Assembly Instruction for FiberOptic Series

FO1

Table of Contents

1 Introduction

This document covers :

- The application of Fischer FiberOptic Series electrical contacts and optical termini to electrical and fiber optic cables (singlemode and multimode fibers)
- The assembly of fiber optic cable with a cladding size of 125 µm and having the cable structure described in Fischer FiberOptic Series Cable Specifications
- The assembly of Fischer FiberOptic Series electrical contacts and optical termini and Rear Accessory sets (Wire, Cable Clamp and Potting sets) to Fischer FiberOptic Series single channel connectors (referred as FO1 in the present document)

Please read these instructions thoroughly before starting assembly.

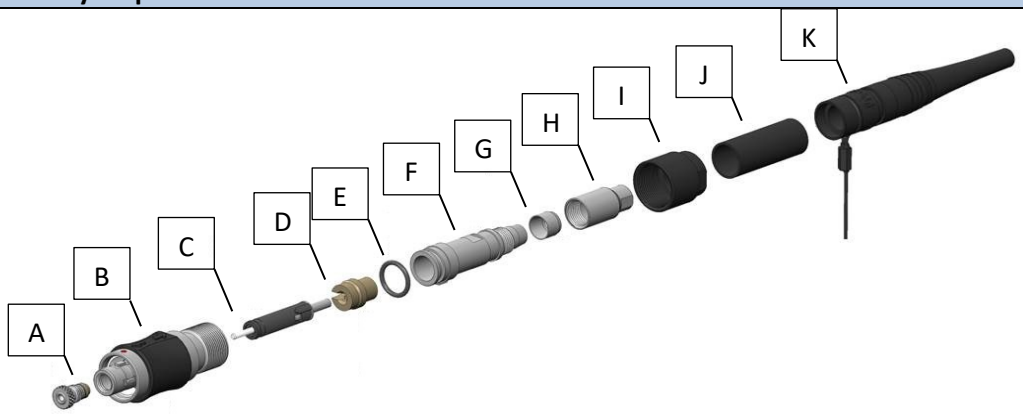
2 Document history

Date	Revision #	Author	Controller	Modification description
15.03.2017	6.0	JGY	SRH/CMI	New Document
14.11.2019	6.1	JGY	SKE	Modification of stripping dimensions for potting set
01.03.2023	6.2	SKE	JGY	Add crimp tool references TX00.241 and TX00.417
20.09.2023	6.3	SKE	JGY	Add specific terminus assembly steps when using wire set (Section 9)

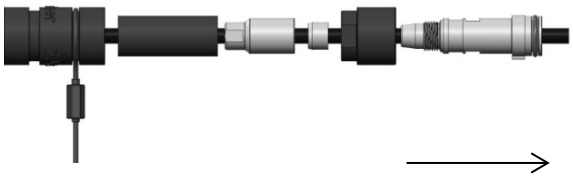
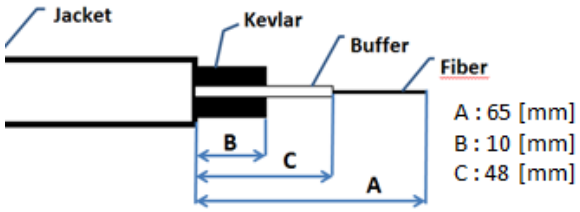
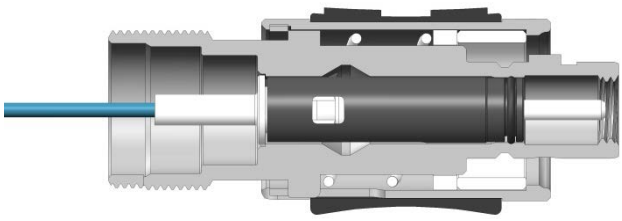
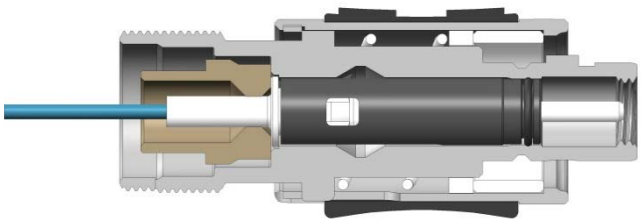
3 Definitions and Acronyms

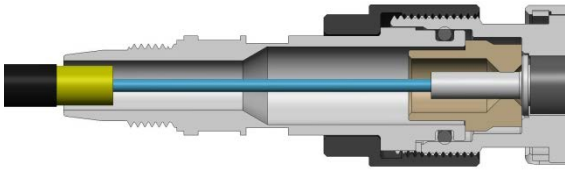
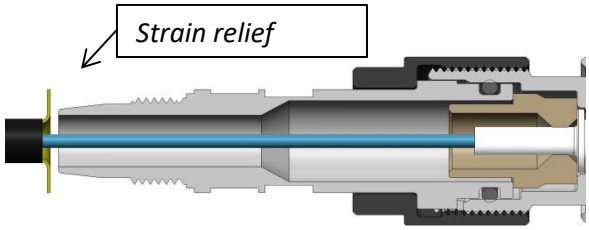
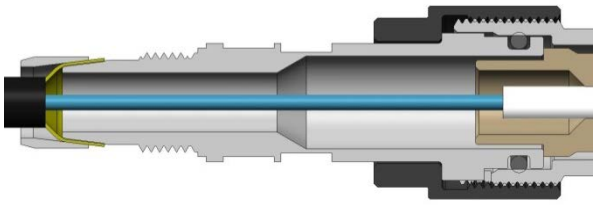
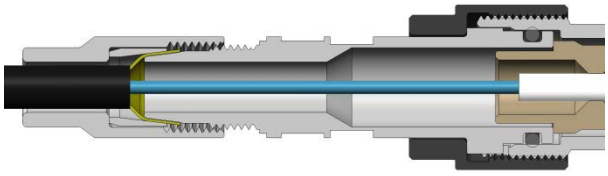
Text	Definition / Acronym
FO	Fischer FiberOptic
FO1	Fischer FiberOptic Series single channel - 1 fiber
IEC	International Electrotechnical Commission

