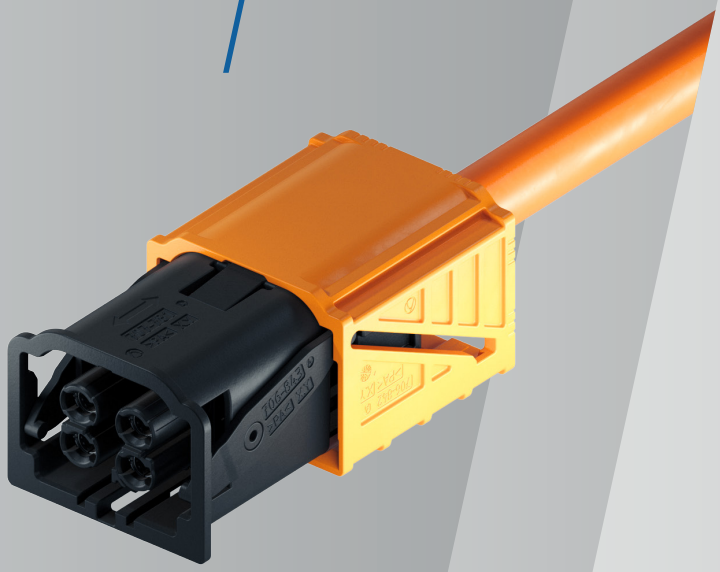

PROCESS SPECIFICATION

HPS40 4+2
Female Connector MCC unshielded

EVS-100161

HIRSCHMANN
AUTOMOTIVE

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1 General

1.1 Introduction

This processing specification is valid for all versions and describes the product structure as well as the manufacturing of the HPS40 4+2 female connector unshielded.

System number	Coding	Wire cross section	CPA version
812-502-501	A	4x 6.0 mm² 3x 6.0 mm² 2x 6.0 mm²	With HVIL
812-502-511	A		Without HVIL

The manufacturer is responsible for the qualitative processing and the described version of the mentioned products in this process specification. In case of an incorrect processing, dissenting from this process specification, there will be no right of recourse in case of appearing quality problems.

1.2 Other current documents

A	HCT4 processing specification (Ag)	EVS-100068
B	Data sheet GG 4x 6.0 mm² sheathed wire	GG no.: FHLR2G2G 4x 6.0 /T180
C	Data sheet GG 3x 6.0 mm² sheathed wire	GG no.: FHLR2G2G 3x 6.0 /T180
D	Data sheet GG 2x 6.0 mm² sheathed wire	GG no.: FHLR2G2G 2x 6.0 /T180
E	Data sheet Coficab 4x 6.0 mm² sheathed wire	Coficab no.: FHLR91X91X T4 4x 6.0 mm²
F	Data sheet Coficab 3x 6.0 mm² sheathed wire	Coficab no.: FHLR91X91X T4 3x 6.0 mm²
G	Data sheet Coficab 2x 6.0 mm² sheathed wire	Coficab no.: FHLR91X91X T4 2x 6.0 mm²
H	Data sheet CABLENA 4x 6.0 mm² sheathed wire	CABLENA no.: FHLR2G2G 4x 6.0 /T180
I	Data sheet CABLENA 3x 6.0 mm² sheathed wire	CABLENA no.: FHLR2G2G 3x 6.0 /T180
J	Data sheet CABLENA 2x 6.0 mm² sheathed wire	CABLENA no.: FHLR2G2G 2x 6.0 /T180

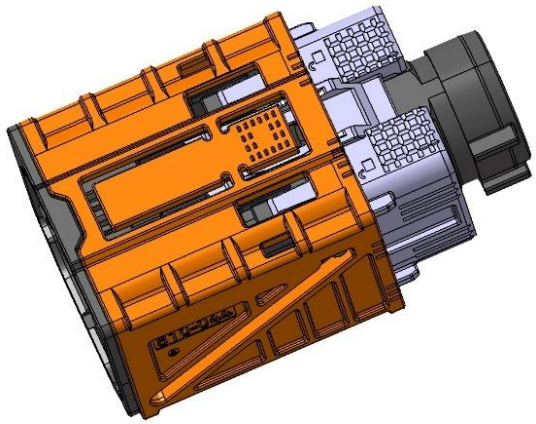
2 Product structure (single components)

2.1 Sheated cable (see table)

Wire manufacturer	Wire cross section		
	4x 6.0 mm² Ø12.4-13.0	**3x 6.0 mm² Ø11.2-11.8**	**2x 6.0 mm² Ø10.4-11.0**
GG	FHLR2G2G		
	FHLR2G2G 4x6 /T180	FHLR2G2G 3x6 /T180	FHLR2G2G 2x6 /T180
Coficab	FHLR91X91X		
	FHLR91X91X T4 150° 4x 6.0 mm²	FHLR91X91X T4 150° 3x 6.0 mm²	FHLR91X91X T4 150° 2x 6.0mm²
Cablena	FHLR2G2G		
	FHLR2G2G 4x6/T180	FHLR2G2G 3x6/T180	FHLR2G2G 2x6/T180

Only wires that are listed here and approved by the respective OEM may be used.

2.2 HPS40 4+2 locking sleeve



-551

Hirschmann Automotive No.	Wire cross section
810-044-551	4x 6.0 mm² 3x 6.0 mm² 2x 6.0 mm²
810-044-B51 (Small series)	4x 6.0 mm² 3x 6.0 mm² 2x 6.0 mm²

Delivery condition: The locking sleeve is supplied in a blister pack.

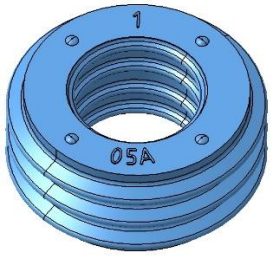
2.3 HPS40 4+2 female contact carrier

-501, -511

Hirschmann Automotive No.	Coding	Colour	HVIL Bridge
812-580-501	A	Black	No
812-580-511	A	Black	Yes
812-580-B01 (Small series)	A	Black	No
812-580-B11 (Small series)	A	Black	Yes

Delivery condition: The female contact carriers will be shrink-wrapped, 50 pieces at a time. The shrink-wrapped packs are then packed in multiples in a carton.

