

ULC Series Remote Manipulated Connectors



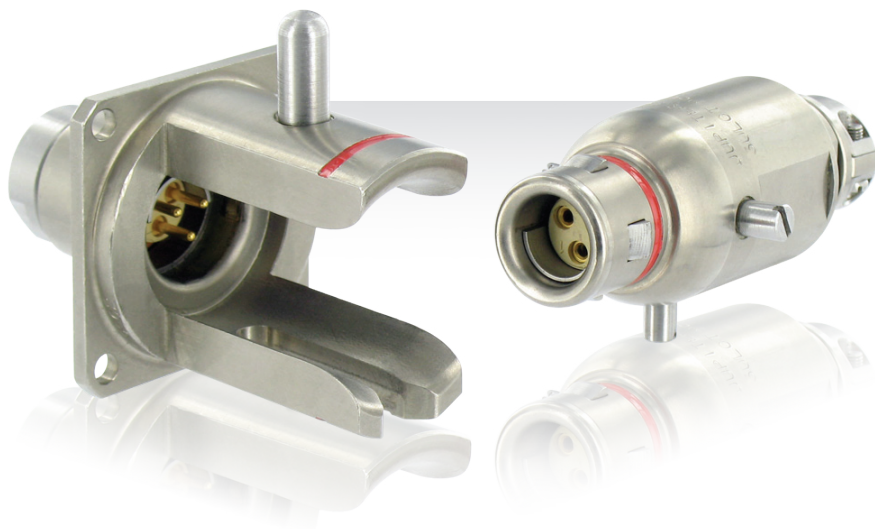
Mechanically Enhanced Push-Pull Connectors for Remote Handling

A large push-pull connector range for mechanical master-slave manipulators and powered remote manipulators for glovebox and hot cells application.

- Radiation withstanding materials** ■ Shell → Brass or Titanium (Stainless steel option)
Insulation → PEEK/Nylatron®
Other non-metallic parts → EPDM/Viton/Nylatron®
- Remote operated** ■ Flat surfaces for easy manipulator handling and guiding forks for an easy mating
- Large range** ■ 3 shell sizes
Multipin signal & power, coaxial, triaxial
- Quick connect** ■ Push-Pull coupling system



SOURIAU
Connection Technologies



Description

- Mechanically enhanced ULC connectors for an easy handling with remote controlled manipulators
- 3 sizes available (3,4 & 5)

Application

- Electrical connection within hot-cells of the nuclear industry where remote handling is required

Qualification standards

- UL1977 listed
- NQA-1 program

Technical features

Electrical

- **Contacts:**
Solder contact
Gold and Nickel plated contact
Shielding continuity option available
- **Standard contacts operating voltage:**
250 to 2500 Vdc
150 to 1500 Vrms with 50Hz

Mechanical

- **Endurance:**
500 mating / unmating
- **Mating forces:**
Size 3 : 35 +/- 10 N
Size 4 : 55 +/- 10 N
Size 5 : 105 +/- 15 N

Environmental

- **Temperature range:**
-50 to +200°C (392°F)
- **Sealing ability:**
IP 68 (open face)
- **Insulator radiation withstanding:**
Nylatron®: 10⁸ Rad
Tefzel: 5x10⁷ Rad
Peek: 10⁹ Rad
Vespel: 4x10⁹ Rad (please consult us)
- **Sealed radiation withstanding:**
EPDM: 8x10⁷ Rad
Viton®: 6x10⁶ Rad

Materials & plating	Receptacle and plug component					
	Shells		Insulator	Seals	Other non-metallic internal materials	Contacts
Material	Brass	Titanium	PEEK, Nylatron®, Tefzel	EPDM/Viton®	Nylatron®	Brass
Plating	Nickel	/	/	/	/	Gold

Features & benefits

Field proven

A connector range dedicated to the nuclear industry

The ULC range has been installed in gloveboxes and hot cells around the world for decades. With standard and remote manipulated versions, this range addresses the high level of requirements associated with nuclear fuel production, fuel reprocessing and waste management industries, as well as experimental facilities.

