



HF FAKRA 90°, PLUG CONTACT KIT

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1. SCOPE

This specification covers the special guidelines for the application of the HF Fakra 90° Plug Contact Kit. The cable types and crimping data are listed in chapter 4.

2. REFERENCED DOCUMENTS

2.1 Customer Drawing

The customer drawings 1718080 / 1719252 / 1719655 / 2112466 / 2297873 show the dimensions and materials for all components.

In the case of a conflict between this application specification and the customer drawing, the customer drawing takes precedence.

2.2 Product Specification

The product specifications 108-18918 and 108-94089 describe the characteristics of these contact kits assembled on a 50Ω-cable, together with the electrical and mechanical requirements.

2.3 Application Specification

The general guidelines laid down in Application Specifications 114-18022 also apply to the crimp quality of the center contacts.

2.4 Instructional Material

411-18087	Instruction Sheet ERGO CRIMP Crimp Hand Tool PN 539 635-1
411-18322	Instruction Sheet ERGO CRIMP ie Set 1579021-4
411-18272	Instruction Sheet ERGO CRIMP ie Set 1-1579001-1
408-8851	Instruction Sheet SDE-SA Hand Crimping Tool PN 9-1478240-0
408-9930	Instruction Sheet Pro-Crimper III Hand Crimping Tool PN 354 940-1
408-9830	Instruction Sheet SDE Die Set 58483-1
412-18876	Customer Manual (WDT) Pneum. Crimping Machine 528050-1
409-10052	Customer Manual (SDE) Pneum. Crimping Machine 1490076-2
412-18103-1	Customer Manual MQC- and HD-Applicators for end feed and side feed contacts with crimp height adjustment
408-7516	Instruction Sheet Application tooling for Screw-Machine Contacts
408-18017	Coaxial Cable Assemblies Handling Instructions
108-94089	Product Specification HF FAKRA 90°, Plug Contact Kit
108-18918	Product Specification HF FAKRA 90°, Plug Contact Kit

2.5 National / International Standards

DIN IEC 352-2:1990	Solderless connections/ Crimped solderless connections
DIN 72594-1; March 2006	Road vehicles Radio frequency interface with 50Ω impedance (50Ω RFI)

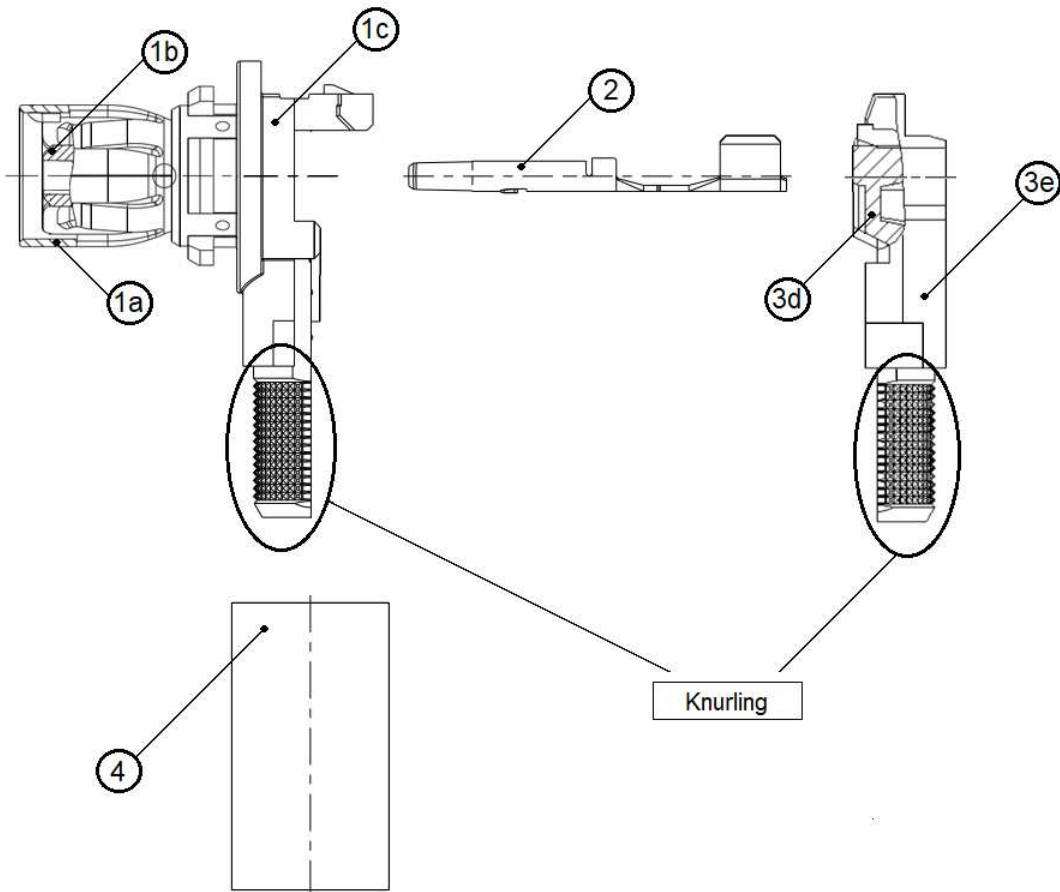
3. NOMENCLATURE

The terms shown below are used in the specification.