2.4 HPS40 4+2 wire seal

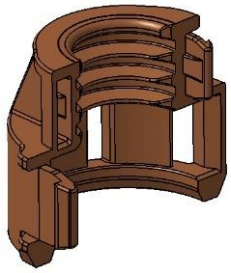
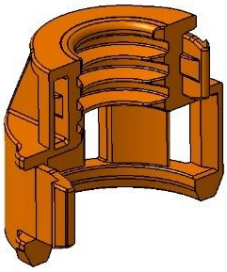
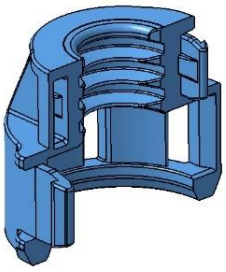
		
-501	-503	-505

Hirschmann Automotive no.	Colour	Wire cross-section
712-138-501	Brown	4x 6.0 mm² / Ø12.4-13.0
712-138-503	Orange	3x 6.0 mm² / Ø11.2-11.8
712-138-505	Light blue	2x 6.0 mm² / Ø10.4-11.0
712-138-B01 (Small series)	Brown	4x 6.0 mm² / Ø12.4-13.0
712-138-A03 (Small series)	Orange	3x 6.0 mm² / Ø11.2-11.8
712-138-A05 (Small series)	Light blue	2x 6.0 mm² / Ø10.4-11.0

Wire manufacturer: The released HV cable for each wire seal is shown on the product drawing. (Hirschmann Automotive no.: 812-502-…00)

Delivery condition: The wire seals are delivered as bulk good.

2.5 HPS40 4+2 cover cap

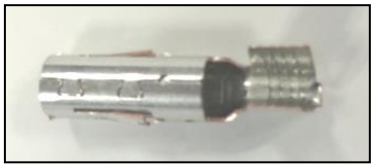
		
-501	-503	-505

Hirschmann Automotive no.	Colour	Wire cross section
707-780-501	Brown	4x 6.0 mm² / Ø12.4-13.0
707-780-503	Orange	3x 6.0 mm² / Ø11.2-11.8
707-780-505	Light blue	2x 6.0 mm² / Ø10.4-11.0
707-780- B01 (Small series)	Brown	4x 6.0 mm² / Ø12.4-13.0
707-780- B03 (Small series)	Orange	3x 6.0 mm² / Ø11.2-11.8
707-780- B05 (Small series)	Light blue	2x 6.0 mm² / Ø10.4-11.0

Wire manufacturer: The released HV cable fore each cover cap is shown on the product drawing. (Hirschmann Automotive no.: 812-502-…00)

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

2.6 HPS40 4+2 HCT4 female pin



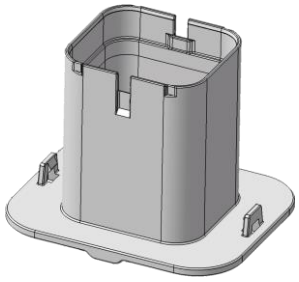
-505

Hirschmann Automotive no.	Wire cross section
709-427-505	4x 6.0 mm² 3x 6.0 mm² 2x 6.0 mm²

Delivery condition: The female pins are delivered on a strip on a roll.

3 Product structure (optional parts)

3.1 HPS40 4+2 protection cap

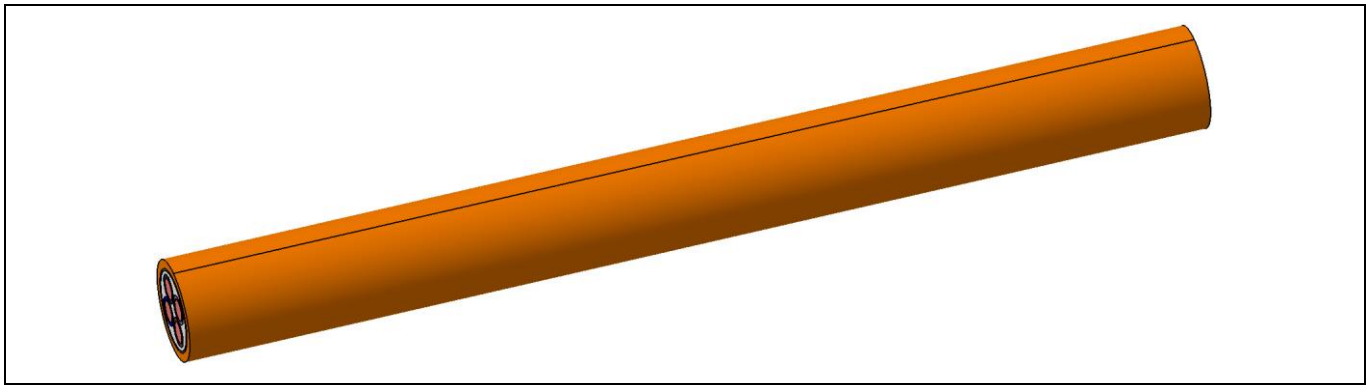
	
Hirschmann Automotive no.	706-991-501

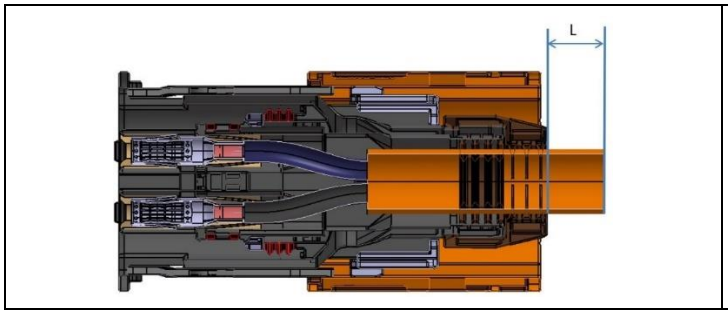
Delivery condition: The protection cap is delivered as bulk good.

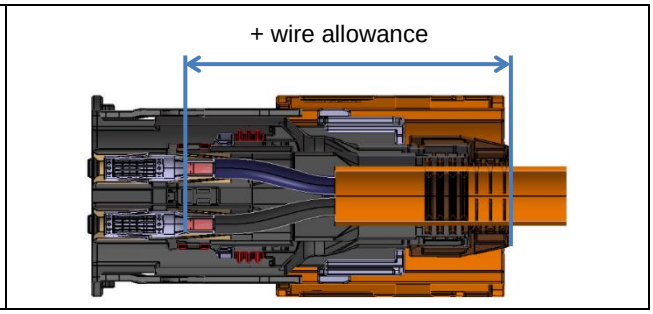
4 Process steps

The following described process steps are used for cross-sections of 4x 6.0 mm², 3x 6.0 mm² and 2x 6.0 mm². The versions with the contact carrier (Code A) and the 4x 6.0 mm² wire were selected as reference samples.

