TABLE

1. General

1.1 Introduction

This process specification is valid for all versions and describes the product structure as well as the manufacturing of the HPS40-1 2+2 female connector SCC.

System number	Coding	HVIL Version	Wire cross section	CPA version
805-972-021	A	Yes	3.0 mm² 5.0 mm²	without CPA
805-972-022	B	Yes		
805-972-023	C	Yes		
805-972-027	Z	Yes		
805-972-028	A	No		
805-972-029	B	No		
805-972-030	C	No		
805-972-034	Z	No		
805-972-035	A	Yes		with CPA
805-972-036	B	Yes		
805-972-037	C	Yes		
805-972-041	Z	Yes		
805-972-042	A	No		
805-972-043	B	No		
805-972-044	C	No		
805-972-048	Z	No		

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	datasheet 3.0 mm² shielded cable of SUMITOMO	ETS-17051
B	datasheet 5.0 mm² shielded cable of FORCE	M6040
C	datasheet 5.0 mm² shielded cable of JUDD	JW1280-09
D	Process specification mini lamina contact MLK 1,2	DOC 00061540 ÄSD10 / March 2008
E	Process specification HCT4 female terminal	EVS-100068
F	datasheet 3.0 mm² shielded cable of COFICAB	t.b.d.

2 Product structure (single components)

2.1 Sheated cable (see table)

Wire manufacturer	Wire cross section	
	3.0 mm²	5.0 mm²
Coficab	FHLR91XC91X T4	-
Sumitomo Electric Interconnect Products (Suzhou) Ltd.	SUMITOMO-SZ EXZSW-F 3 150° C, 600 V	-
Judd Wire Inc.	-	1C BC XLPO/XLPO; SHIELDED, ISO 150° C, 600 V, HEV
Beijing Force Automotive Wire Co. Ltd.	-	FORCE-S61-2009 150°C, 600 V
KBE		FHLR91XC91X T4

2.2 HPS40-1 2+2 locking sleeve

	
without CPA	with CPA

Hirschmann Automotive No.	Wire cross section
806-230-515	3.0 mm² 5.0 mm²
806-230-516	

Delivery condition: The locking sleeves will be delivered in PE-bag in cardboard-box.

2.3 HPS40-1 2+2 female contact carrier

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

Hirschmann Automotive No.	Coding	Colour	HVIL bridge	Wire cross section
806-229-571	A	Black	Yes	3.0 mm² 5.0 mm²
806-229-572	B	Natural/ White	Yes	
806-229-573	C	Blue	Yes	
806-229-577	Z	Water-blue	Yes	
806-229-580	A	Black	No	
806-229-581	B	Natural/ White	No	
806-229-582	C	Blue	No	
806-229-586	Z	Water-blue	No	

Delivery condition: The female contact carriers will be delivered as bulk good.

2.4 HPS40-1 2+2 shielding sleeve

-511

Hirschmann Automotive No.	Wire cross section
709-115-511	3.0 mm² 5.0 mm²

Wire manufacturer: The released HV cable for each shielding sleeve is shown on the product drawing. (Hirschmann Automotive no. 805-972-…00)

Delivery condition: The shielding sleeves will be delivered in BE-bag as bulk good.

2.5 HPS40-1 2+2 stress relief

-501, -502

Hirschmann Automotive No.	Wire cross section
709-973-501	5.0 mm²
709-973-502	3.0 mm²

Wire manufacturer: The released HV cable for each stress relief is shown on the product drawing. (Hirschmann Automotive no. 805-972-…00)

Delivery condition: The stress relief will be delivered in BE-bag as bulk good.

2.6 HPS40-1 2+2 wire seal

-501

Hirschmann Automotive No.	Colour	Wire cross section
709-972-501	Blue	3.0 mm² 5.0 mm²

Wire manufacturer: The released HV cable for each seal is shown on the product drawing. (Hirschmann Automotive no. 805-972-…00).

Delivery condition: The wire seals will be delivered as bulk good.

2.7 HPS40-1 2+2 cover Cap

-501

Hirschmann Automotive No.	Wire cross section
706-541-501	3.0 mm² 5.0 mm²

Wire manufacturer: The released HV cable for each cover cap is shown on the product drawing. (Hirschmann Automotive no. 805-972-…00).

