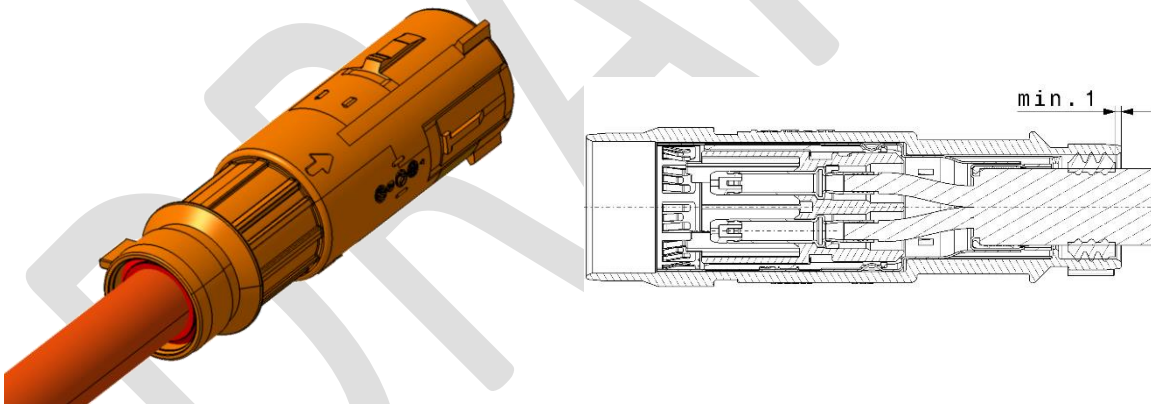
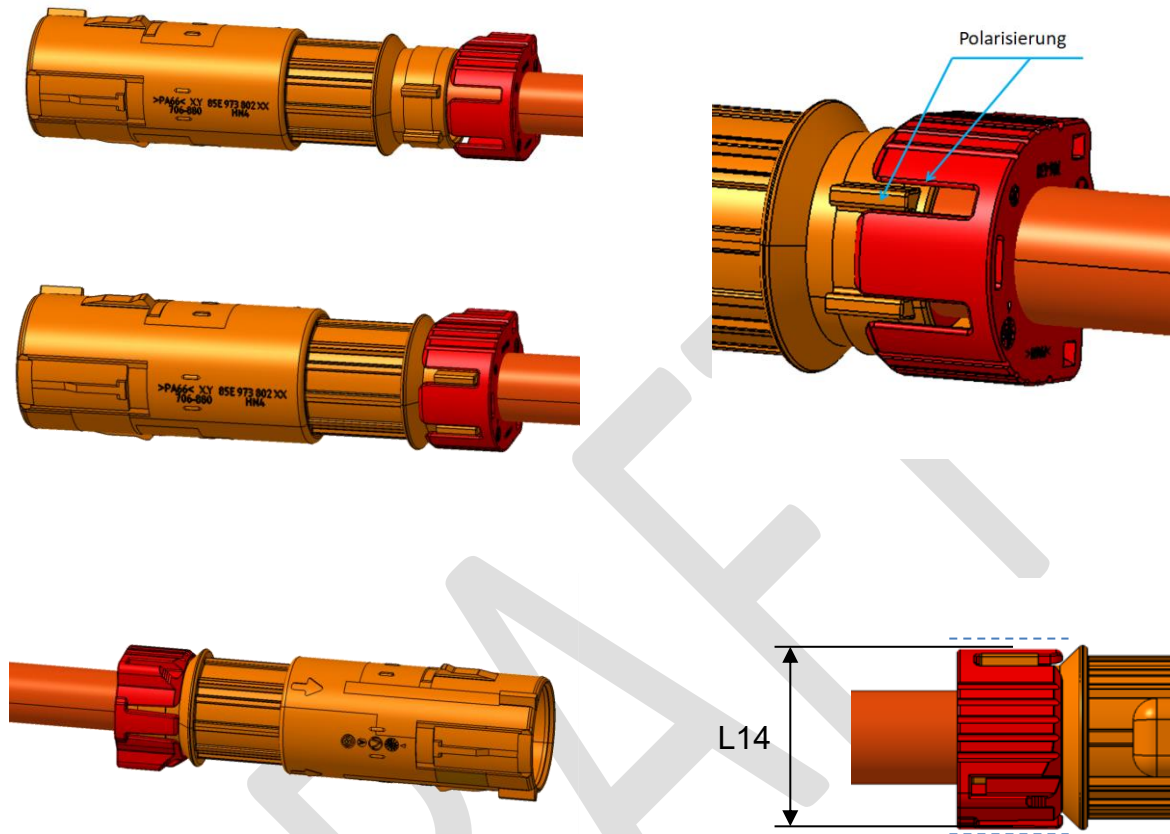