4.1 Cut the shielded cable







Wire length allowance for the HPS40 4+2 unshielded connector:

Wire cross section	Dimension L + wire allowance excl. zero-cut allowance	Dimension L + wire allowance incl. zero-cut allowance (mm)
4x 6.0 mm² 3x 6.0 mm² 2x 6.0 mm²	L + 70	L + 74

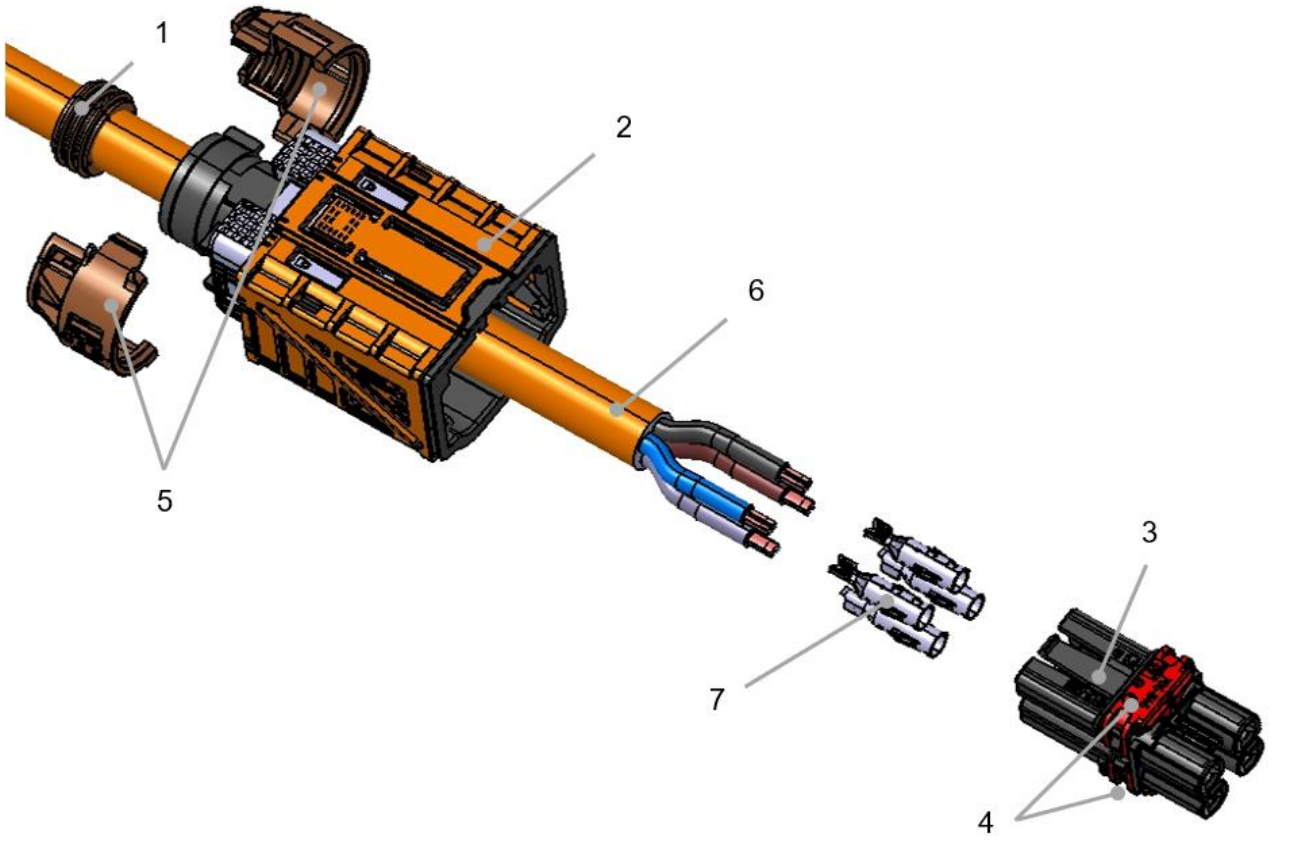
This length must be added to the planned length when cutting the wire for each connector.

Depending on whether the crimping equipment used integrates a zero-cut of the wires during the crimping process for the HCT4 contacts, the corresponding wire allowance incl. or excl. a zero-cut allowance should be used. When using the equipment from Schäfer (EPS2001-HPS40-4-HCT4), the wire allowance including the zero-cut allowance must be used.

4.2 Assembly the single components

Slide the wire seal (1) and locking sleeve (2) onto the shielded wire (6). Assemble HCT4 pins (7), contact carrier (3+4) and cover cap (5).

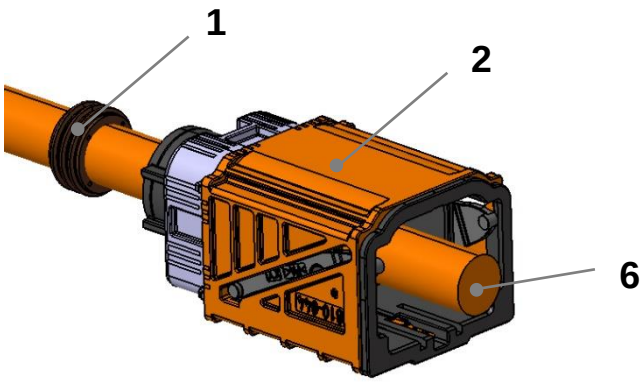
1	5	2	6	7	4 + 3



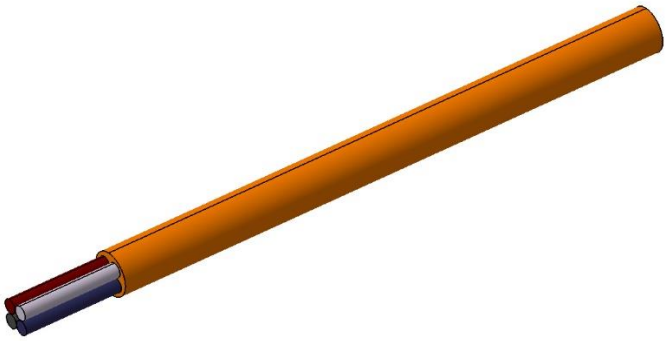
4.3 Assembly

Slide the wire seal (1) and locking sleeve (2) onto the shielded wire (6).