Used in facilities around the world, the ULC remote manipulated range can be handled with a large choice of Mechanical Master-Slave Manipulators and Powered Remote Manipulators, from brands like La Calhène, CRL, Wälischmiller, etc.



Approved quality assurance program

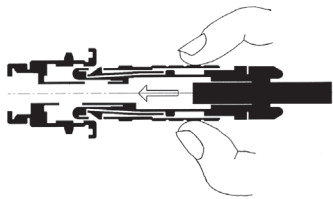
SOURIAU quality assurance program meets international & nuclear standards:

- ISO 9001/EN 9100

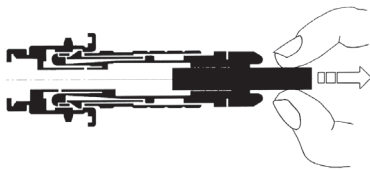
Product overview

Push-pull coupling plugs

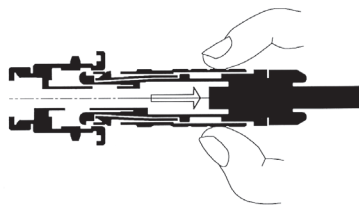
The ULC range is based on a reliable and safe push-pull system.



The latching of the plug into the receptacle is achieved by a simple axial push of the outer plug shell in the receptacle.

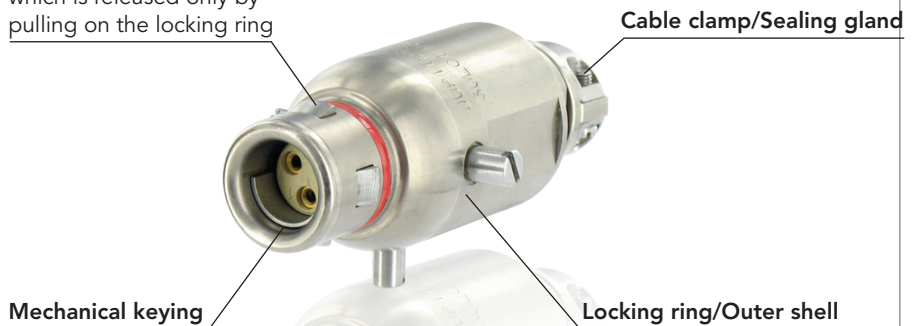


Connection can not be broken by pulling the cable or any other parts of the plug than the outer shell.



To unmate the plug from the receptacle, just pull the outer shell axially.

Locking spring
Strong locking system which is released only by pulling on the locking ring



Easy to use

- Self-locking mechanism

Quick to connect and disconnect

- A simple axial push/pull

Adapted for remote-control operation

- Specially designed shells to be handled with master-slave manipulators or with power manipulators
- Guiding forks allowing a two-step connection

Signal integrity ensured

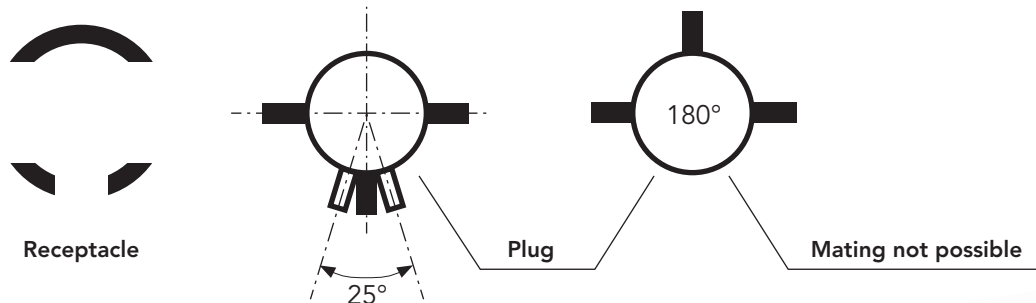
- Secured against accidental disconnections