Figure 57: Symbolic representation of the Wire-Seal one end position

The Wire-Seal can be slightly widened during assembly.

It is possible to move the Wire-Seal with the Cover-Cap [1] on the wire but care must be taken that the Wire-Seal does not twist and is not pinched or damaged.

- Snap the Cover-Cap [1] into the recess of the Plastic-Housing [3] and consider the polarization.

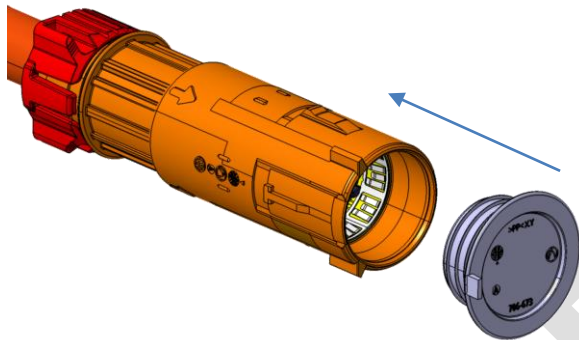


**Figure 58: Cover-cap on end position**

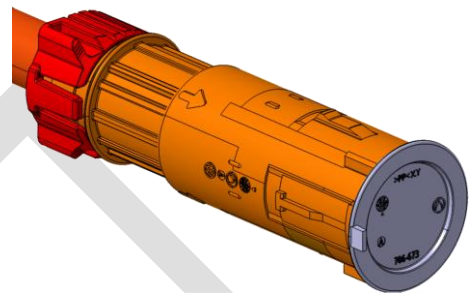
- Do not damage the Cover-Cap (1) or the Wire-Seal (2) during assembly.
- If the Cover-Cap is in end position, the latching hooks must fit directly on the Plastic-Housing on both sides. They are not allowed to stay in a deflected position. They have to be within the dimension L14 = max. 25mm.

### 3.14 Assemble transport protection cap (optional)

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



**Figure 59: Mounting direction transport protection cap**



**Figure 60: Transport protection cap in end position**

Insert the transport protection cap until it is aligned to the front face of the Plastic-housing. It is possible to turn the transport protection cap 360° during and after the assembling.

### **3.15 Technical cleanliness**

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

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

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

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

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



## **4 Appendix**

The test systems and devices described in this chapter were used at Hirschmann Automotive for the assembly of various test and validation parts. The selection, design and commissioning of the equipment and fixtures is the responsibility of the assembler.

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

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

**Order number:** T.B.D

**Name of the device:** crimping insert

**Artikelnummer:** T.B.D

**Kontakt:**

**Schäfer Werkzeug- und Sondermaschinenbau GmbH**

**Dr.-Alfred-Weckesser-Str. 6**

**76669 Bad Schönborn-La, Deutschland**

**Tel: +49 7253 9421-0**

**Fax: +49 7253 9421-94**

**[www.schaefer.biz](http://www.schaefer.biz)**

#### **4.2 Assemble ASSY Male-Contact-holder with wires into ASSY Shield-sleeve (see chapter 3.9)**

**Name:** ASSY Shield-sleeve on ASSY Male-Contact-holder

**Part number:** t.b.d.

**Contact:** MAXXOM Automation GmbH  
Gewerbegebiet, Salzweg. 1  
A-4894 Oberhofen am Irrsee, Österreich  
Tel: +43-6213-20053-0  
Fax: +49-8761-726768  
[www.MAXXOM-Automation.at](http://www.MAXXOM-Automation.at)