3.1 Components

For Part Number List see chapter 7 – P/N Overview

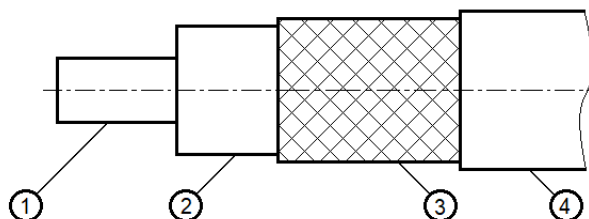
1. Front Shell Subassembly / also Subassy Plug
 - a. Outer Contact
 - b. Terminal Dielectric
 - c. Front Shell
2. Center Contact (can be ordered on reel only)
3. Rear Shell Subassembly / also Subassy Cover
 - d. Dielectric Cover
 - e. Rear Shell
4. Ferrule



Pictures for clarification, do not represent complete product range.

3.2 Cable

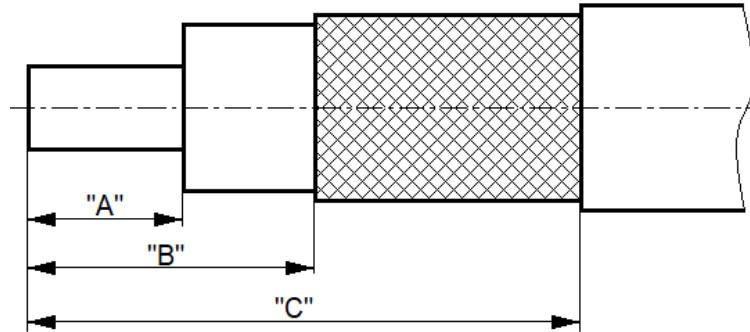
1. Inner conductor
2. Dielectric
3. Braid
4. Jacket



4. INFORMATION

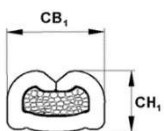
4.1 Stripping dimensions:

Units in millimeters, unscaled



Cable Type	Low Loss 956163-2	RTK031 956339-1 956339-2	RG174 1449103-1 1719435-1	1.5DS Cables	Dacar 462 1557725-1	1.5DS Cable with kit PN 2112466-2	4.0mm Shikoku 1557701-2	RTK044 2371807-1
Dim. "A"	2,8+0,2/-0,3							
Dim. "B"	5,3+0,2/-0,3					4,0+0,2/-0,3	4,5+0,2/-0,3	5,3+0,2/-0,3
Dim. "C"	9,8+0,2/-0,3							

4.2 Crimping tools for the center contact

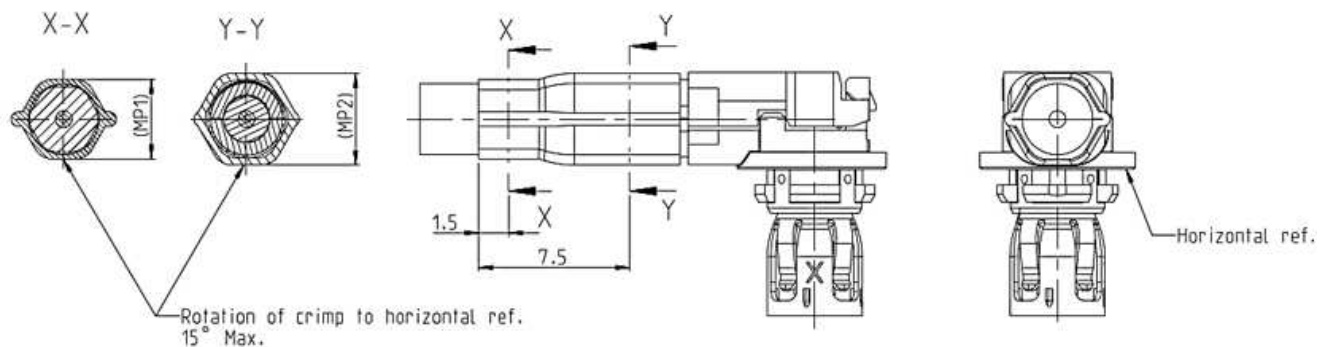
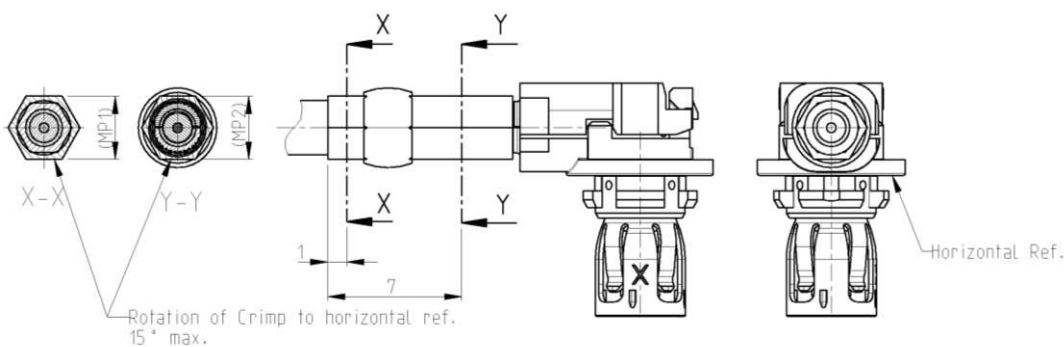
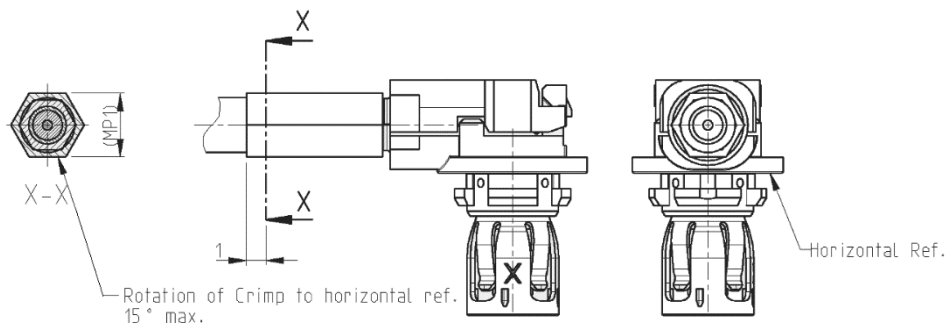