Product overview

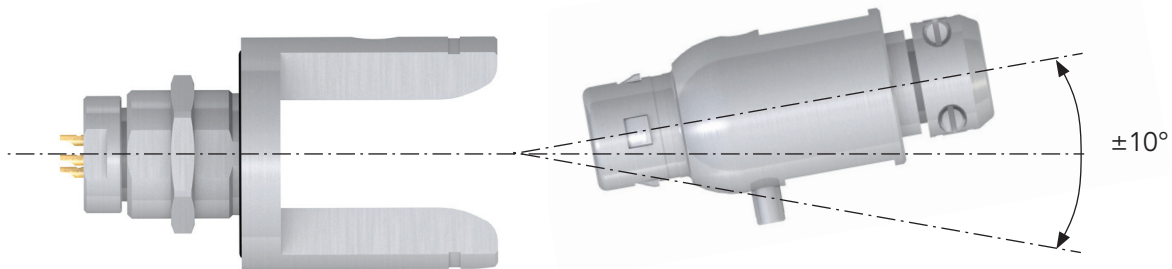
Pre-guiding forks

The Remote manipulated Connectors present many benefits:

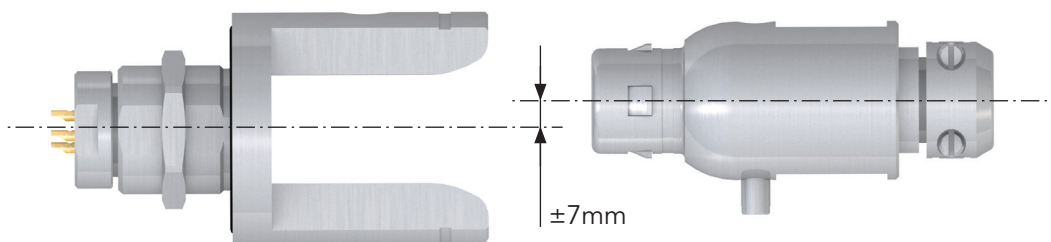
- The spur and fork system ensures the operator is always mating the connector correctly. The pre-guiding system allows a rotational misalignment up to 25°.



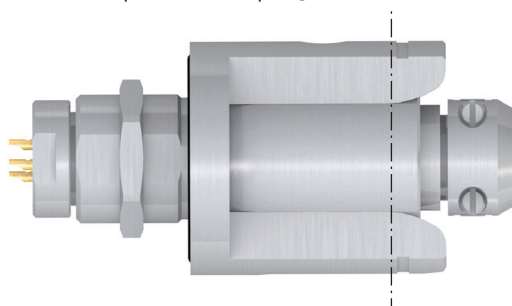
- Angular Mating Tolerance $\pm 10^\circ$



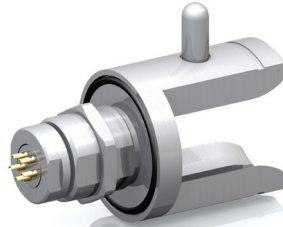
- Axial Mating Tolerance ± 7 mm



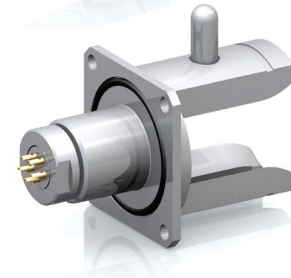
- The mating of the plug on the receptacle can be done in a two-step process. Once lower spur of the plug has overtaken the marking on the receptacle, the plug can be released before having the final mating push.



Receptacles



REFP
Round receptacle with pre-guiding fork



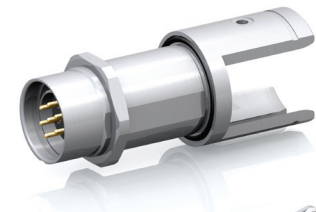
RECFP
Square receptacle with pre-guiding fork