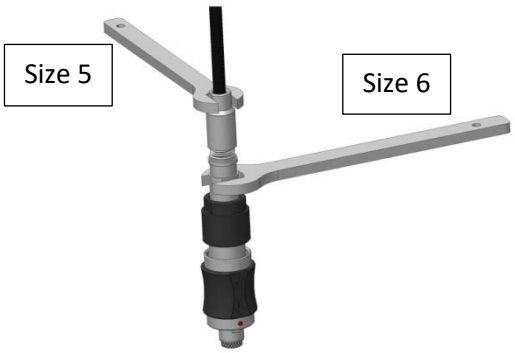
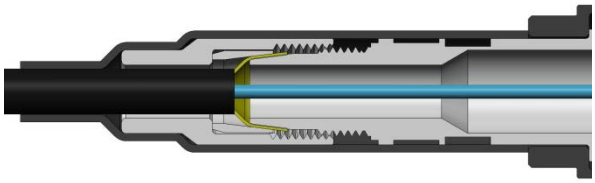
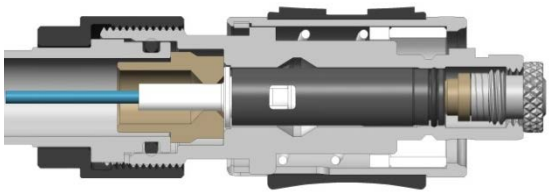
4 FO1 Plugs & Receptacles with Cable Clamp Set

Assembly steps	
	Components list : A – Sleeve Holder B – Connector Body C – Terminus D – Support Washer E – O-ring Seal F – Clamp Set Body G – Conical Ring H – Clamp Nut I – Rear Nut J – Shrink Tube K – Bend Relief

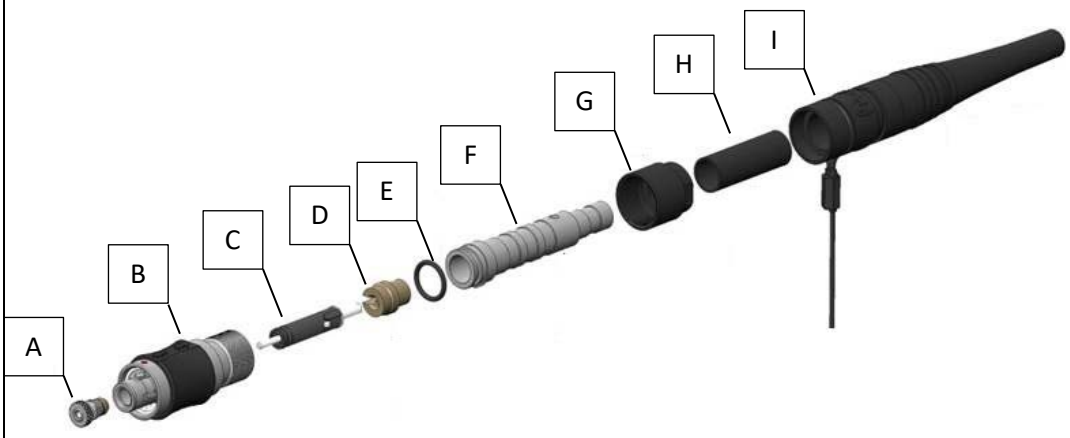
Note : the pictures shown in this section represent a P01 Plug.
The following assembly steps are valid for P01 plug, as well as R01, R03 and R50 receptacles, except the final step (sleeve holder assembly).

Picture	Process	Tools
	Slide over the cable : - the Bend Relief “K” - the Shrink Tube “J” - the Rear Nut “I” - the Clamp Nut “H” - the Conical Ring “G” - the Clamp Set Body “F” - the O-Ring Seal “E”	
	Strip the cable to the dimensions as given on the picture.	Ruler, aramid shears, jacket stripper, and strip tool
Terminus assembly : See section 8		
Polishing: See section 10		
	Insert the Terminus "C" into the Connector Body "B".	
	Insert the Support Washer "D" and position it around at the back of the Terminus "C" as shown on the picture.	

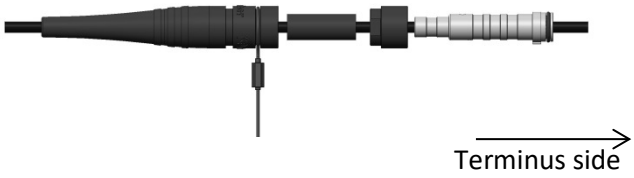
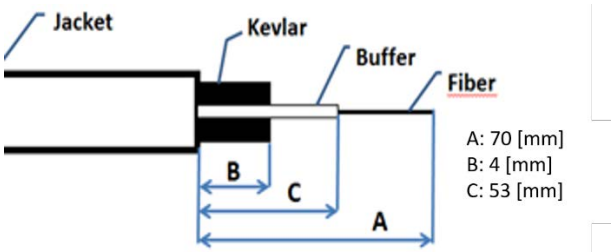
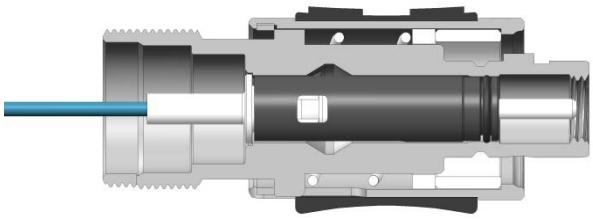
	Position the O-Ring Seal “E” on the Clamp Set Body “F” then slide the Clamp Set Body “F” into the Connector Body "B".	
 	Screw by hand the Rear Nut “I” on the Connector Body “B”, then uniformly distribute the cable strength members around the back of the Clamp Set Body “F”.	
	Position the Conical Ring “G” against the strength members.	
	Screw by hand the Clamp Nut “H” on the Clamp Set Body “F”.	
	Screw the Rear Nut "I". Recommended torque : 3.0 Nm	

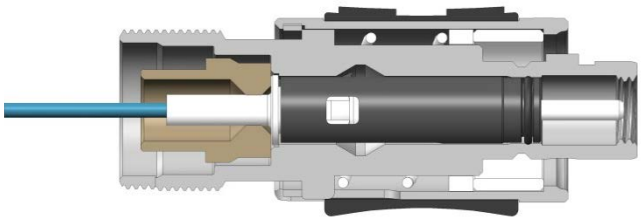
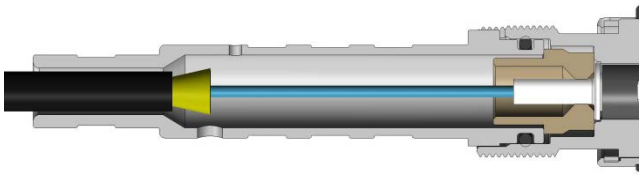
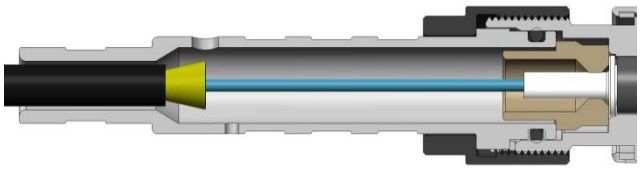
	Screw the Clamp Nut ”H”. Recommended torque : 3.0 Nm Note : hold the Clamp Set Body with a wrench while screwing the Clamp Nut “H”.	Clamp Nut : Wrench Size 5 Clamp Set Body : Wrench Size 6
	Slide the Shrink Tube "J" until the end of the shrink tube bottoms against the Back Nut “I” and heat it.	Heat gun Shrink tube operating temperature range: -55 °C to 110 °C
	Apply epoxy on the Shrink Tube "J" and slide the Bend Relief ”K” until the end of the bend relief bottoms against the Back Nut “I”.	Epoxy: RT-355 Resintech
 	Screw the Sleeve Holder "A" in the Connector Body "B" until the Sleeve Holder “A” is free to rotate. Note : there is no sleeve holder for R01, R03 and R50 receptacles. Thus, this final assembly step is valid only for P01 plug.	