Wire Crimp

Cable Type TE P/N	Low Loss 956163-2	RTK031 956339-1 956339-2	RG174 1449103-1 1719435-1	Dacar 462 1557725-1	1.5DS cables	4.0mm Shikoku 1557701-2	RTK044 2371807-1
Center contact PN	1418990-1 1418990-5		1719685-1 1719685-5	1719685-5	2112465-1	2141947-1	1418990-5
Applicator PN	9-541781-7 or 2151974-2		9-541782-7 or 2151972-2	2151972-2	2151558-2	1530525-6-A	2837899-2
Crimp Height CH	1,03±0,03	0,91±0,03	0,71±0,02	0,71±0,02	0,73±0,02	0,86±0,05	0,95±0,03
Crimp Width CB	.046" F (1,17mm)		.037" F (0,94mm)	.037" F (0,94mm)	.042" F (1,07mm)	.062" (1,57mm)	1.17mm
Applicator Settings	A	B	A	A	-	-	

4.3 Crimping tools for the ferrule

Cable Type TE P/N	Low Loss 956163-2	RTK031 956339-1 956339-2	RG174 1449103-1 Dacar 462 1557725-1	1.5DS Cable	1.5DS Cable with kit PN 2112466-2	4.0mm Shikoku 1557701-2	RTK044 2371807-1
Pneumatic crimping machine PN + Adapter PN + Die Set PN or Loose Piece Mini Applicator	528050-1 + 1-528051-6 + 1579021-4 Or 2383869-1	528050-1 + 1-528051-6 + 1-1579001-1	528050-1 + 1673663-2 + 58483-1 (Pos. C)	1490076-2 + 1673663-2 + 58483-1 (Pos. C)	1490076-2 + 1-528051-0 + 2217611-1	36-1094682 + 1-528051-0 + 58552-1	2374600-1 – G II Terminator 2844810-1 – GII+ Terminator + 2380734-1
Hex Dimension (MP1)	3,9 ±0,1	3,25±0,05	3,84+0,1/-0.05	4,10±0,10	5,18±0,05	4,15±0,1	
Hex Dimension (MP2)	4,52±0,05						4,52±0,05

Low Loss, RTK 031 and RTK044

RG 174 and 1.5DS with kit PN 2112466-2

1.5 DS, 4.0mm Shikoku


Pictures for clarification, do not represent complete product range

5. REQUIREMENTS

5.1 Cable

A Selection

The tables in chapter 4.2 enclose an overview of the permitted combinations cable / contact kit. Other cables require the approval of the Engineering Department.

B Preparation

The cable must be stripped to the lengths shown in chapter 4.1. The stripping operation must not cut any cable strands, dielectric or jacket at places other than specified by the cable stripping dimensions.

Take care that the individual strands of the cable are not bent and that the insulation (dielectric or jacket) is not damaged, compressed or deformed.

The surface must be clean and free of contamination.

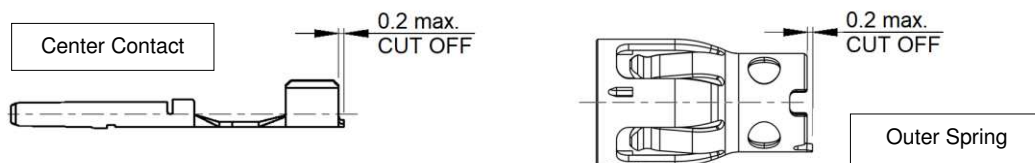
C Handling

At all times the bending radius in the cable specification must be fulfilled - bending below its minimum bend radius could cause circular cross section distortion resulting in internal damage, changing the characteristic impedance.