RLFP
Round receptacle with pre-guiding fork and lever

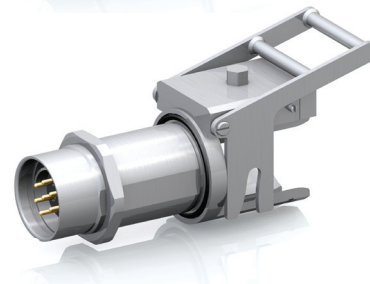


RLCFP
Square receptacle with pre-guiding fork and lever



TREFP
Feedthrough with pre-guiding fork

Feedthroughs

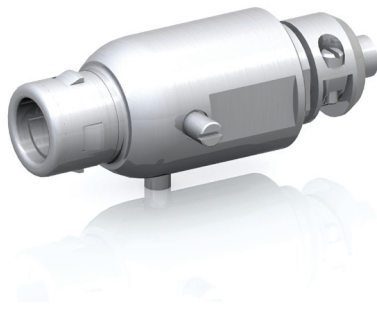


TRLFP
Feedthrough with pre-guiding forks and lever

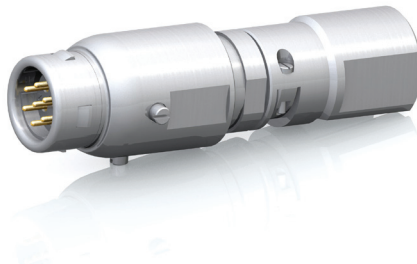


overview

FETFP
Remote manipulated
straight plug with pre-
guiding spurs



FLTFP
Remote manipulated
straight plug with
pre-guiding spurs
and a lengthened
casing adapted to
receptacles with lever



Plugs


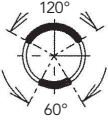
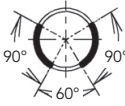
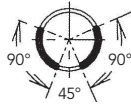
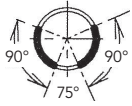
Product overview

Keying

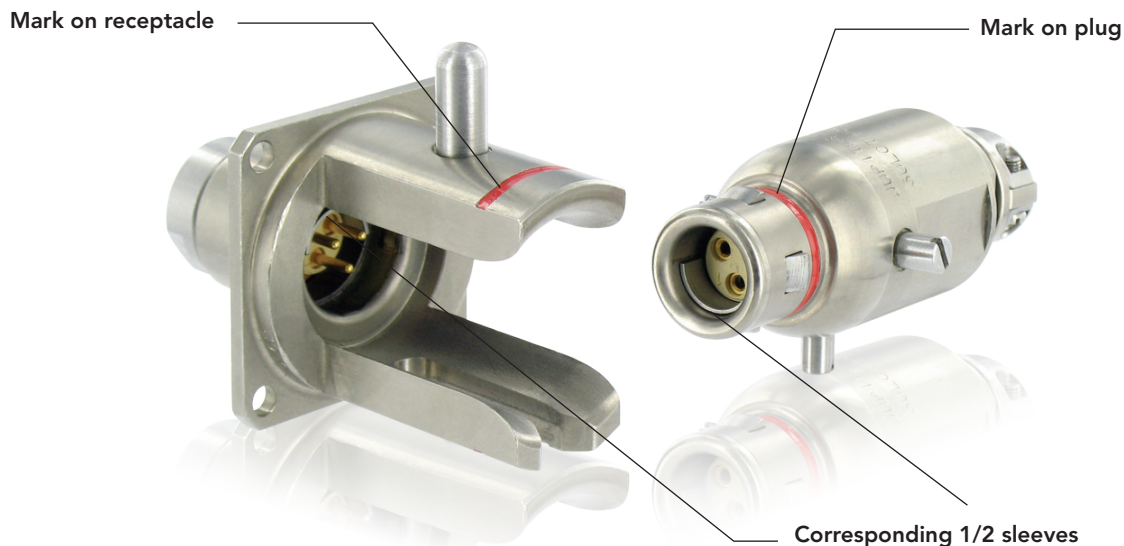
The push-pull connectors can be equipped with 5 different keying:

- One hot cell can accommodate several ULC connectors of the same size and with the same contact layouts without any risk of a Inverted mating. Five different keying options are available. Each specific pattern goes with a specific color marking on the plug and on the receptacle. The pre-guiding forks and spurs help the operator to find the right orientation of the connector when connecting. The keying system uses a rigid sleeve that also protects the contacts during the mating process.