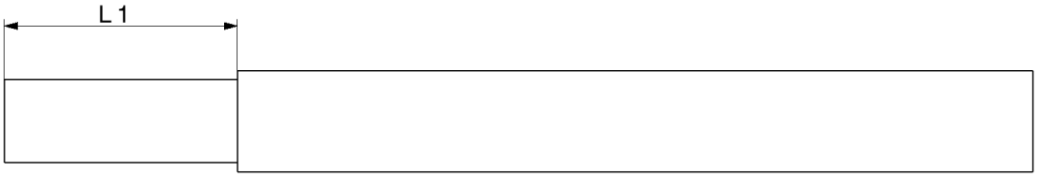
1	2	6



4.4 Strip insolation of shielded wire



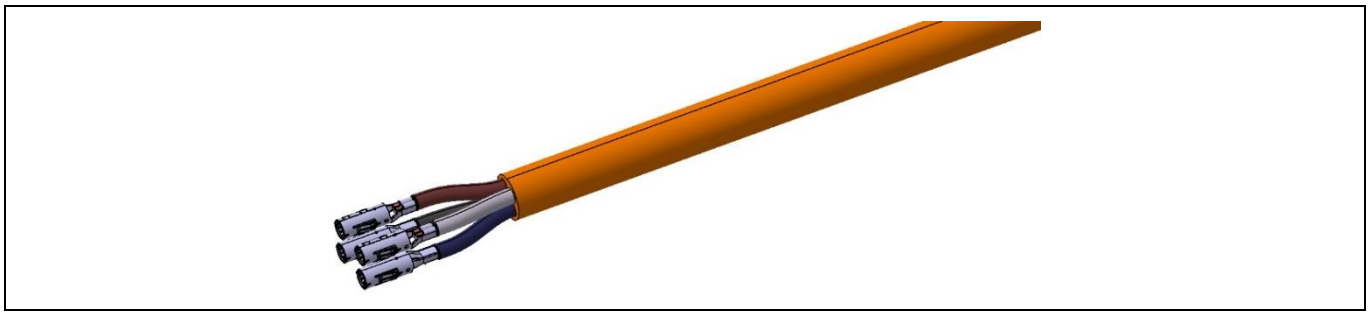
Stripping length:



Wire cross section	When crimping the HCT4 contact by triggering via individual wires.	
	Dimension L1 excl. zero-cut allowance (mm)	Dimension L1 incl. zero-cut allowance (mm)
4x 6.0 mm² 3x 6.0 mm² 2x 6.0 mm²	38 +3/ -5	42 +3/ -5

The individual wires must not be damaged during the entire processing.

4.5 HCT4 contacts chipped

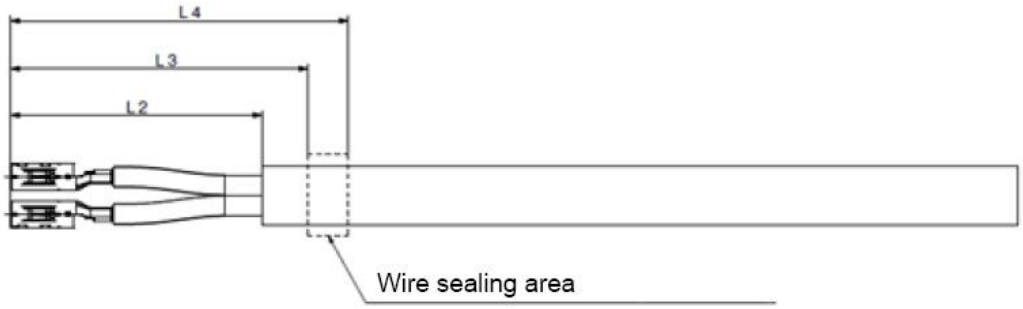


When crimping the socket contact, crimp specifications EVS-100068 must be considered.

The assembler is responsible for commissioning a crimping device.
The crimping device used by Hirschmann for test setups is described at topic 6 Appendix. For this reason, this issue only deals with the crimping and positioning data for the crimping process.

- **Process data**
  a) The crimp data can be found in "Processing specification HCT4 socket contact EVS-100068"
  b) The HCT4 socket contacts are crimped in relation to the individual wires. To be able to mount the polarized HCT4 contacts smoothly in the contact carrier, the contacts must be crimped to the wire in the correct position.

The dimensions presented in the drawing below must be observed after crimping.

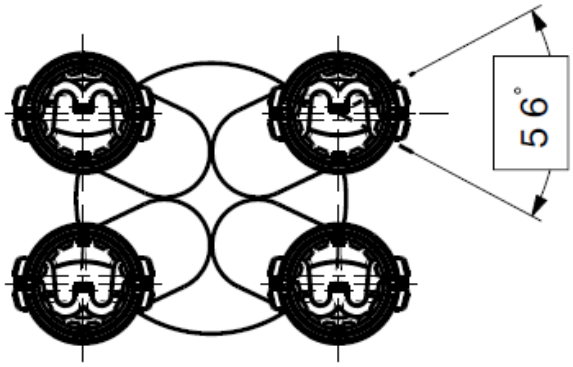
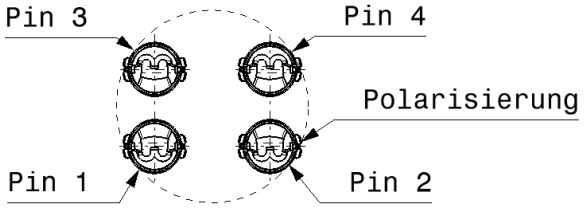


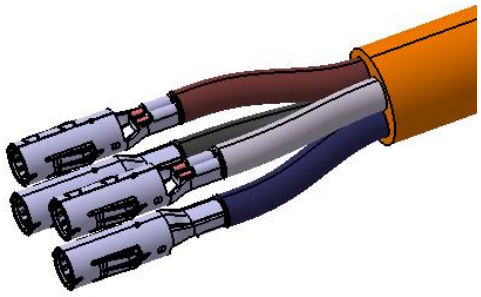
L2 = 50 ± 1
L3 = min. 64
L4 = max. 72

The dimension L2 is only used to control the processes. This dimension results from L1 and the EVS-100068.