5.2 Cut-off and Burr for the center contacts

The cut-off must be visible after crimping. The maximum length of the cut-off is 0.2 mm.

No burrs at the shearing point, cut off not bent downwards are allowed. No sharp edges are allowed.



5.3 Wire Crimp of the center contact

A Wire position

Before crimping, the center contact must be positioned to fulfill following conditions:

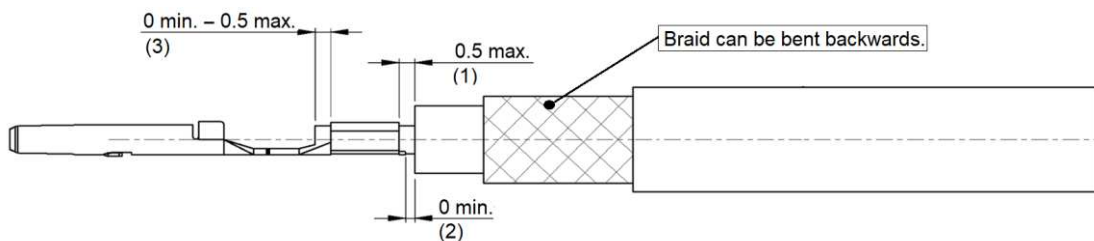
- a maximum air gap of 0.5 mm is allowed between the shoulder of the cable dielectric and the crimp bell mouth of the center contact (1)
- a minimum air gap of 0 mm has to be between the shoulder of the cable dielectric and the cut-off of the center contact (2).

All strands must be positioned in the crimp barrel.

After crimping, the end of the wire must extend 0±0.5 mm beyond the front end of the wire crimp (3).

No upcoming strands.

See also Specification 114-18022.



B Crimping data

The shape, height and width of the crimp, and the cable types are shown in chapter 4.2.

C Extraction forces

The crimp extraction forces must fulfill the requirements of DIN IEC 352 Part 2.

D Crimp bell-mouth

The size of the rear bell-mouth depends on the wire range: 0.03 – 0.56 mm² (AWG 32-20): 0.25 ±0.15 mm
 0.30 – 0.81 mm² (AWG 22-18): 0.30 ±0.15 mm

A front bell-mouth is **not** permissible.

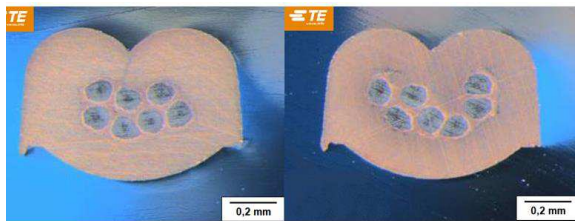
Pictures of front and rear bell-mouth are available in specification 114-18022.

E Crimp quality of center contact

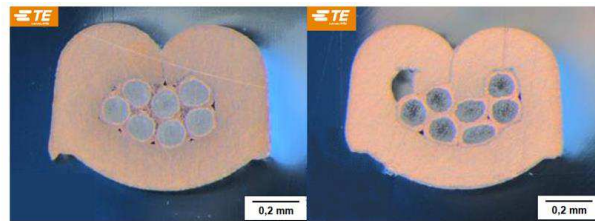
The general guidelines of application specification 114-18022 are valid for the crimping of the center contacts. The following exceptions are made due to the use of copper clad steel strands.

- crimp wing rolls in: by stubbing of the crimp wing on a steel strand (instead of sliding between the strands) the crimp wing end may be curled.
- support angle: a support angle up to 35° is acceptable.
- support length: the support length can be less than half barrel material thickness. The minimum criterion is the crimp must be closed.

Following typical crimp microsections are shown.



Minimum crimp height 0.69mm



Maximum crimp height 0.75mm

5.4 Ferrule crimp

A Position of the ferrule before crimping

After positioning the strands of the cable braid, the ferrule is moved over the cable braid until it stubs with the shoulder of the rear shell (subassembly) or of the (front shell) subassembly. Only then, in this end position, the ferrule may be crimped. Pictures are attached in chapter 6.8.

In no case may the strands of the cable braid protrude over the knurling area (see chapter 6.7) and consequently get stuck between the ferrule and the shoulder of the rear shell (subassembly) or of the (front shell) subassembly. The strands are not allowed to be visible after positioning the ferrule.

B Crimping data

The crimping process can only take place with the tools and data listed in chapter 4.3.

The section cut of the single strands (or the tensile strength) may not be influenced by the crimping process. A means for analysis is the measuring of the cable pull out force:

Cabel Type	Part Number	Minimum Pull-out force [N]
Low Loss	956163-2	90
RTK031	956339-1	120
RG174	1449103-1	90
	1719435-1	100
1.5DS	2300568-1	90
	1832844-1	90
Dacar 462	1557725-1	90
4.0mm Shikoku	1557701-2	110
RTK044	2371807-1	110

5.5 Contact Area

After crimping, neither the locking nose nor the contact body must be bent or deformed.