Delivery condition: The cover caps will be delivered as bulk good.

2.8 female terminal HCT4

-504

Hirschmann Automotive No.	Wire cross section
709-427-504	3,0 mm² 5,0 mm²

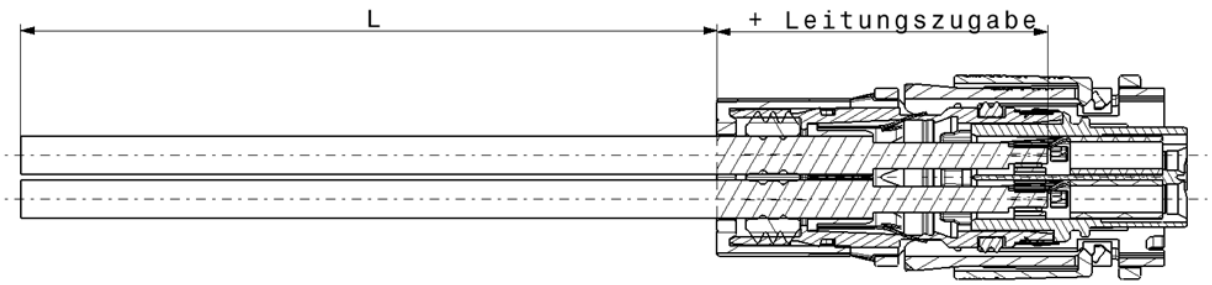
Wire manufacturer: The released HV cable for each terminal is shown on the product drawing. (Hirschmann Automotive no. 805-972-…00).

Delivery condition: The female terminals will be delivered on the spool.

3 Process steps

The following described process steps are used for the cross-sections 3.0 mm² and 5.0 mm². The version with 5.0 mm² FORCE cable plus the terminal holder code A, were selected as reference.

3.1 Cut the shielded cable



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

Wire cross section	Wire add-on without zero-cut (mm)	Wire add-on with zero-cut (mm)
3.0 mm²	48.3	52.3
5.0 mm²	48.3	52.3

3.2 Assembly the single components

Push the cover cap (1), seal for wire (2), locking sleeve (3) and stress relief (4) onto the shielded cable.

1	2	3	4
			

3.3 Strip insolation of shielded cable

Stripping length:

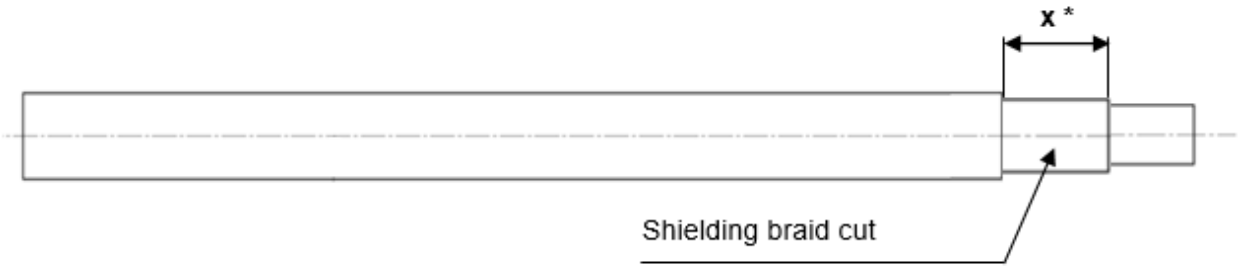
Wire cross section	Dimension L1 for Hirschmann Automotive HCT4 terminal incl. zero-cut (mm)	Dimension L1 for Hirschmann Automotive HCT4 terminal excl. zero-cut (mm)
3.0 mm²	29.05 ± 1	25.05 ± 1
5.0 mm²	29.05 ± 1	25.05 ± 1

Do not cause any mechanical damages during the manufacturing processes.

3.4 Wire processing I

Assemble stress relief, cut shielding braid

Length shielding braid:



*Dimension x can vary, depending on the production-method of each confectioner.