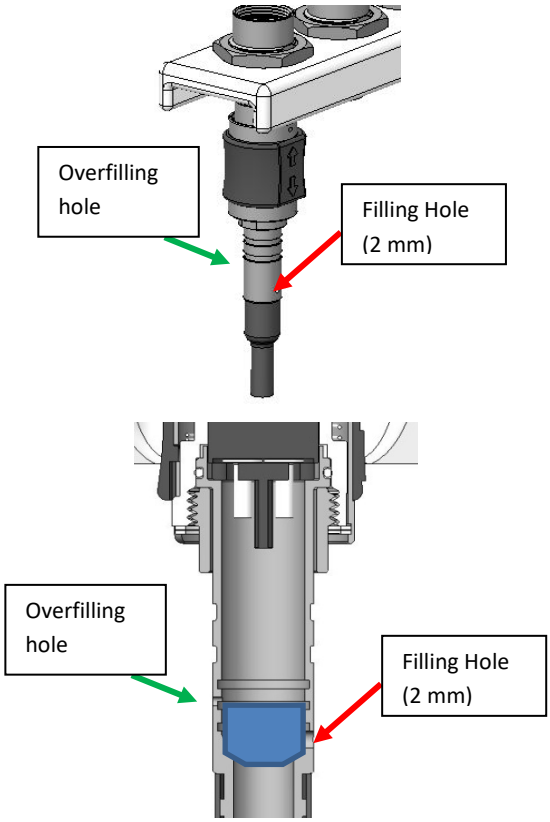
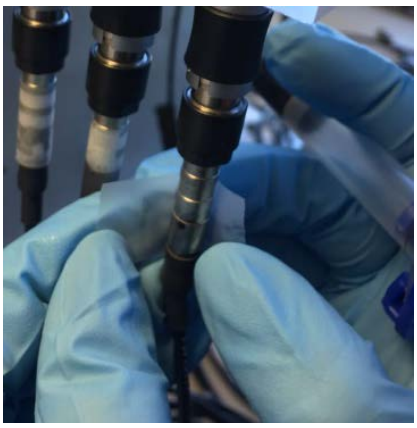
5 FO1 Plugs & Receptacles with Potting Set

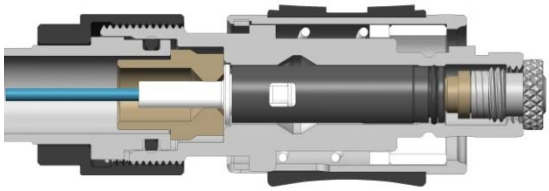
Assembly steps	
	Components list : A – Sleeve Holder B – Connector Body C – Terminus D – Support Washer E – O-ring Seal F – Potting Set Body G – Rear Nut H – Shrink Tube I – Bend Relief

Note : the pictures shown in this section represent a P01 Plug.
The following assembly steps are valid for P01 plug, as well as R01, R03 and R50 receptacles, except the final step (sleeve holder assembly).

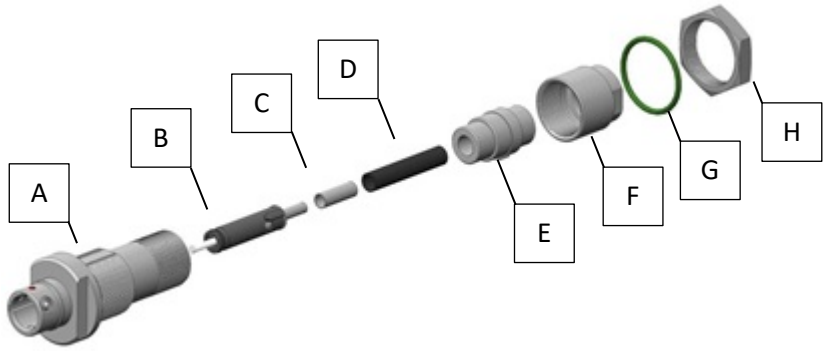
Picture	Process	Tools
	Slide over the cable : - the Bend Relief “I” - the Shrink Tube “H” - the Rear Nut “G” - the Potting Set Body “F” - the O-Ring Seal “E”	
	Strip the cable to the dimensions as given on the picture.	Ruler, aramid shears, jacket stripper, and strip tool
Terminus assembly : See section 8		
Polishing: See section 10		
	Insert the Terminus "C" into the Connector Body "B".	

	Insert the Support Washer "D" and position it around at the back of the Terminus "C" as shown on the picture.	
	Position the O-Ring Seal “E” on the Potting Set Body “F” then slide the Potting Set Body “F” into the Connector Body "B".	
	Screw by hand the Rear Nut “G” on the Connector Body “B”.	
	Screw the Rear Nut "G". Recommended torque : 3.0 Nm	Rear Nut : Wrench Size 9
	Slide the Shrink Tube "H" until the end of the shrink tube bottoms against the Potting Set Body “F” as shown on the left picture and heat it.	Heat gun Shrink tube operating temperature range: -55 °C to 110 °C