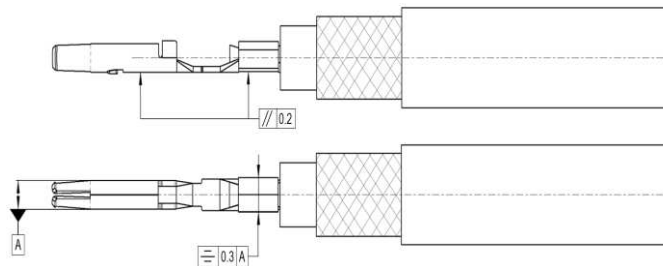
5.6 Shape and Position Tolerances

Parallelism

The bottom of the wire crimp must be parallel with the contact body, with a tolerance of 0.2mm.

Symmetry

The width of the wire crimp must be symmetrical with the contact body with a tolerance of 0.3mm.

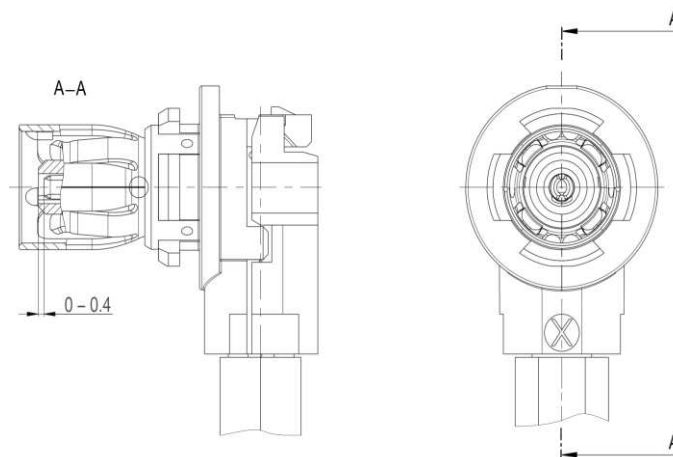


5.7 Control dimensions after cable assembly

If the contact kit is assembled according to the procedure described in chapter 6, the position of the center contact is assured.

A means to control the position is to measure the distance from the front of the terminal dielectric to the front of the center contact. This dimension is allowed to be 0 mm min. and 0,4 mm max.

Because this dimension is difficult to measure, it must only be checked if the position of the center contact is not assured, e.g. due to false manipulation during the assembly steps described in chapter 6.4 and 6.5.



Pictures for clarification, do not represent complete product range

6. CABLE ASSEMBLY OF THE CONTACT KIT

General note:

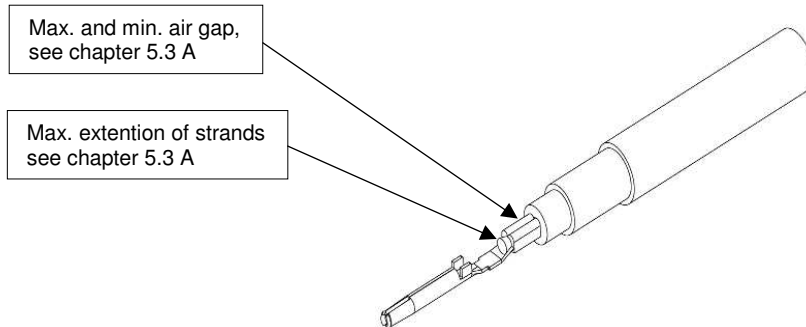
The pictures below represent the assembly procedure for the plug contact kit for cable type Low Loss (contact kit PN 1718080-1). The assembly procedures of the other contact kits (see chapter 7 - PN overview) with other cable types occur in the same manner.

Caution: the sequence of the first three assembly steps (6.1 to 6.3) can be chosen freely.

6.1 Step 1: crimp center contact

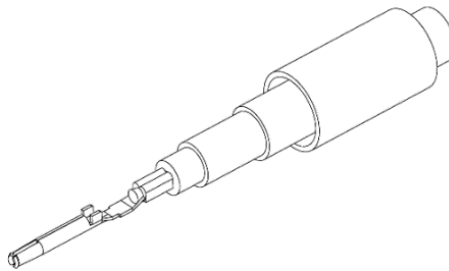
The center contact is assembled on the cable after stripping the cable. The stripping dimensions are listed in chapter 4.1.

The center contact is processed with an applicator. The stability of the center contact in the application tool must always be assured to guarantee a symmetric F-crimp. The requirements in chapter 5 must be fulfilled.



6.2 Step 2: mount ferrule

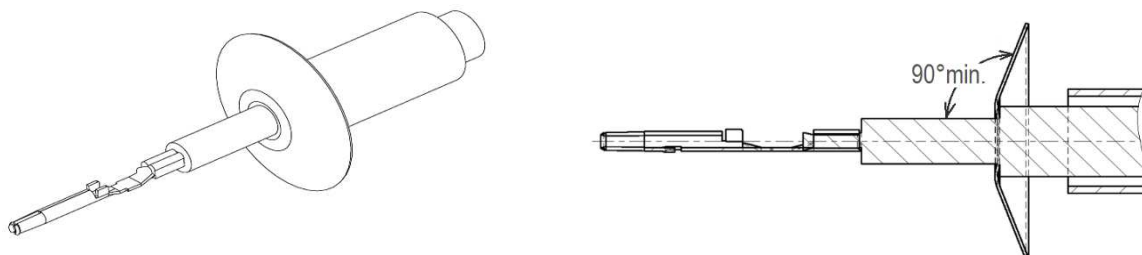
Now the ferrule must be mounted (pulled) over the cable jacket.