No residues or parts allowed on the cable after cutting the shield netting. This must be ensured with actions like the following:

- Prevention by removing the separated shield netting.
- Prevention by blowing-out or suction residues / parts from the shield netting.

Furthermore, it must be guaranteed, that after the next processing step, a 70% overlapping of the shield netting over the position on the stress relief is given.

3.5 Wire processing II

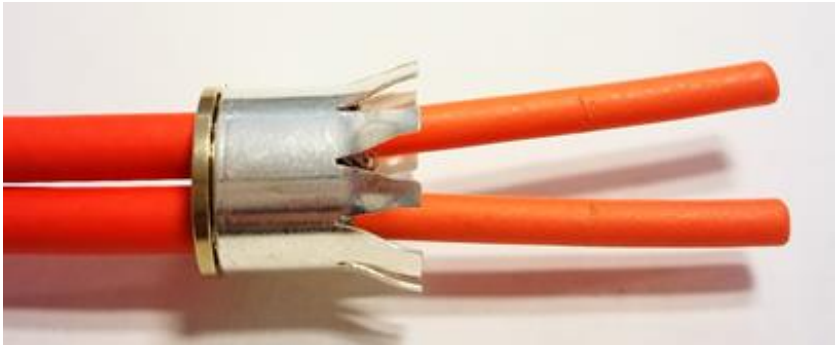
Put the shielding braid back (Remove foil, if needed.)

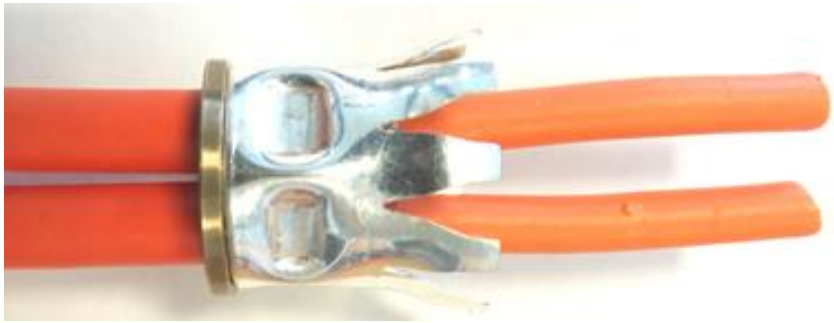
Do not cause any mechanical damages on the single conductors during the manufacturing process. If necessary, the twisted shield netting can be dissolved (brushed off).

3.6 Assembly I

Strain relief, shielding braid and shield crimp socket positioned and pressed

Strain relief → Shielding braid needs to be laid out firm.


Shielding crimp socket → Shield crimp socket should not be damaged during positioning.


Hexagonal pressing geometry


- **Device for pressing operation**

The device for the pressing operation of the company “WKM” can be used for the exact positioning and pressing operation of the stress relief and the shield crimp socket.

Name of the device:	HV - Kabelverpressungsvorrichtung
Order number:	13 88 02
Name of the device:	Wechselmodul zur Leitungsvorbereitung HCT4

The above-mentioned device was developed and realized according to the process guidelines of Hirschmann Automotive GmbH. Single details, regarding the ordering, handling and process specification can be obtained directly at the manufacturer.

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

The ordering of a device for pressing operation is part from the different manufacturers. Therefore, only the pressing operation data will be described in detail in this process specification HPS40-1 2+2 female connector SCC.