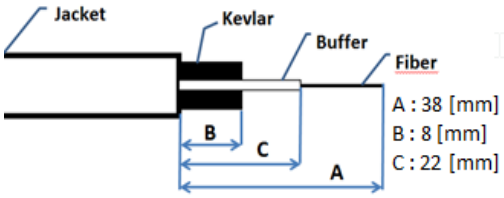
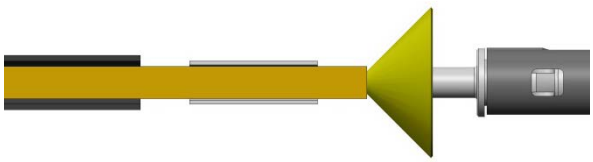
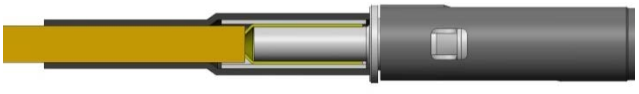
	Slowly inject the epoxy inside the Potting Set Body “F” using the filling hole located at the bottom of the Potting Set Body “F”. Note : the second hole, smaller and located above the filling hole, is an overfilling hole. Stop injecting epoxy when epoxy starts to flow from this overfilling hole.	Resin Epoxy RS 851-044 Black
	Remove any excess epoxy from the assembly (if any), apply tape on both filling and overfilling holes and place the assembly onto the curing oven block.	Curing time: 12 hours @ approx. 23 °C
	Apply epoxy on the Shrink Tube "H" and slide the Bend Relief ”I” until the end of the Bend Relief ”I” bottoms against the Back Nut “G”.	Epoxy: RT-355 Resintech

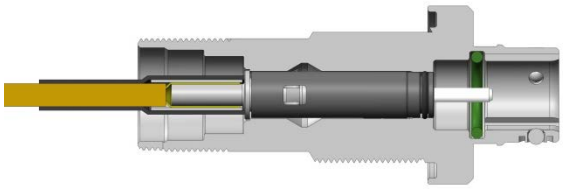
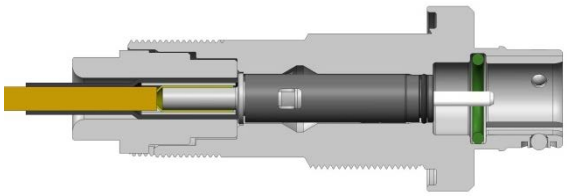
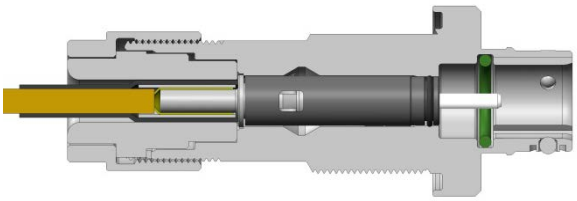
 	Screw the Sleeve Holder "A" in the Connector Body "B" until the Sleeve Holder “A” is free to rotate. Note : there is no sleeve holder for R01, R03 and R50 receptacles. Thus, this final assembly step is valid only for P01 plug.	

6 FO1 R01 & R03 Receptacles with Wire Set

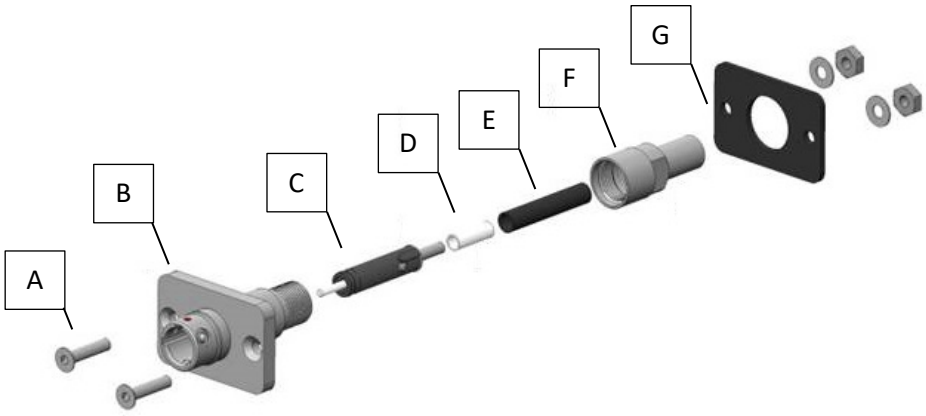
Assembly steps	
	Components list : A – Connector Body B – Terminus C – Crimp Sleeve D – Shrink Tube E – Wire Set Body F – Wire Set Nut G – Connector Panel Seal H – Connector Nut

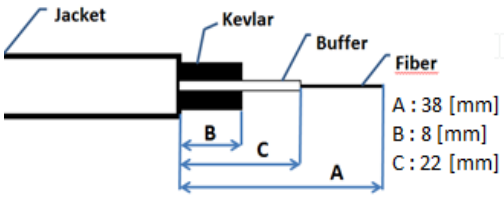
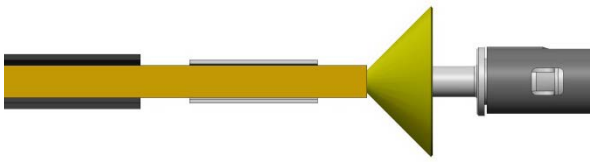
Note : the pictures shown in this section represent a R03 receptacle.
The following assembly steps are valid for R01 receptacles as well.

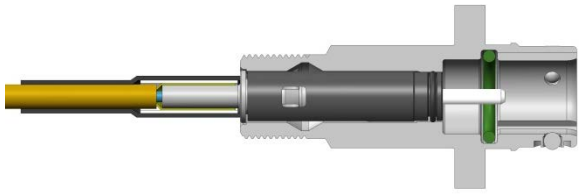
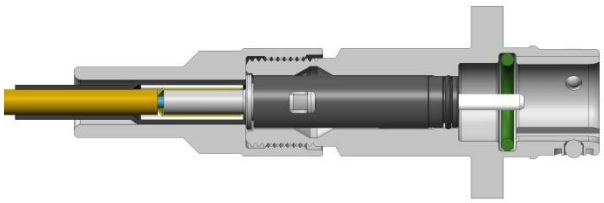
Picture	Process	Tools
	Slide over the cable : - the Wire Set Nut “F” - the Wire Set Body “E” - the Shrink Tube “D” - the Crimp Sleeve “C”	
	Strip the cable to the dimensions as given on the picture.	Ruler, aramid shears, jacket stripper, and strip tool
Terminus assembly : See section 9		
	Uniformly distribute the cable strength members around the back of the Terminus “B”.	
	Slide the Crimp Sleeve “C” over the cable strength members until the end of the crimp sleeve bottoms against the Terminus “B”.	Crimp tool: TX00.241 with Crimping dies: TX00.417
	Slide the Shrink Tube “D” over the Crimping Sleeve ”C” and heat it.	Heat gun Shrink tube operating temperature range: -55 °C to 110 °C

Polishing: See section 10		
	Insert the Terminus “B” into the Connector Body “A”.	
	Insert the Wire Set Body “E” into the Connector Body “A”.	
	Screw the Wire Set Nut “F” on the Connector Body “A”. Recommended torque : 3.0 Nm	