A length offset of the contact front surfaces from one another is permitted up to a maximum of 0.5 mm.

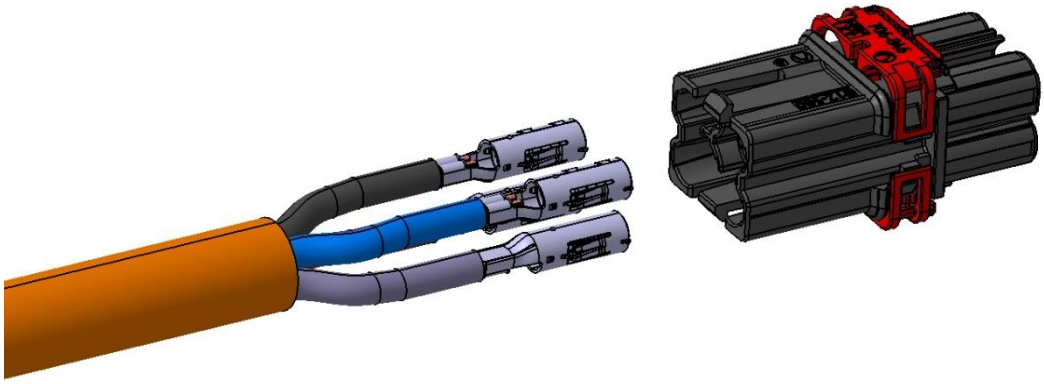
An imprint on the insulation of the individual wires or on the outer sheath because of the fixing of the wire during the crimping process is permissible. However, it must be ensured that the insulation is not damaged (torn, penetrated, etc.), otherwise an insulation resistance error will occur. There must be no wire deformation or damage on the outer sheath in the area where the wire seal is positioned that would negatively affect the sealing function. (See L3)

Maximum permissiblle inclination of the contacts to the wire	Nominal condition of the contacts to the wire
	



To ensure correct assembly/ primary locking and secondary locking, it is important that the contacts are crimped in the correct position on the wire. The horizontal option model is to be provided here by default. The permitted angle deviation results from the geometry of the run-in bevels on the socket contact carrier and the maximum permissible assembly force of the sheathed wire with the contacts in the contact carrier. This can be checked by means of an assembly test during the process. (Refer to Point 3.5 Assembly of socket contacts in the contact carrier)

4.6 Assembly II

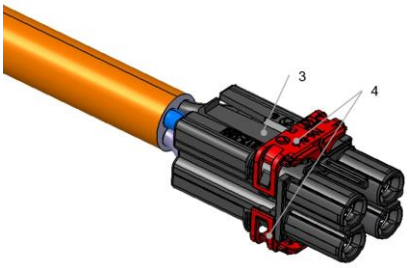
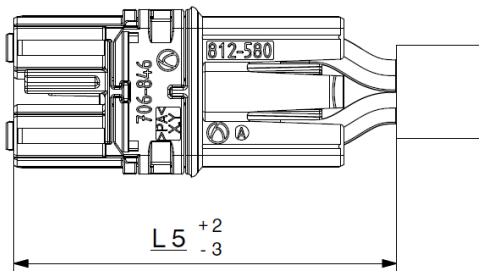
Insert the HCT4 pins into contact carrier (3).


When fitting the HCT4 contacts, the locking lance of the HCT4 contact is deflected. As soon as the end position is reached, the locking lance snaps in and the contacts are primarily locked.

The assembly force of the contacts must be proven if a double stroke crimping press from Schäfer is not used or if the contacts are loaded into the contact carrier by means of a fully automated process.

Wire cross section	4x 6.0 mm²	3x 6.0 mm²	2x 6.0 mm²
Montagekraft	72N (92N*)	54N (69N*)	36N (46N*)

*Now the small series parts have a higher assembly force. The large series parts will be further tuned/ improved to achieve a lower assembly force.

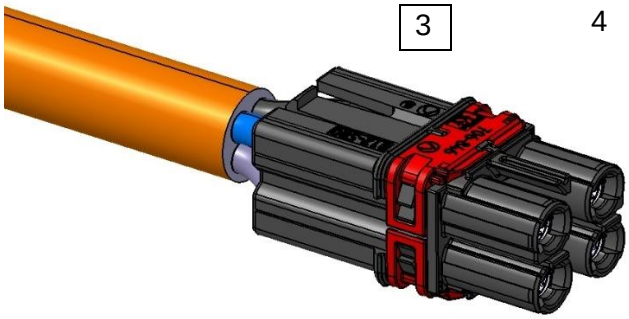
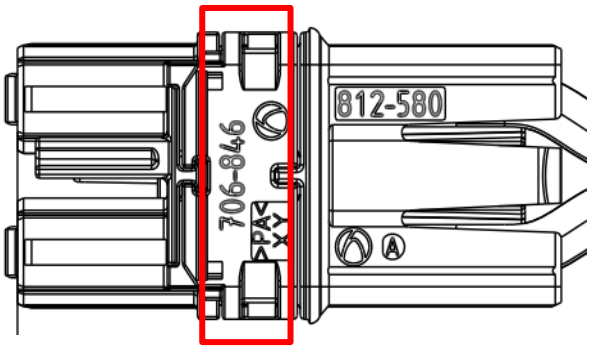
	
Secondary lock (4) pre-locked position/ HV contacts primary-locked	L5 = 52.2

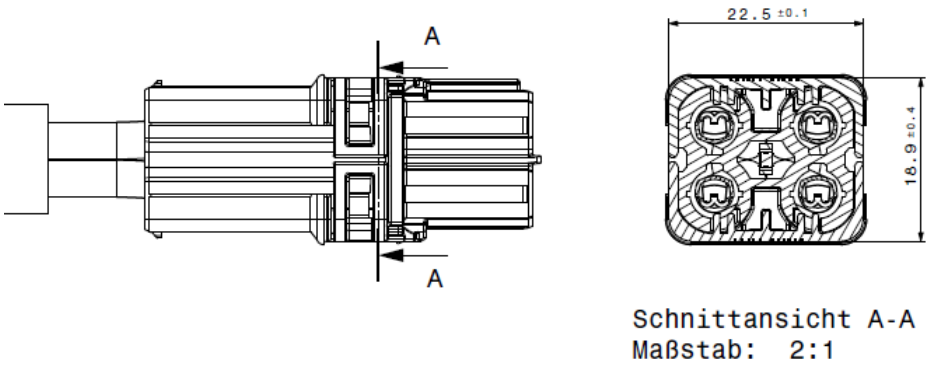
The dimensions in the following image result from the process steps shown above and from dimension L2. Depending on the assembler, there are different procedures for verifying this dimension. If the dimension L2 has already been used to verify compliance with the tolerance, the dimension in the following figure does not have to be considered. As an alternative to dimension L2, verification can also be provided using dimension L5. When measuring dimension L5, the contact carrier and the wire must be positioned in a suitable holder to correct any positional deviations between them.