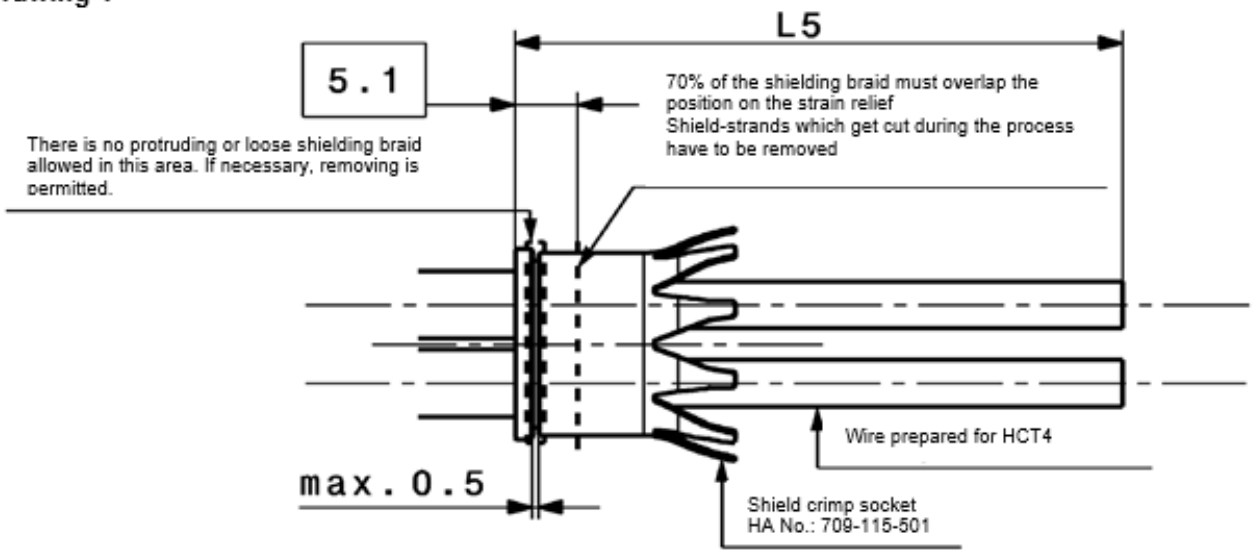
- **Pressing operation data**

Dimensional parameters:

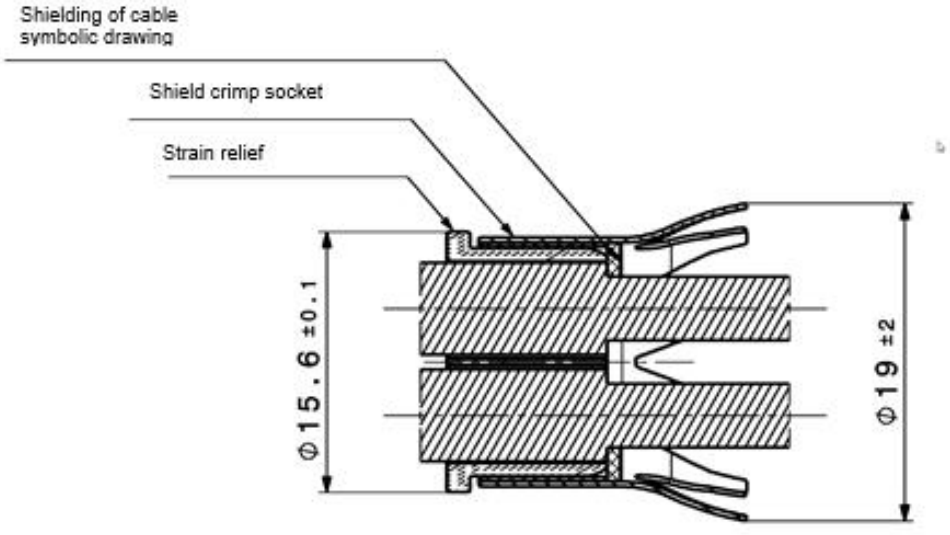
Hirschmann Automotive GmbH HCT4 female terminal:

a) The strain relief, shielding braid and shield crimp socket must be positioned in the device in a correct and precise position in relation to the wire end with the straight cut. (Dimension L5 = 39.65 ± 1 mm).
b) The circularity of the shield crimp socket must be guaranteed.
c) Before and after pressing operation, the specified dimensions on the following drawing 1 must be kept.