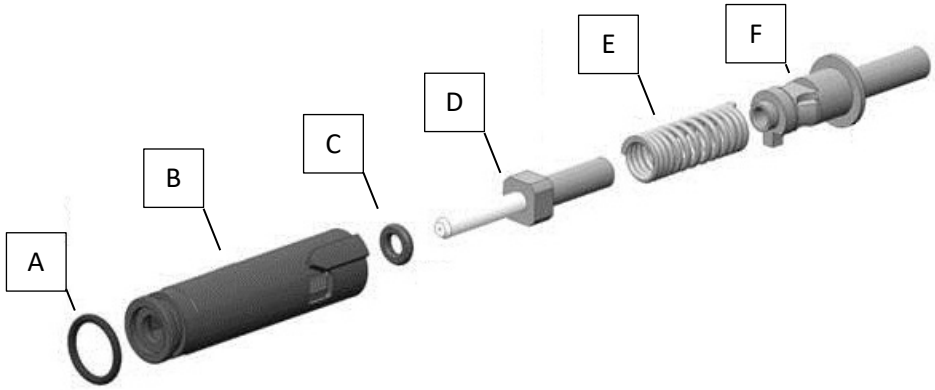
7 FO1 R13 Receptacle with Wire Set

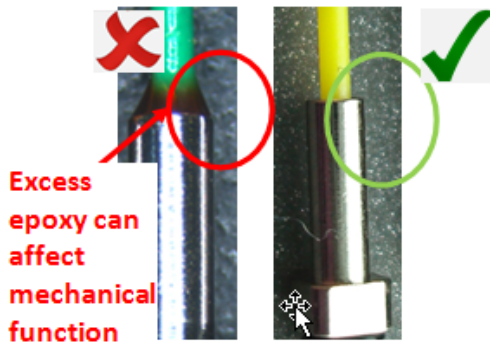
Assembly steps	
	Components list : A – Screws B – Connector Body C – Terminus D – Crimping Sleeve E – Shrink Tube F – Wire Set Nut G – Connector Panel Seal, Washers & Nuts

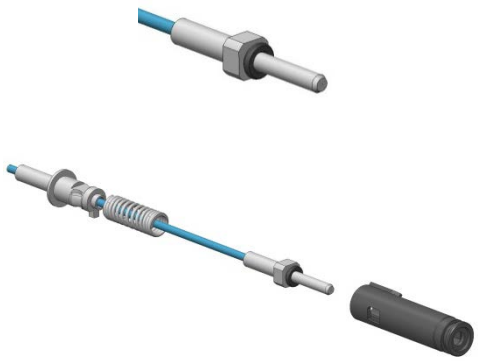
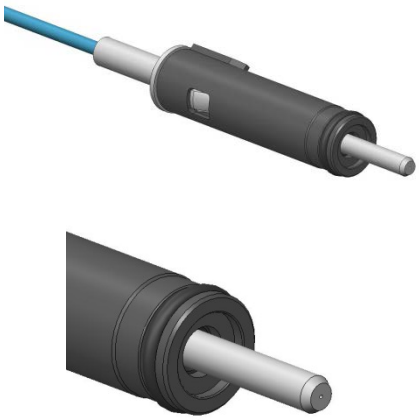
Picture	Process	Tools
	Slide over the cable : - the Wire Set Nut “F” - the Shrink Tube “E” - the Crimp Sleeve “D”	
	Strip the cable to the dimensions as given on the picture.	Ruler, aramid shears, jacket stripper, and strip tool
Terminus assembly : See section 9		
	Uniformly distribute the cable strength members around the back of the Terminus “B”.	
	Slide the Crimp Sleeve “D” over the cable strength members until the end of the crimp sleeve bottoms against the Terminus “C”.	Crimp tool: TX00.241 with Crimping dies: TX00.417
	Slide the Shrink Tube “E” over the Crimping Sleeve ”D” and heat it.	Heat gun Shrink tube operating temperature range: -55 °C to 110 °C

Polishing: See section 10		
	Insert the Terminus “C” into the Connector Body “B”.	
	Screw the Wire Set Nut “F” on the Connector Body “B”. Recommended torque : 3.0 Nm	

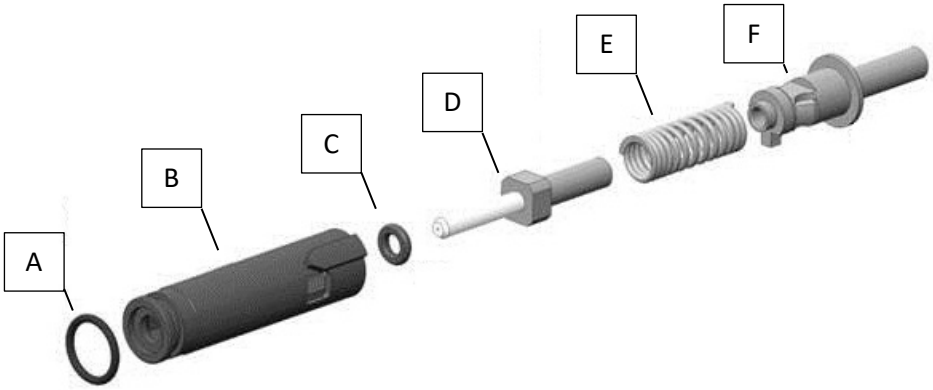
8 Terminus assembly

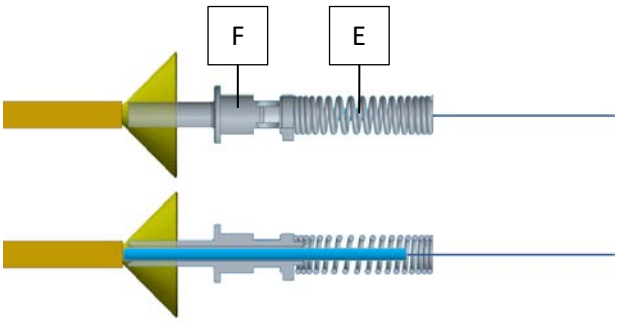
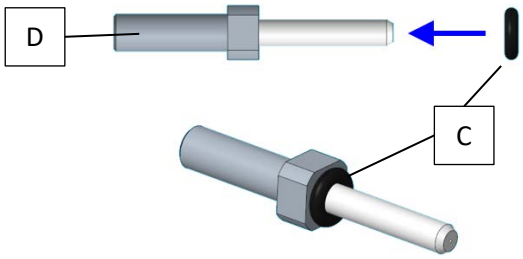
Assembly steps	
	Components list : A – Housing O-Ring B – Termini Housing C – Ferrule O-Ring D – Ferrule E – Spring F – Termini Closure