4.7 Assembly III

Activate secondary lock (4)

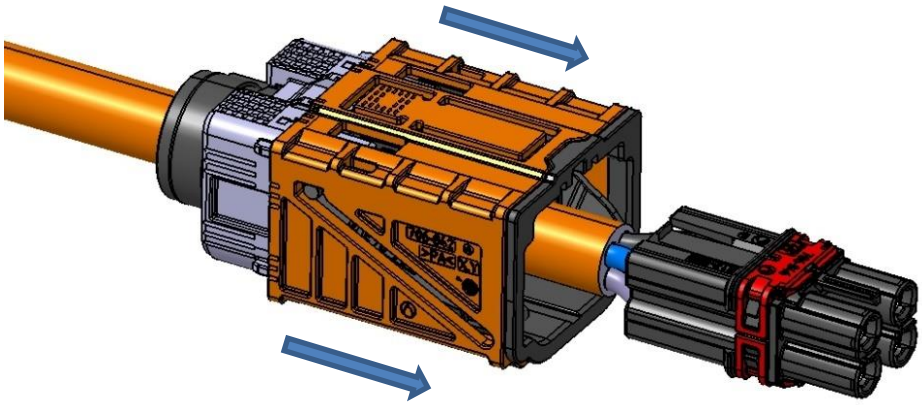
The secondary lock can only be actuated when the contacts are in the end position. Any visible difference in the position of the contacts in the contact chamber can be the result of the contact position on the wire and the rest play of the contacts in the chamber and is permissible.

Secondary lock in end-position	The secondary latch should be actuated in the area marked red, otherwise it may not fully engage.
	



The dimensions 22.5 mm ± 0.1 and 18.9 mm ± 0.4 are used to check whether the secondary latch has been correctly pressed into the end position.

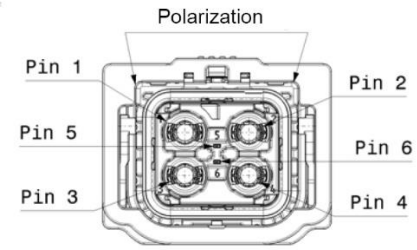
4.8 Positioning of the locking sleeve



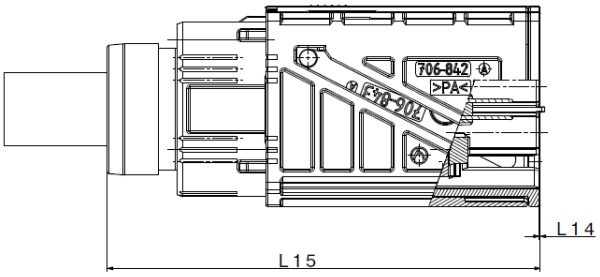
Assemble the locking sleeve in the correct position by applying force.

The assembly of the outer housing onto the contact carrier is to be monitored via force and displacement. During the press-in process, a force of min. 70N to max. 120N must be applied. The required minimum press-in force should ensure that the contact carrier is mounted up to the end stop in the locking sleeve and that the latching hooks engage. An additional dimensional check can be carried out using the test dimension L14.

The commissioning of an assembly device for the series assembly process is the responsibility of the assembler. Therefore, this issue only deals with the assembly data in the assembly process.



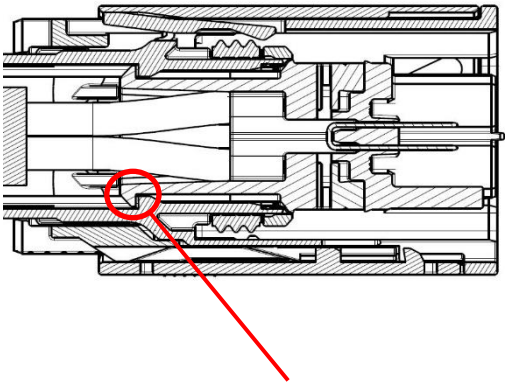
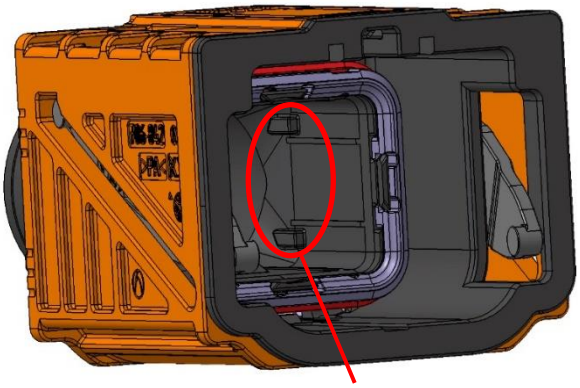
The contact carrier must be assembled to the locking sleeve in the correct position.



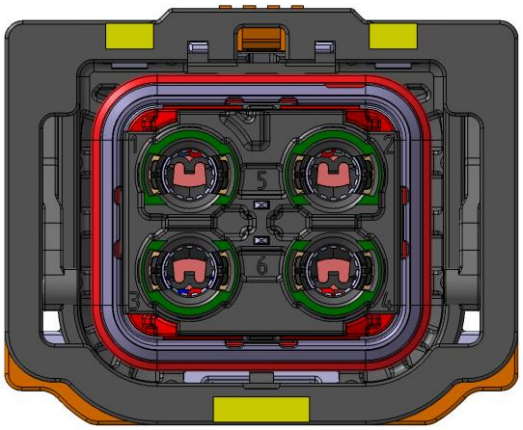
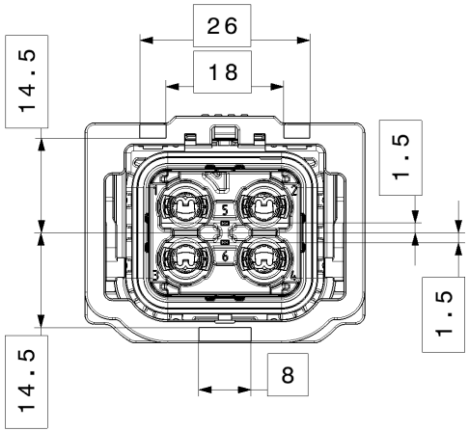
Dimension L14 (0.3±0.2) is used as a test dimension for the position of the contact carrier in relation to the outer housing.