Drawing 1



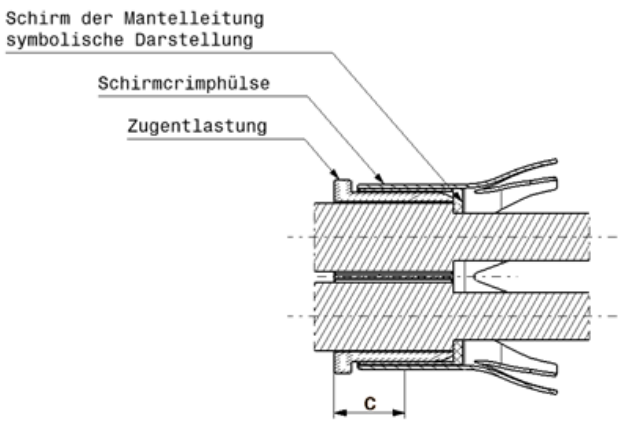
HCT4 incl. zero-cut add on	L5 = 39,65 mm
HCT4 excl. zero-cut add on	L5 = 35.65 mm



- **Pressing operation geometry**

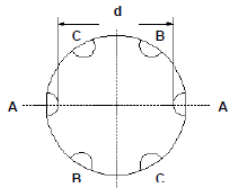
Hexagonal geometry of pressing operation

Position of pressing operation:



Wire cross section	Dimension c (mm)
3.0 mm²	5.7 ± 0.3
5.0 mm²	5.7 ± 0.3

Depth of pressing opteration:



Shield relief to shielded cable
with shield netting.

Wire manufacturer	Wire cross section	
	3.0 mm²	5.0 mm²
Coficab	13.25 ± 0.25	-
Sumitomo Electric Interconnect Products (Suzhou) Ltd.	-	-
Judd Wire Inc.	-	-
Beijing Force Automotive Wire Co.Ltd	-	13.25 ± 0.25
KBE	-	13.50 ± 0.20

Dimension “d” in mm

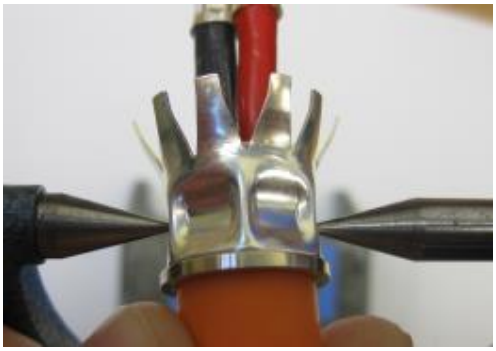
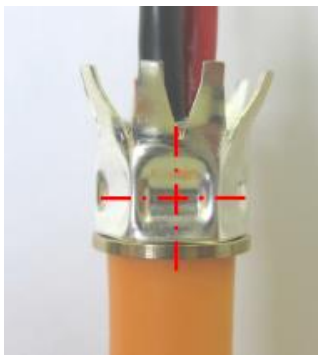
*The upper tolerance of the pressing depth can be raised, until the presented value, if it is not possible to change the settings on the machine. But then the manufacturer must ensure that the isolation of the wire is not getting pulled back of the strain relief while assembling it into the locking device. Additionally, the locking position of the shield crimp socket must be reached.

- **Check measurement of the depth of the pressing operation**

Use the measurement device to ensure the depth of the pressing operation is correct: to check dimension **“d”**, all three depths (A-A, B-B and C-C) must be measured. All measurement values must be within the given tolerance.

The measuring must be done with a point micrometer
(Manufacturer Mitutoyo, measuring range 0-25 mm, measuring point 15°/R 0.30 mm).

Schematic representation of the measurement procedure:

<table>
<tr><td>  </td><td>  </td></tr>
<tr><td colspan="2">Position measuring points: center to center</td></tr>
<tr><td>  </td><td>  </td><td>  </td></tr>
</table>

Pull-off-force with shield neeting

The pull-off test with neeted shield must be carried out.

Wire cross section	Pull-off force
3.0 mm²	≥ 50 N
5.0 mm²	≥ 50 N

Pull-off-force without shield neeting

The pull-off test without a needed shield does not have to be carried out and only serves as an additional indication of positive processing.

Wire cross section	Pull-off force
3.0 mm²	≥ 30 N
5.0 mm²	≥ 30 N

General specifications

Do not cause any mechanical damages on the following parts during the pressing operation.

- Isolation of shielded cable
- Isolation of single conductors
- Shield crimp socket
- Shield strand
- Stress relief

3.7 Assemby II - female terminal HCT4

- **Double stroke crimping machine**

The crimping device by the company “Schäfer” can be used for the exact positioning and crimping operation of the HCT4 female terminal.