#### **4.3 Pressing device (see chapter 3.11)**

**Name:** t.b.d.

**Part number:** t.b.d.

#### **4.4 Assembly device Plastic-housing (see chapter 3.12)**

**Name:** Pressing device horizontal for positioning  
Assembly Plastic-housing HPS40-2 In-Line

**Part number:** 197079

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

## **4.5 Auxiliary measuring devices**

Process queries and checks must be defined by the manufacturer with suitable measuring strategies and associated auxiliary measuring devices for the individual process steps.

DRAFT



## 5 Change History

| Version | Description of change                                                                                                                                                                                                                                                                                                                     | Editor     | Status   | Date       |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|----------|------------|
| 00      | First release                                                                                                                                                                                                                                                                                                                             | Rümmele M. | released | 23.06.2021 |
| 01      | General: Part description/naming adapted;<br>Chapter 2: Table 3 added;<br>Chapter 2.7 Tabele 8 adapted;<br>Chapter 3.4 Definition of foil overlapping adapted;<br>Chapter 3.5 "measurement in straightened length" at<br>Dimension L4 added;<br>Chapter 3.10.1 Dimensions L10 and L11 –<br>addition/definition as tool related dimension; | Rümmele M. | released | 13.04.2022 |
| 02      | Chapter 3.5: Shielding structure adjusted;<br>Figure 28, 29 and 30 adapted;<br>L4.1 added;<br>Text adapted;<br>Chapter 3.10.1 dimension L10 corrected; Figure 45<br>adjusted and expanded;<br>extraction force adjusted to 300N;                                                                                                          | Rümmele M. | released | 24.03.2023 |
| 03      | Chapter 1.1: Text J added;<br>Chapter 3.6: Text adapted;<br>Chapter 3.7: L5.1 added;<br>Chapter 3.10: Text adapted;<br>Chapter 3.11: Figure 52 and Text adjusted;<br>L13 removed;<br>Chapter 3.12: Picture 53 and 54 adapted;                                                                                                             | Rümmele M. | released | 12.05.2023 |



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| 04 | Chapter 1.1: Item J added;<br>Chapter 1.2: 85D.973.802 added;<br>Chapter 1.3: 85D.973.802 added;<br>Chapter 1.4 added;<br>Chapter 2.2 and table 3. added;<br>Chapter 2.5: 710-741-501 added;<br>Chapter 2.10: 706-880-553 added;<br>Changed chapter 3.4 to 3.4.1;<br>Added chapter 3.4.2;                                                                                                                                                                                         | Gohm M.    | released   | 01.09.2023 |
| 05 | Chapter 1.4: Pull out face of shield pressing removed and crimp height HCT4 added as characteristic.<br>Chapter 3.1: Table 15 adapted; Note added;<br>Chapter 3.3: Dimensions and description adapted ;<br>Chapter 3.5: L4 and L4.1 adapted; L4.2 added;<br>Chapter 3.6: L5 and L6 adapted;<br>Chapter 3.9: L8 and L9 adapted;<br>Text for L9 adapted;<br>Chapter 3.10.1: Figure 54 adapted;<br>Chapter 4.5 added;                                                                | Rümmele M. | In process | 09.05.2025 |
| XX | Chapter 2.1: Europe Configuration Stress-Relief DDP<br>Chapter 2.2: Europe Configuration Stress-Relief DDP<br>Chapter 2.5: Stress Relief DDP<br>Chapter 3.3: Strip-length L1 changed<br>Chapter 3.4: Pictures and text adapted<br>Chapter 3.5: L4.1 and L4.2 adapted<br>Chapter 3.6: L5 adapted;<br>Chapter 3.7: L5.1 adapted;<br>Chapter 3.10: Rotative orientation added<br>Chapter 3.11.1: Dimension L10 and L11 adapted<br>Figure 47 and 48 Plunger and Anvil design changed; | Rümmele M. | t.b.d.     | 12.06.2025 |