Dimension L15 (75.3 (Info)) is only for checking.

The contact component carrier and the sheathed wire must not be damaged during the assembly process. Pulling on the sheathed wire is not necessary.

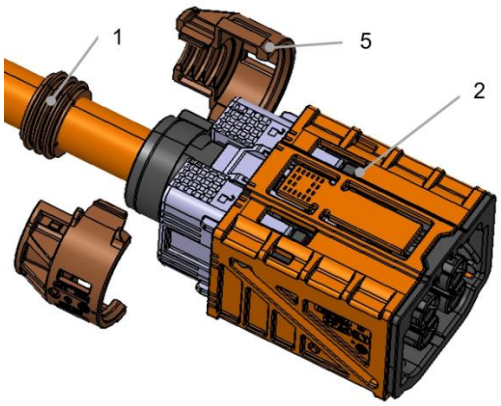
	
Contact carrier locked in the locking sleeve via the undercut.	Stop for contact carrier.

Contact carrier pressed into the locking sleeve as far as it will go. For a defined measurement of dimension L14, the locking sleeve and contact component carrier components should be recorded/ measured on the reference surfaces.

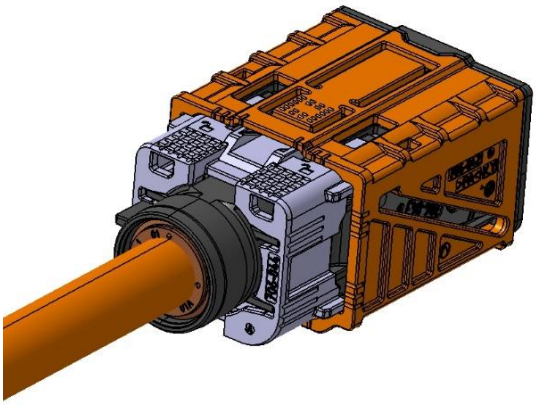
	
Reference surface locking sleeve (see picture, marked in yellow) Reference surface contact component carrier (see picture, marked in green)	

4.9 Assemble the wire seal and cover cap

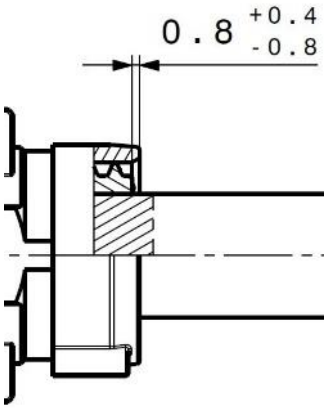
1	5	2



Slide the wire seal (1) into the locking sleeve (2)

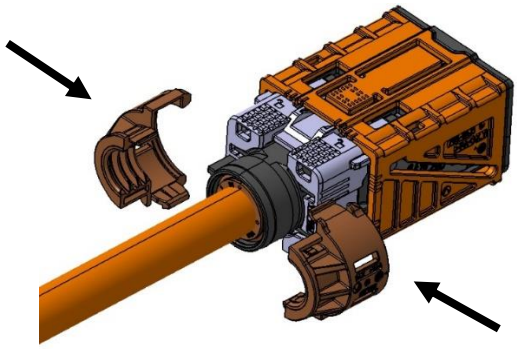


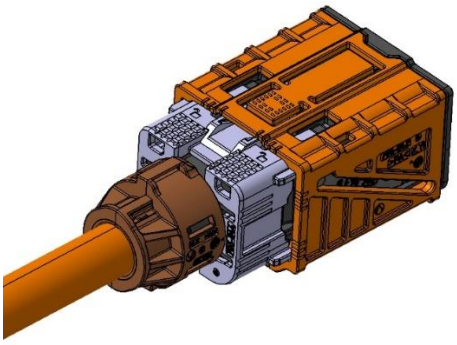
The wire seal can be slightly expanded during assembly. Damage to the seal lips is not permitted, but imprints on the face of the seal are permitted.



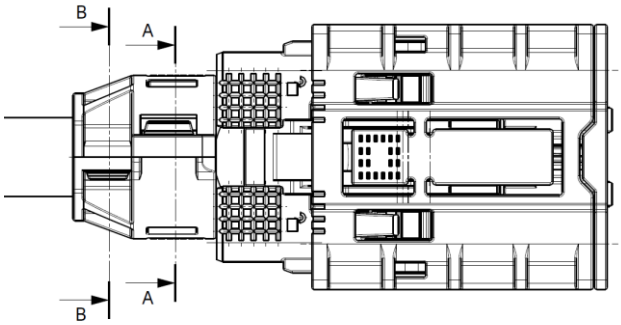
The seal must be pressed into the locking sleeve to up to 0.8 mm +0.4/-0.8 during assembly.

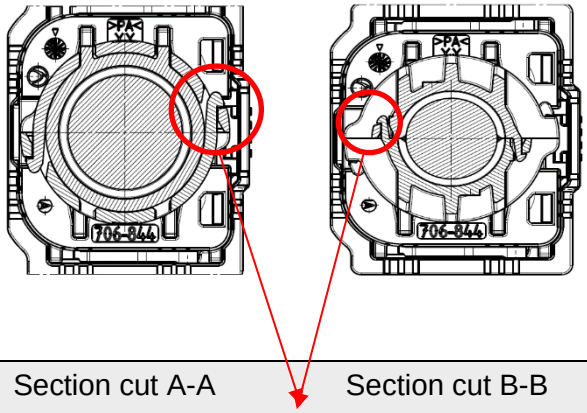
Connect the cover cap (5) over the recess provided in the locking sleeve (2). A press can be used for this assembly process. The holding of the retaining caps in the press, as well as the application of pressure, should take place over a surface that is as large as possible. A supplier for an assembly device is described within topic 6 Appendix this specification.