- Layouts available (receptacle view):

Keying code	P1	P2	P3	P4	P5
Plug front view					
Color	Red	Blue	White	Yellow	Green

Note : if more patterns (up to 8) are needed, please contact SOURIAU



Contacts

Plug & receptacle:

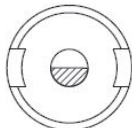
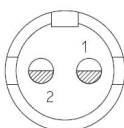
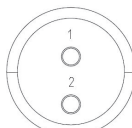

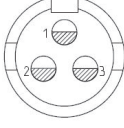
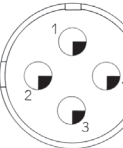
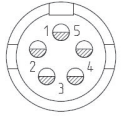
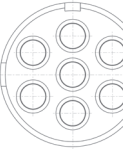


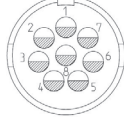
- The ULC range accommodates solder contacts from $\varnothing 0.7$ to $\varnothing 7$.
The different layouts are described on pages 9 to 12.
The electrical characteristics are detailed on page 13.

Ordering information

Basic series	REFP	F	5	M4	T	ULCL	S		P1
Shells									
FETFP: Remote manipulated straight plug with pre-guiding spurs									
FLTFP: Lengthened FETFP adapted to receptacles with lever (size4&5)									
REFP: Round receptacle with pre-guiding fork									
RECFP: Square receptacle with pre-guiding fork									
RLFPP: Round receptacle with pre-guiding fork and lever (size4&5)									
RLCFP: Square receptacle with pre-guiding fork and lever (size4&5)									
TREFP: Feedthrough with pre-guiding fork									
TRLFP: Feedthrough with pre-guiding fork and lever (size 4&5)									
Contacts*									
M: Pin contacts									
F: Socket contacts									
Shell sizes									
3									
4									
5									
Contact layouts (Refer to table p.10, 11 and 12)									
Mxxx: Multipin + contact layout reference									
CTXxx: Coaxial + impedance (50Ω or 75Ω)									
Kxxx: Thermocouple + impedance (50Ω or 75Ω)									
Shell to shell conductivity**									
T: Contact n°1 connected to shell ground (multipin only)									
Series:									
ULCL: Brass shell									
ULCT: Titanium shell									
Insulator material									
S: Nylatron®									
TZ: Tefzel (coaxial only)									
N: PEEK									
Cable outer diameter:									
XXX: Mention cable outer diameter in 1/10° of mm									
Keying									
P1, P2, P3, P4, P5 (see table page 6)									

**No shell to shell conductivity wanted: do not mention anything

Contact layouts

		Multipin power & signal layouts						
		Contacts size						
		Ø0.7	Ø0.9	#20	#16	Ø2	#12	
Number of contacts	1					1M1*		4U35 (35mm²)* 5U50 (50mm²)* 
	2				3M2*	4M2(#16)		 
	3		1M3*		3M3			 
	4		1M4*		3M4		4M4/5M4	5M4D5 
	5			3M5				
	7			3M7	4M7		5M7	5M7D8 
	8	1M8*		3M8	4M8			  
							<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 4 M 4 Connector shell size Multipin Number of contacts </div>	

*Nylatron version isn't suitable with n° 1 contact conneted to the shell ground

Contact layouts

		Hybrid layouts					
		Contacts size					
		#20	#20	Ø1.3	Ø1.3	#16	#12
Number of contacts	6					4M6+1C50/1C75 	
	7						5M7+2(#16)
	8		M8+2(#16) 				
	9						
	10	4M10+3C50+1HV 	4M10+2C50* 				
	12			4M12+1C50/1C75* 	4M12+2(Ø4)* 	5M12+7(#16)+4C50* 	

Connector shell size 5 M 14

Multipin

Number of contacts

All the layouts described in this section are available with removable crimp contacts (MC & FC).



For other arrangements, please consult us.

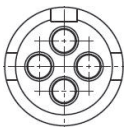
* Version not suitable with n°1 contact connected to shell ground.

Notes

A large grid of graph paper for taking notes, consisting of 20 columns and 30 rows of small squares.