Name of the device:	Double stroke crimping machine
Article number:	EPS2001-HCT4
Name of the device:	Crimping insert
Article number:	Must be taken from the “Process specification HCT4 female terminal EVS-100068”

The mentioned device was developed and realized according to the processing guidelines by Hirschmann Automotive GmbH. Single details, regarding the ordering, handling and process specification could be enquired directly by the supplier.

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

The ordering of a device for pressing operation is part from the different manufacturers. Therefore, only the crimp and position operation data will be described in this process specification HPS40-1 2+2 female connector SCC in detail.

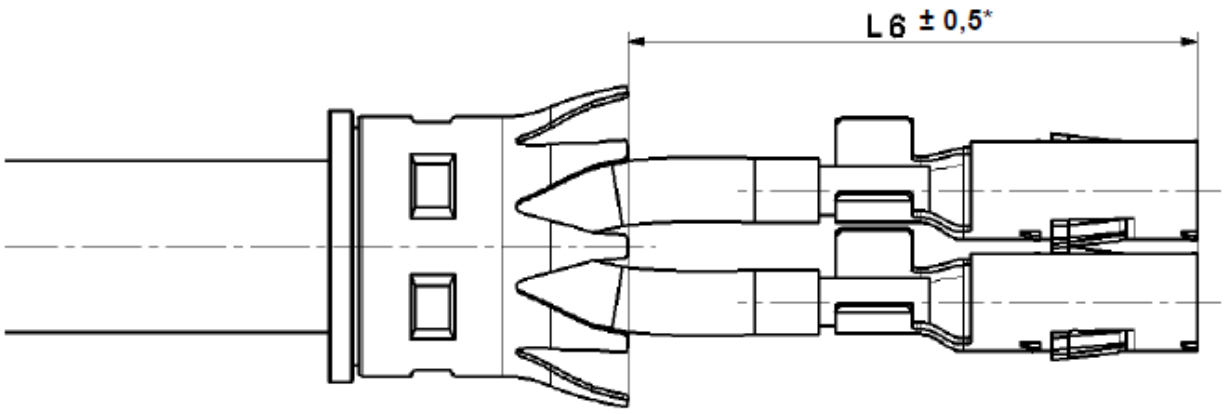
- **Process data**

  a) The crimping operation data must be taken from the “process specification HCT4 female terminal EVS-100068”.
  b) The crimping of HCT4 female terminals is related to the shield crimp socket. The relevant wire related length dimension L6 will be created over tool changeable inserts on the crimp press machine. This must be ordered at company Schaefer separately. To mount the polarized HCT4 terminals smoothly into the contact holder, the terminals must be crimped in the correct position to the wire.

The dimensions shown in the following drawing 2 must be observed after crimping.

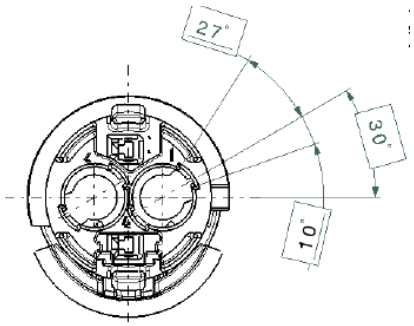
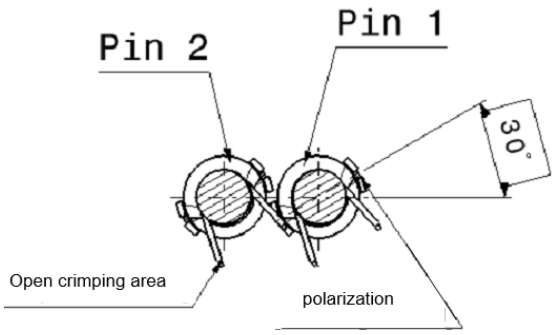
Schematic representation of the measurement procedure:

Drawing 2



HCT4	L6 = 33.8 mm

* For all silicon core cables with silicon insulated single wire the upper tolerance can be increased to +1.7 mm to enable an easier assembly process. The maximum length of 35.5 mm is not allowed to extend, because of the risk of cable damages in case of cable overlength inside of the connector. The minimal cable length must be checked and released with the used assembly equipment for the assembly step. (Shield crimp sleeve latching must be ensured!)