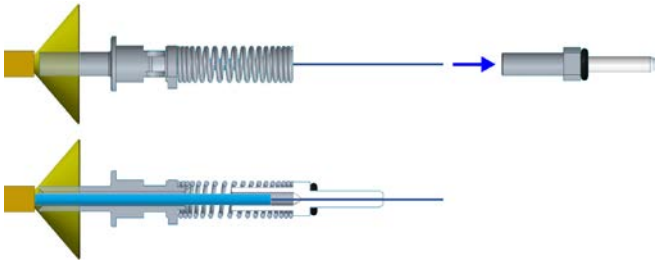
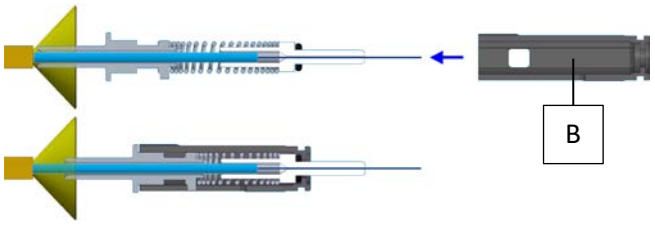
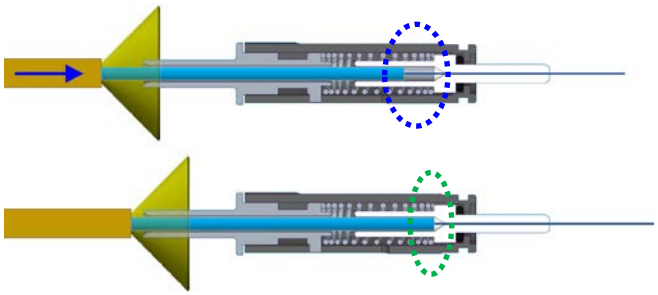
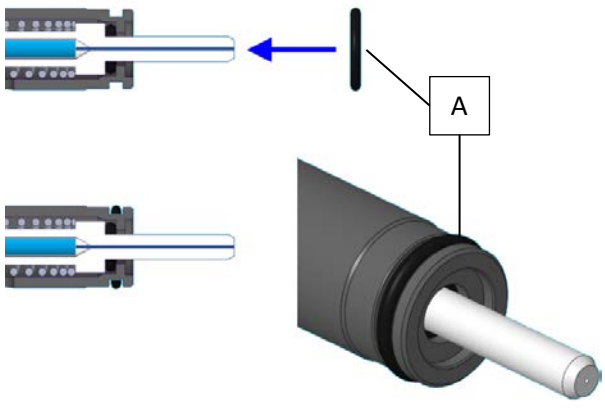
Picture	Process	Tools
	Slide over the cable : - the Termini Closure “F” - the Spring “E”	
Prepare the cable according to stripping dimension from the relevant section.		
	Insert epoxy into the Ferrule “D” until a little drop appears at the ferrule end. Carefully insert the fiber into the back of the Ferrule “D and make sure the buffer slides inside the ferrule the buffer bottoms on the ceramic.	Extended Working Life, 2-Part Epoxy, 2.5 Gram Packet Supplier : FIBER OPTIC CENTER Ref : ET383ND-2.5G
	Remove any excess epoxy from the assembly	
	Cure the epoxy	120 +10/-20 °C during 20 min.
	Cleave fiber	Scribe Tool

	Position the Ferrule O-ring “C” on the Ferrule “D” as shown on the top left picture. Slide the Spring “E” and Termini Closure “F” at the back of the Ferrule “D” and assemble them into the Termini Housing “B”.	
	Position the Housing O-ring “A” on the Termini Housing “B” as shown on the left picture.	

9 Terminus assembly: specific when using Wire Set

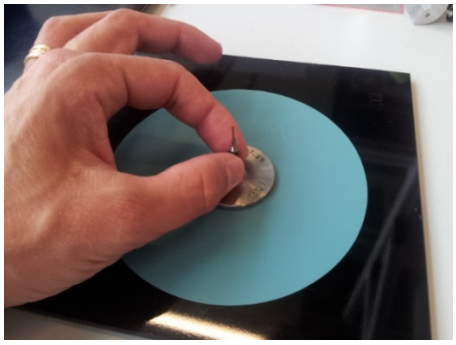
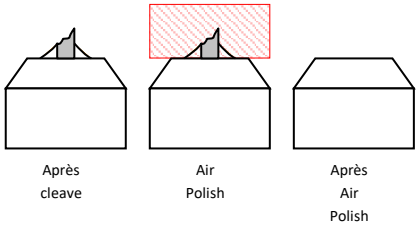
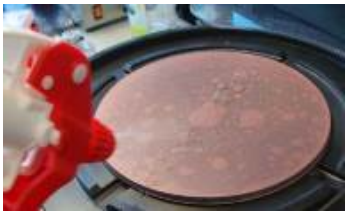
Assembly steps	
	Components list : A – Housing O-Ring B – Termini Housing C – Ferrule O-Ring D – Ferrule E – Spring F – Termini Closure

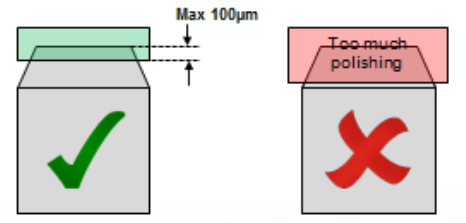
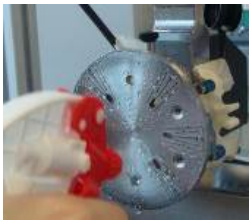
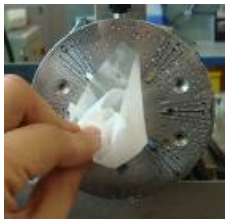
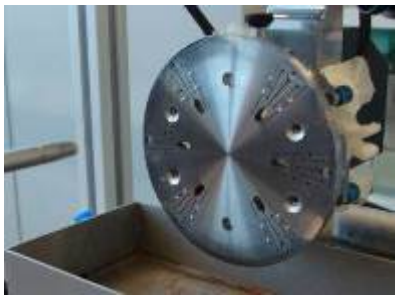
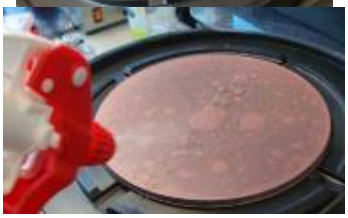
Prepare the cable according to stripping dimension from the relevant section.		
Picture	**Process**	**Tools**
	Slide over the cable : - the Termini Closure “F” - the Spring “E”	
	Position the Ferrule O-ring “C” on the Ferrule “D”.	
	Insert epoxy into the Ferrule “D” until a little drop appears at the ferrule end.	Extended Working Life, 2-Part Epoxy, 2.5 Gram Packet Supplier : FIBER OPTIC CENTER Ref : ET383ND-2.5G