6.3 Step 3: bend cable braid backwards

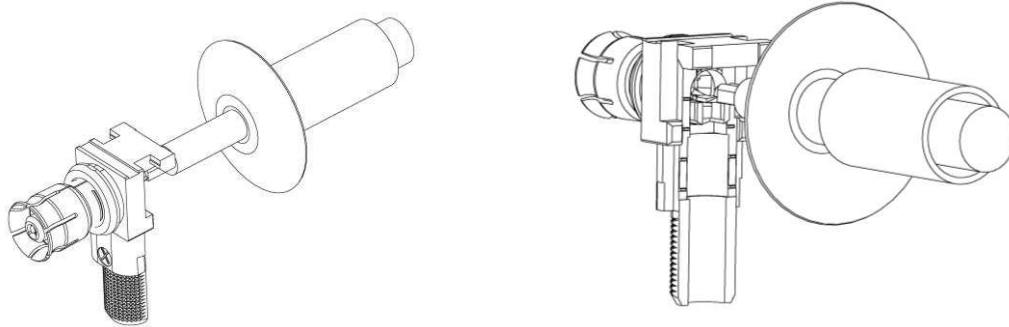
The cable braid must be bent over the cable jacket. The angle over which the strands are moved is minimum 90°. The cable strands must not be damaged.

In case an aluminum foil is present between braid strands and dielectric, the foil is not to be moved from its position along the complete assembly process.



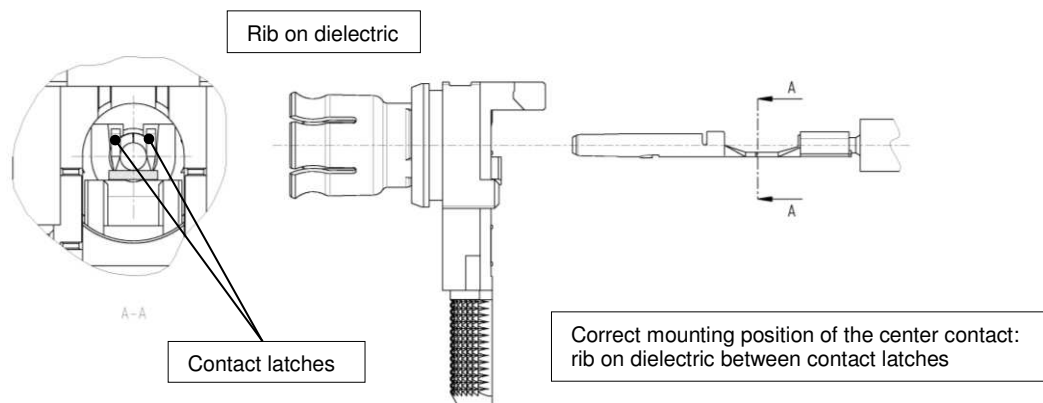
6.4 Step 4: load crimped center contact in subassembly

After crimping the center contact, mounting the ferrule and bending the cable braid (see chapter 6.1 to 6.3), the crimped center contact must be loaded into the (front shell) subassembly. The center contact must be pushed so far until a snap function can be recognized. Only then the center contact is guaranteed to be in its end position. Efforts of inserting the center contact more are not allowed.



Following requirements must be fulfilled:

- the center contact is not allowed to be bent or damaged
- the loading process of the center contact in the subassembly must neither be interrupted nor be made undone
- torque on the center contact is not allowed
- the requirements in chapter 6.3 ("90° min.").

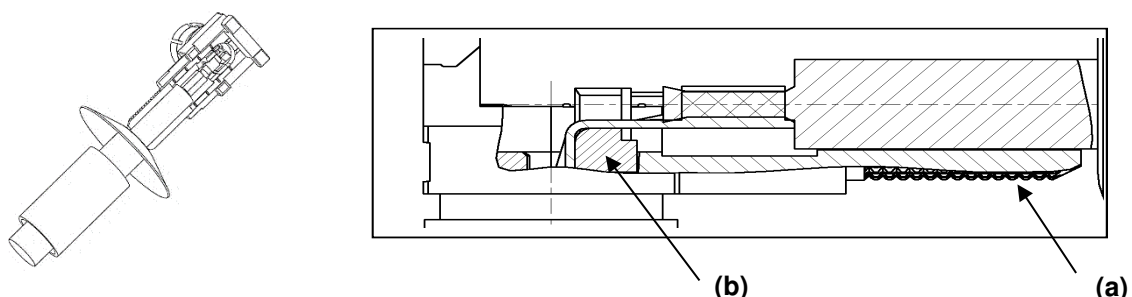


6.5 Step 5: bend center contact

Now the cable dielectric is positioned in the (front shell) subassembly (a) by bending the center contact over the radius of the terminal dielectric (b).