Cover cap in end position

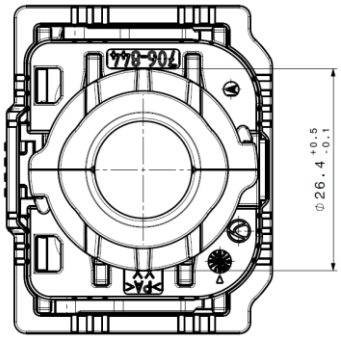




Section cut A-A Section cut B-B

Both locking hooks in end position.

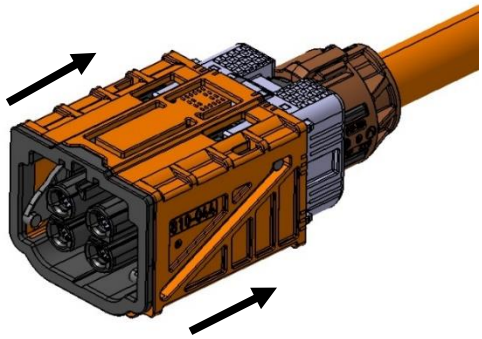
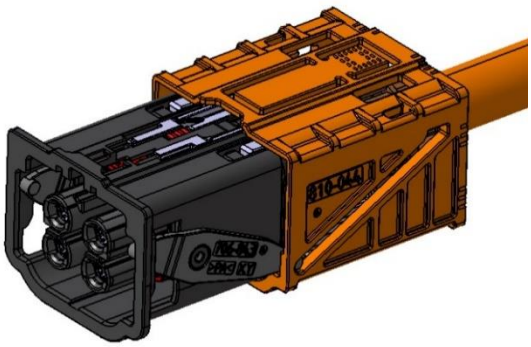
After assembly, make sure that the locking hooks are locked in place.



The measurement 26.4 +0.5/-0.1 can be used as a check. Measuring this dimension does not guarantee that the parts are closed.

The cover cap (5) and wire seal (1) should not be damaged during assembly

4.10 Slide the insertion aid to the end position

After assembly, the pull-in aid must be pushed to the rearmost end position.	
	

4.11 Assembly protection cap

Depending on whether transport protection of the connector interface is required by the customer, a transport protection cap can be assembled on the locking sleeve.

The transport protection cap must be pushed on until both locking elements engage over the front collar of the locking sleeve. It is possible to rotate the transport protection cap 360° during and after assembly.

4.12 Delivery of produced harnesses

For a capable and controlled process delivery of the produced harnesses to quantitatively free defined bundles.

5 Technical information

5.1 General requirements

It is not allowed, that any damages appear on the single components during the whole production process.

5.2 Technical cleanliness

In generally, pay attention to the cleanliness at and inside of the connector. Metallic particles generated at the assembly process must be removed with a suitable measure. No metallic particles >1000µm allowed on the inside neither on the outside of the connector.

Metallic particles at each connector: CCC = N (J4/K0) according to VDA 19
All other particles at each connector: CCC = N (J4/K0) according to VDA 19

5.3 General information and templates

a) The processing specification describes specific requirements from Hirschmann Automotive as to how the defined component(s) must be processed to comply with the product and processing specifications of the product.

b) The assembler/customer who processes the relevant Hirschmann Automotive products is responsible for proper processing and compliance with the processing results described in accordance with the specification.

c) Any complaints due to improper, deviating processing by the assembler/customer are void.

d) No damage whatsoever may occur to the individual components and assemblies during the entire assembly process.

e) The manufacturers of equipment and devices named in the respective processing specifications do not represent a mandatory requirement on the part of Hirschmann Automotive, but only serve as a non-binding indication that the results of the processing have been determined, validated, and released with the equipment of these manufacturers.

f) Our customers can also use other equipment and device manufacturers for processing if they so wish.

g) In general, the complete manufacturing process must also be independently validated and approved by the assembler/customer, regardless of the equipment manufacturer.

h) Also, no process parameters (such as welding currents, times, etc.) are specified by Hirschmann Automotive. Rather, the necessary technical result of this process is defined in the processing specification, through which conformity with the product specification is achieved. For example, weld node geometry (length, width, height...), min. pull-off forces in N, etc.

i) All warranty and liability claim by the customer/assembler against Hirschmann Automotive in accordance with the agreed contractual provisions apply exclusively subject to compliance with the corresponding processing specifications.

6 Appendix

6.1 Double-stroke crimp press

The crimping press from Schäfer can be used for the positioning and crimping process of the HCT4 socket contacts.

Description:	HPS40-4+2POL Double-stroke crimping press
Material number:	EPS2001-HPS40-4-HCT4

Description:	Crimp insert
Material number:	Can be found in the processing specification HCT4 socket contact "EVS-100068"

The device was developed and implemented based on the processing guideline specified by Hirschmann Automotive. The individual details regarding commissioning, handling and process description of the device can be requested directly from the supplier.

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

6.2 Mounting fixture retaining cap pressing

For the pressing process of the retaining cap, a device can be requested from WKM Maschinenbau GmbH.

Description:	Retaining cap latching HPS40 4+2 Female
Material number:	Will be distributed by WKM Maschinenbau GmbH.

The device was developed based on the data provided by Hirschmann Automotive. The individual details, regarding Assignment, handling, and process description of the fixture, can be requested directly from the supplier.

WKM Maschinenbau GmbH
Oberes Ried 15
A-6833 Klaus
Tel. +43.5523.54907-14
Fax +43.5523.54907-50
klien.m@wkm.at
www.wkm.at

7 Change of documentation

Change description	Change date	Editor
First release	03.09.2022	Schwer A.
General: Secondary lock geometry updated Section 1.3 and 2.1: Wire Cablena added Section 2.3, 2.5 and 2.6: New indexes added after coordination Section 2.5: Info text deleted Section 2.8: Link to individual parts added Process step 3.4: Link to item 4.1 and maximum inclination of contact added Process step 3.5: small series insertion forces added Process step 3.6.1 deleted Process step 3.7: Assembly text updated, L14 without F-feature Process step 3.8: Info text deleted, new pictures for retaining cap latching hooks added Addendum 4.1: added link to point 3.4 Addendum 4.2 deleted	27.09.2022	Schwer A.
General update of the images to big series Section 2.3: Colours corrected Section 2.3 - 2.6: Big series indexes added Section 3.8: Text for retaining cap press added, link to section 4.2 added Section 4.2: New section for "Assembly device retaining cap press" added	26.07.2023	Schwer A.
Update design specification	19.10.2023	Jussel E-M.