Insertion chamber female terminal HCT4	Nominal position of the terminals of the wire
These angular dimensions are theoretical dimensions and only serve information.	
	

To ensure the correct assembling, primary locking and secondary locking, the crimping of the terminal in the correct position to the wire is important. The nominal angle should be 30°. Depending on the wire the angular deviation can vary.

The allowed angular deviation will be specified by the geometry of the insertion chamber at the female terminal holder and the max. permissible assembly force of the shielded cable with the terminals into the terminal holder. This can be checked during the assembling process.

3.8 Assembly III

Assemble HCT4 terminals into HPS40-1 contact carrier (1).		
HCT4 terminal	**Pin**	**Polarity/ Colour**
	1	+/ Orange
	2	-/ Orange

During the assembly of the HCT4 female terminals, the snap latch of the HCT4 female terminal will be deflected. When reaching the final position, the latch will lock audible, and the terminals are primary-locked.

Pre-locking position / primary locked	Press secondary lock (2).
	

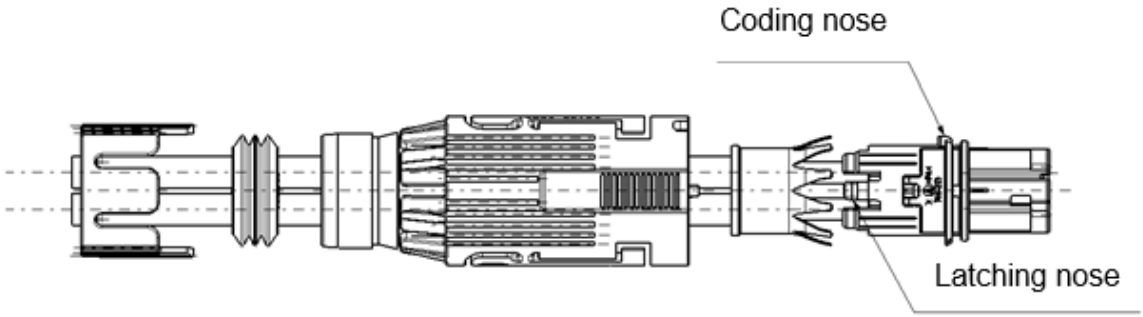
A plastic particle may form inside the contact chamber when fitting the HCT4 contact. Particles that are within the technical cleanliness limits are permitted and can be left in the plug-in system.

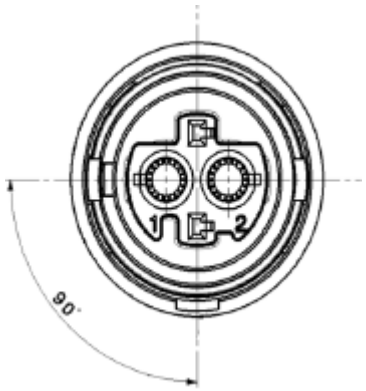
Pictures: HCT4 female contact holder, coding C with plastic chip

Wire manufacturer	Wire cross section	
	3.0 mm²	5.0 mm²
Assembly-force	**30 N**	**36 N**
Coficab	FHLR91XC91X T4	-
Beijing Force Automotive Wire Co.Ltd	-	FORCE-S61-2009 150° C, 600 V
Judd Wire Inc.	-	1C BC XLPO/XLPO, SHIELDED, ISO 150° C, 600 V, HEV
Sumitomo Electric Interconnect Products (Suzhou) Ltd.	SUMITOMO-SZ EXZSW-F 3 150° C, 600 V	-
KBE		FHLR91XC91X T4

3.9 Positioning locking sleeve unit

Polarized and power-assisted assembly of the locking sleeve unit.	
	



	Polarization characteristics Locking device unit and terminal holder

The optimum assembly forces and force distributions may differ depending on the type of cable. For machine-assisted production, the Fmax forces must be taken into account in order to avoid damage to the components

Even a compression of the HV single wires and the related risk of damaging the HV wires must be avoided during the assembling process.