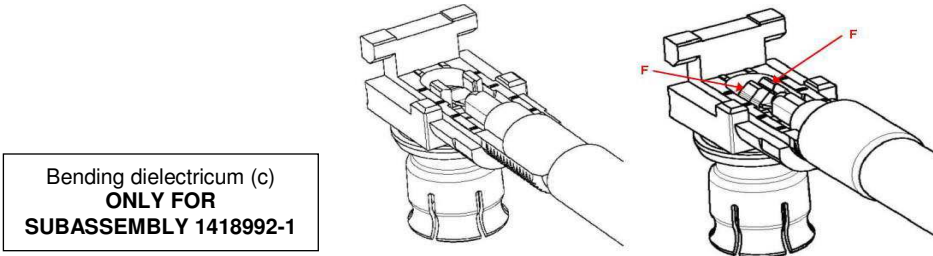
Caution:

- this assembly step must only take place after that the center contact is locked in the (front shell) subassembly (see chapter 6.4).
- the center contact must remain locked at all times during this assembly step
- the center contact is allowed to be bent only once.



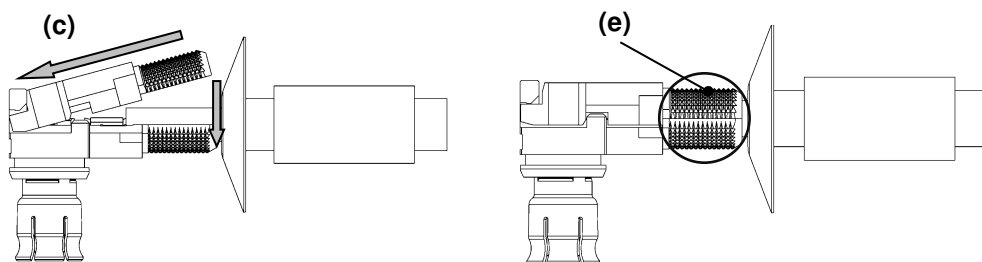
6.6 Step 6: bend dielectrics latches

Only for center contacts assembled in Subassembly 1418992-1 (contact kit 1718080-1), the dielectric latches are bent over after bending the center contactin position, see (c).



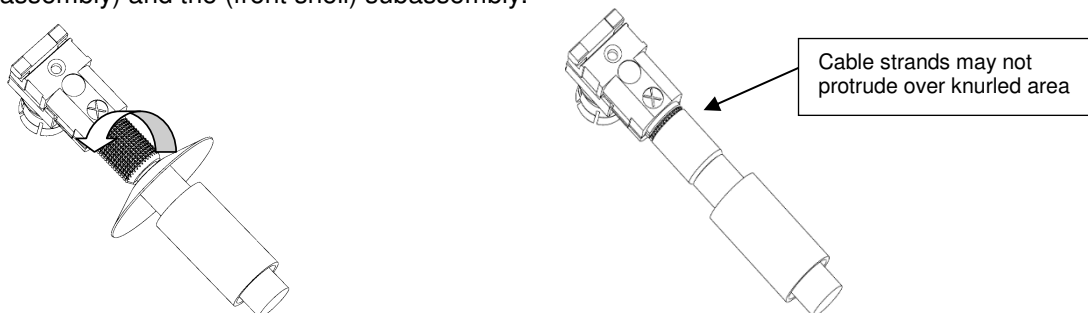
6.7 Step 7: mount rear shell

Now the rear shell (subassembly) must be mounted. It is hooked in the (front shell) subassembly (c) and pushed downwards (d). After this process step rear shell (subassembly) and (front shell) subassembly must be closed completely in their knurled zones (e).



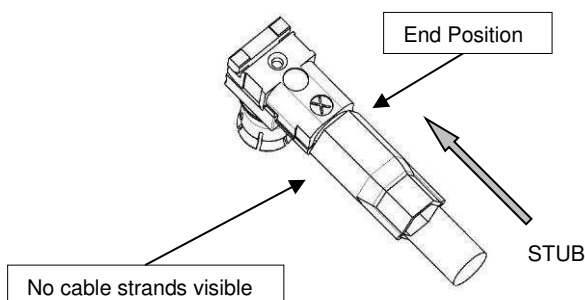
6.8 Step 8: bend cable braid forwards

After positioning the rear shell is the cable braid folded over the knurled area of the rear shell (subassembly) and the (front shell) subassembly.



6.9 Step 9: mount and crimp ferrule

Now the ferrule is moved over the cable braid in its end position, and crimped. The requirements in chapter 5.4 must be fulfilled in this assembly step.