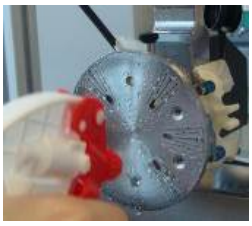
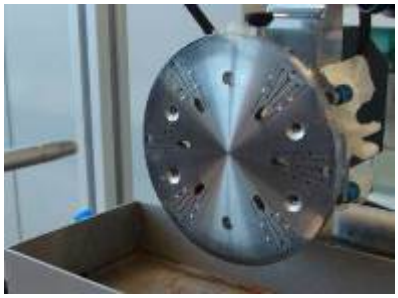
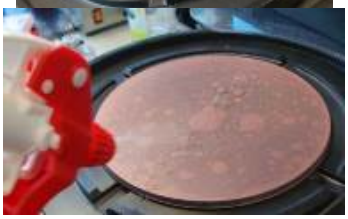
	Carefully insert the fiber into the back of the Ferrule “D”. At this stage, it is not possible to push the buffer against the ceramic because of the length of the Spring “E” and the Termini Closure “F” located between the Ferrule “D” and the end of the cable jacket. This operation will be carried out after assembling the Termini Housing “B”.	
	Slide the Termini Housing “B” over the Ferrule “D” and Spring “E” and clip it over the Termini Closure “F”. **WARNING:** Be careful not to touch the protruding fiber.	
	Gently push the buffer so that it stops against the ceramic. **WARNING:** Be careful not to touch the protruding fiber.	
	Cure the epoxy	120 +10/-20 °C during 20 min.
	Cleave fiber	Scribe Tool
	Install the Housing O-ring “A” in the groove of the Termini Housing “B”.	

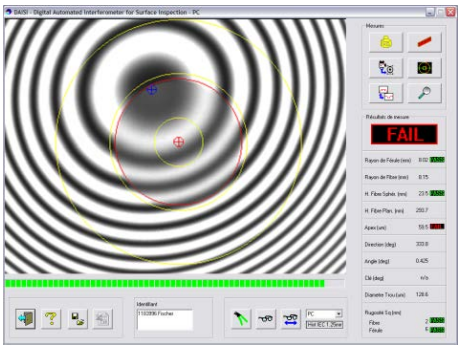
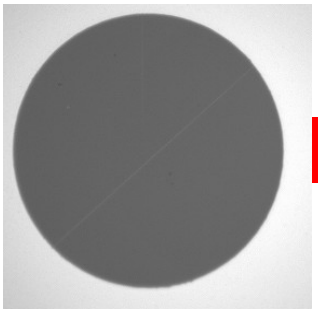
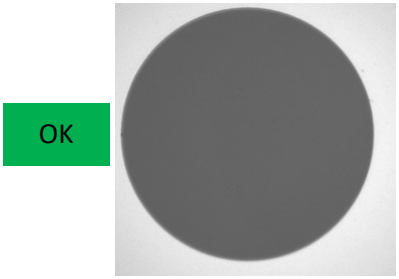
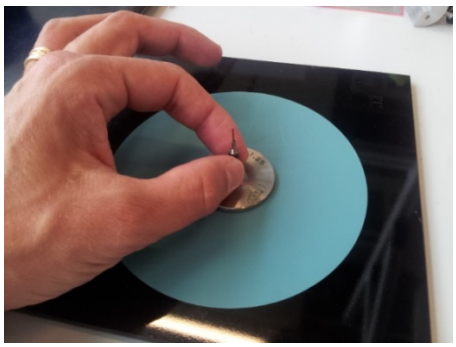
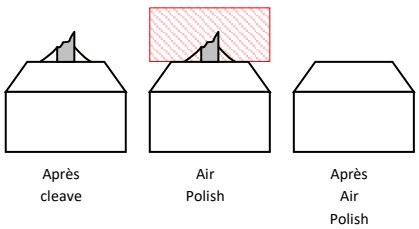
10 Polishing

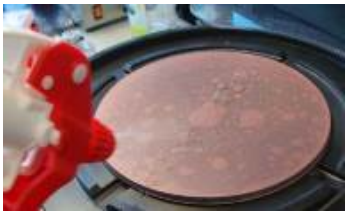
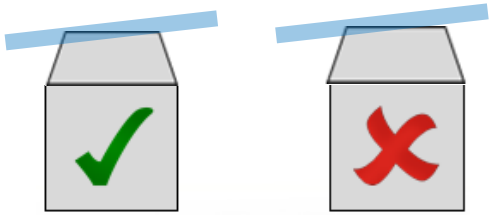
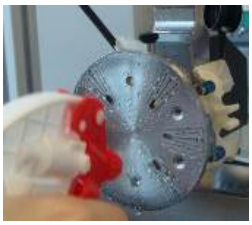
It is recommended polishing the fiber using a polishing machine.
Polish the fiber according to the machine manufacturer's instructions.

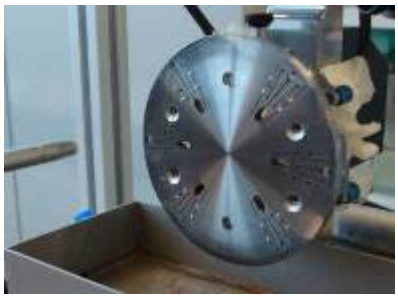
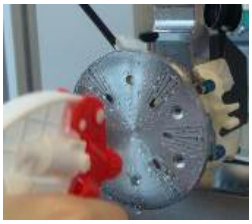
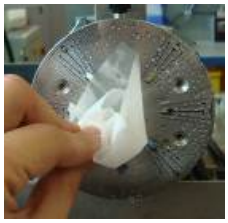
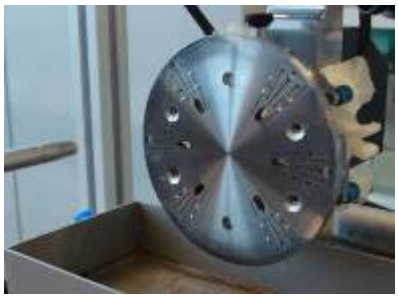
Picture	Process	Tools
PC termini		
 	**Step1 : Air polish** Holding the polishing bushing and terminus, place the polishing bushing on the film. Using light pressure on the ferrule, polish the endface of the ferrule in a small circular motion.	▪ Polishing film: 9 µm Silicon carbide ▪ Polishing Pad : N/A ▪ Lubricant: N/A ▪ Tool: FO-10090
    	Clean the polishing pad with demineralized water and lint-free cloth, from the center outwards. Spray some demineralized water on the polishing pad and place the polishing film, starting at edges of the polishing pad. Spray abundantly demineralized water on the polishing film.	