This can be achieved by a simultaneous pull + press and prevent the relative movement between terminal holder and cable. --> max. allowance of the compression of the HV single wire is 1 mm. Alternative it is possible to pull the cable until you reach the end position of the shield crimp socket. In a second step the contact holder must be pushed to achieve the final locking position.

Compressive force (contact holder)	Fmax = 200 N on terminal holder unit
Tensile force (HV cable)	Fmax = 120 N (170N*) on harness

Schematic representation of the measurement procedure:

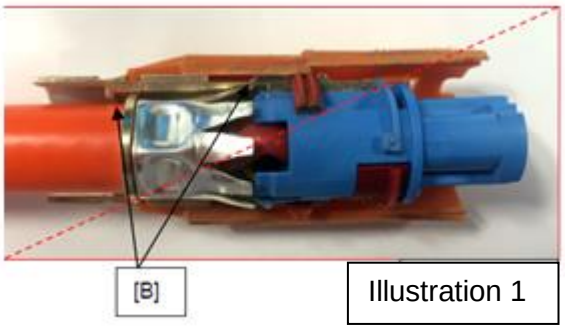


Illustration 1

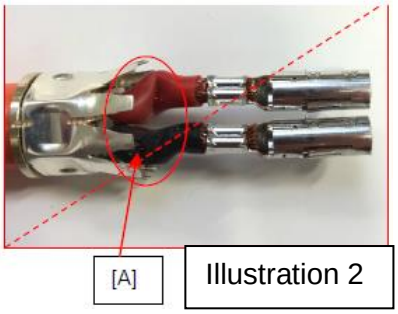


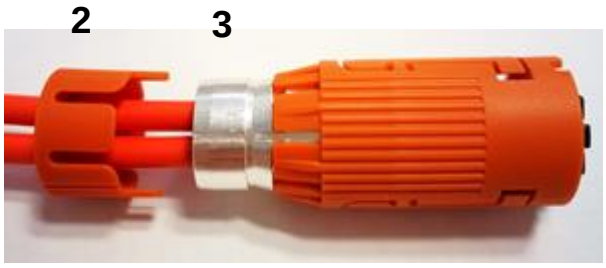
Illustration 2

These errors may be caused by cables that are too long, or deviation from the process specification. As a result, wires might be kinked and damaged [A] (risk of short circuit), and incorrect locking position [B] of the shield crimp socket.

- The shield crimp socket, both latching hooks and the latching nose of the terminal holder unit, must be locked in the gaps of the locking device unit.
- There may not occur any damages on the shield crimp socket, the coding nose and both latching noses, during the assembly process. The shield of the HV wire may not be pulled out of the strain relief sleeve.

*If necessary, the pulling force can be increased to 170 N, if there is no damage on the wire, also the sheath of the wire cannot be loosened of the stress relief.

3.10 Assembly seal and cover cap

Seal (1) and cover cap (2) have not to be damaged during the assembly process. Assemble the Seal (1) with the cover cap (2).	
	
Lock cover cap (2) in the cut-out (3) of the locking sleeve unit. Cover cap (2) is not locked against rotation.	
	

3.11 Delivery of produced harnesses

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

4 Technical information

4.1 General requirements

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

4.2 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 >1,000 µm 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 (J10/K0) according to VDA 19

5 Change of documentation

Version	Change description	Change date	Editor
1	Initial edition SCC	05/ 2018	Hoor-Murati R.
2	Added Coficab SCC cable	07/ 2022	Ding S.
3	New design for the process specification Added dimensions and pull-off force for 3.0 mm² cable	08/ 2022	Natter T.
4	New design of process specification	06/ 2023	Jussel E-M.
5	Adjusting data of the bottom line	07/ 2023	Jussel E-M.
6	Page 22: Updated “Pull-off-force with shield neeting”-dimension Topic 2.1, Page 20, Page 27: extension line wire manufacturer KBE	10/ 2023	Jussel E-M.
7	Topic 2.4: specified the stress relief PN	05/ 2024	Jussel E-M.
8	Adjustment between DE and EN version	03/ 2025	Jussel E-M.