7. P/N OVERVIEW

P/N Contact Kit	Cable Type	P/N Components	Description	P/N Subassemblies	Description	Applicable Housings
1718080-1	Low loss RTK031	1418988-1	FRONT SHELL	1418992-1	SUBASSY	1 Pos. Cover/Retainer 1718028-1 1718317-1
		1488151-1	OUTER CONTACT			
		1418991-1	DIELECTRIC			
		1418990-1	CENTER CONTACT			
		1418989-1	REAR SHELL			
		1418993-1	FERRULE			
1718080-2	Low loss RTK031	1719250-1	FRONT SHELL	1719249-1	FRONT SHELL SUBASSY	1 Pos. Housing x-1718030-x 2 Pos. Housing 1718164-4
		1719243-1	DIELECTRIC			
		1719244-2	OUTER CONTACT			
		1418990-1	FEMALE CONTACT			
		1719246-1	REAR SHELL	1719245-1	REAR SHELL SUBASSY	
		1719247-1	CONTACT PROTECTION			
		1418993-1	FERRULE			
1719252-1	Low loss RTK031	1719242-1	FRONT SHELL	1719241-1	FRONT SHELL SUBASSY	
		1719243-1	DIELECTRIC			
		1719244-2	OUTER CONTACT			
		1418990-1	FEMALE CONTACT	1719245-1	REAR SHELL SUBASSY	
		1719246-1	REAR SHELL			
		1719247-1	CONTACT PROTECTION			
		1418993-1	FERRULE			
1719252-5	RTK031	1719242-1	FRONT SHELL	1719241-1	FRONT SHELL SUBASSY	
		1719243-1	DIELECTRIC			
		1719244-2	OUTER CONTACT			
		1418990-5	FEMALE CONTACT	1719245-1	REAR SHELL SUBASSY	
		1719246-1	REAR SHELL			
		1719247-1	CONTACT PROTECTION			
		1418993-1	FERRULE			
1719655-1	RG174	1719657-1	OUTER SHELL	1719656-1	FRONT SHELL SUBASSY	
		1719243-1	DIELECTRIC			
		1719244-2	OUTER CONTACT			
		1719685-1	FEMALE CONTACT	1719658-1	REAR SHELL SUBASSY	
		1719659-1	REAR SHELL			
		1719247-1	CONTACT PROTECTION			
		1-413889-3	FERRULE			
1719655-5	RG174 Dacar 462	1719657-1	OUTER SHELL	1719656-1	FRONT SHELL SUBASSY	x-1719261-x
		1719243-1	DIELECTRIC			
		1719244-2	OUTER CONTACT			
		1719685-5	FEMALE CONTACT	1719658-1	REAR SHELL SUBASSY	
		1719659-1	REAR SHELL			
		1719247-1	CONTACT PROTECTION			
		1-413889-3	FERRULE			
2112466-1	1.5DS	1719657-1	OUTER SHELL	1719656-1	FRONT SHELL SUBASSY	
		1719243-1	DIELECTRIC			
		1719244-2	OUTER CONTACT			
		2112465-1	FEMALE CONTACT	1719658-1	REAR SHELL SUBASSY	
		1719659-1	REAR SHELL			
		1719247-1	CONTACT PROTECTION			
		1-413889-4	FERRULE			
2112466-2	1.5DS	1719657-2	FRONT SHELL	1719656-2	FRONT SHELL SUBASSY	
		1719243-1	DIELECTRIC			
		1719244-2	OUTER CONTACT			
		2112465-1	CENTER CONTACT	1719658-2	REAR SHELL SUBASSY	
		1719659-2	REAR SHELL			
		1719247-1	CONTACT PROTECTION			
		1488167-1	FERRULE			
2297873-1	4.0mm Shikoku	1719242-1	FRONT SHELL	1719241-1	FRONT SHELL SUBASSY	
		1719243-1	DIELECTRIC			
		1719244-2	OUTER CONTACT			
		2141947-1	CENTER CONTACT	1719245-1	REAR SHELL SUBASSY	
		1719246-1	REAR SHELL			
		1719247-1	CONTACT PROTECTION			
		2297871-1	FERRULE			



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2379354-1	RTK044 Solid	2379357-1	FRONT SHELL	2379356-1	FRONT SHELL SUBASSY	x-2141494-y/ x-1719261-x / x-2330270-x / x-2327929-x
		1719243-1	DIELECTRIC			
		1719244-2	OUTER CONTACT			
		1418990-5	CENTER CONTACT			
		2379369-1	REAR SHELL	2379367-1	REAR SHELL SUBASSY	
		1719247-1	CONTACT PROTECTION			
		1418993-1	FERRULE			

LTR	REVISION RECORD	DWN	APP	AQE	DATE
C10	Addition of info about handling (2.4 and 5.1 C), revision record table	V. Stavarek	V. Cech	D. Nagel	18.6.2018
C11	Correction of revision record table data, addition of Shikoku 4.0mm	V. Stavarek	R. Novakova	D. Nagel	15.8.2018
C12	Addition of new PN 2112466-2, update of chapter 4.1 Stripping dimensions and 4.3 Crimping tool for the ferrule; German language removed	R. Novakova	V. Cech	D. Nagel	01.3.2019
C13	Addition of RTK044 Cable details in 4.1,4.2,4.3,5.4 B, RTK044 PNs added in Chapter 7	R. Mujumdar	V. Cech	J. Cordier	25.11.2020
C14	Crimping for RTK031 ferrule CAD updated, Loose piece Mini applicator details added for ferrule crimping in Chapter 4.3	R. Mujumdar	S. Rathod	M. Baouab	31.10.2023