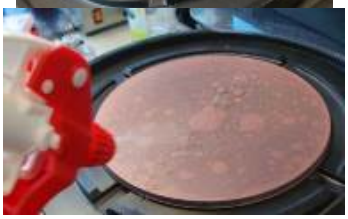
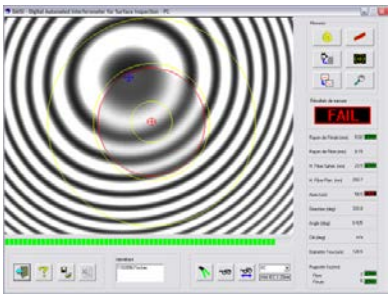
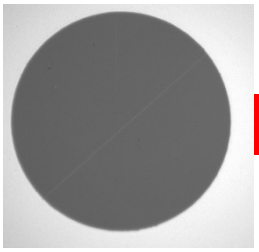
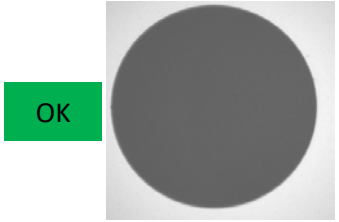
	**Step 2 :** Polish the termini with 5µm Silicon carbide polishing film, until no peripheral chips are visible. **Do not remove more than 100 µm.**	▪ Polishing film: 5 µm Silicon carbide ▪ Polishing Pad : 90 duro black ▪ Lubricant: DI-water ▪ Fixture tool: FO-10019
  	Wipe abundantly the polishing tool holding the termini with demineralized water and clean it carefully with a lint-free cloth. Use an airpressure gun to remove residual water.	
  	Clean the polishing pad with demineralized water and lint-free cloth, from the center outwards. Spray some demineralized water on the polishing pad and place the polishing film, starting at edges of the polishing pad. Spray abundantly demineralized water on the polishing film.	
	Step 3 : Polish the termini with 1µm Diamond polishing film in an 8 pattern motion (or pattern of the polishing machine).	▪ Polishing film: 1 µm Diamond ▪ Polishing Pad: 80 duro green ▪ Lubricant: DI-water Fixture tool: FO-10019

  	Wipe abundantly the polishing tool holding the termini with demineralized water and clean it carefully with a lint-free cloth. Use an airpressure gun to remove residual water.	
  	Clean the polishing pad with demineralized water and lint-free cloth, from the center outwards. Spray some demineralized water on the polishing pad and place the polishing film, starting at edges of the polishing pad. Spray abundantly demineralized water on the polishing film.	
	Step 4 : Polish the termini with AngstromLap Final Polish SiO2 in an 8 pattern motion. **Do not clean the polishing tool after this step, to avoid creating scratches on the polished ferrule.**	▪ Polishing film: AngstromLap Final Polish SiO2 ▪ Polishing Pad: 80 duro green ▪ Lubricant: DI-water ▪ Fixture tool: FO-10019

	**Geometrical control :** • ***Ferrule Radius[mm]:*** Min 5 - Max 12 • ***Apex Offset[um]:*** Min 0.0 – Max 50.0 If fail, repeat from step 3.	
 NOK  OK	Fiber core inspection : Examine the endface of the ferrule for scratches according to left pictures. If fail, repeat from step 4.	
	If not installing the connector immediately, install a protective cover onto terminus to prevent contamination to the endface of the ferrule.	
8° APC termini		
  Après cleave Air Polish Après Air Polish	**Step1 : Air polish** Holding the polishing bushing and terminus, place the polishing bushing on the film. Using light pressure on the ferrule, polish the endface of the ferrule in a small circular motion.	▪ Polishing film: 9 µm Silicon carbide ▪ Polishing Pad : N/A ▪ Lubricant: N/A ▪ Tool: FO-10090

    	Clean the polishing pad with demineralized water and lint-free cloth, from the center outwards. Spray some demineralized water on the polishing pad and place the polishing film, starting at edges of the polishing pad. Spray abundantly demineralized water on the polishing film.	
  OK NOK	**Step 2 :** Polish the termini with 8° angle using the fixture tool. Make sure the endface of the ferrule is fully polished, as shown on the left pictures. If not, repeat from step 2.	▪ Polishing film: 5 µm Diamond ▪ Polishing Pad: Glass ▪ Lubricant: DI-water ▪ Fixture tool: TX00.285
 	Wipe abundantly the polishing tool holding the termini with demineralized water and clean it carefully with a lint-free cloth.	

	Use an airpressure gun to remove residual water.	
  	Clean the polishing pad with demineralized water and lint-free cloth, from the center outwards. Spray some demineralized water on the polishing pad and place the polishing film, starting at edges of the polishing pad. Spray abundantly demineralized water on the polishing film.	
	Step 3 : Polish the termini with 1µm Diamond polishing film in an 8 pattern motion (or pattern of the polishing machine).	▪ Polishing film: 1 µm Diamond ▪ Polishing Pad: 80 duro green ▪ Lubricant: DI-water ▪ Fixture tool: TX00.285
  	Wipe abundantly the polishing tool holding the termini with demineralized water and clean it carefully with a lint-free cloth. Use an airpressure gun to remove residual water.	

  	Clean the polishing pad with demineralized water and lint-free cloth, from the center outwards. Spray some demineralized water on the polishing pad and place the polishing film, starting at edges of the polishing pad. Spray abundantly demineralized water on the polishing film.	
	Step 4 : Polish the termini with AngstromLap Final Polish SiO2 in an 8 pattern motion. **Do not clean the polishing tool after this step, to avoid creating scratches on the polished ferrule.**	▪ Polishing film: AngstromLap Final Polish ▪ Polishing Pad:80 duro green ▪ Lubricant: DI-water ▪ Fixture tool: TX00.285
	**Geometrical control :** ***Ferrule Radius[mm]:*** Min 5 - Max 12 ***Apex Offset[um]:*** Min 0.0 – Max 50.0 If fail, repeat from step 3.	
 	Fiber core inspection : Examine the endface of the ferrule for scratches according to left pictures. If fail, repeat from step 4.	

	If not installing the connector immediately, install a protective cover onto terminus to prevent contamination to the endface of the ferrule.	