Contact layouts - Solder contacts

Coaxial	
 <p style="text-align: center;">3C50 50 ohms - coaxial contact + impedance for coaxial cable Kx23 or Kx15 / shell size 3 Max current rating = 3A for Kx 23; 4A for Kx15 Contact resistance $\leq 5\text{m}\Omega$</p>	 <p style="text-align: center;">3C75 75ohms – coaxial contact + impedance for coaxial cable AWG 15 / shell size 3 Max current rating = 8A Contact resistance $\leq 4\text{m}\Omega$</p>
Triaxial, please consult us	

Chromel / Alumel thermocouple	
<p>All Multipin power and signal arrangements can be equipped with K type thermocouple contacts. Example:</p>	
<p>3K3 2 thermocouple contacts type K (1 Chromel and 1 Alumel) for wire #16 (Solder fixed) + 2 standard copper contacts #16 (Solder fixed) Shell Size 3</p>	
For other arrangements, please consult us.	

Electrical Characteristics				
Contact size	Contact diameter (mm)	Solder bucket diameter (mm)	Current rating (per contact)	
			UL recommendation	SOURIAU recommendation
HV	1.02	1.3	NA	7A
Ø7	7	9		115A
Ø5	5	5.1		40A
Ø4	4	4		33A
#12	2.39	2.6	13A	26A
Ø2	2	1.8	NA	18A
#16	1.59	2	4.5A	13A
Ø1.3	1.3	1	NA	10A
#20	1.02	1.3		7A
Ø0.9	0.9	0.8		5A
Ø0.7	0.7	0.7		4A

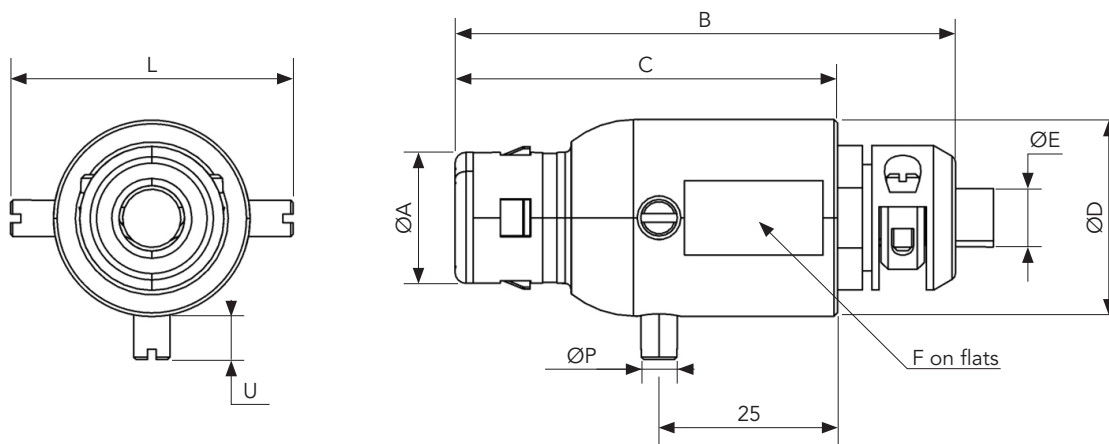
Contact layouts

Electrical characteristics			
Contact size	Layout	Operating Voltage (Vdc) UL	Operating Voltage (Vdc) SOURIAU
		Recommendation	
#12	4M4	600V	1200V
	5M4		2500V
	5M7		1600V
	5M7+2	NA	1500V
#16	3M2	600V	700V
	3M3		
	3M4		
	4M2		1200V
	4M7		
	4M8		1100V
	4M8+2		
	4M6+1C50/1C75		
	4M12		1000V
	5M14		700V
	5M19		1000V
	5M22		800V
	5M27		900V
	5M4D5	700V	
5M12+7+4C50	1500V		
	NA	500V/250V (Coax)	
Ø1.3	1M2	NA	700V
	4M30		400V
	4M12+1C50/1C75		500V
	4M12+2		
	4M11+1HV		500V / 7000V (HV)
	5M33		600V
#20	3M5	600V	700V
	3M7		
	3M8		600V
	4M14		900V
	4M18		500V
	4M10+2C50	NA	800V
	4M10+3C50+1HV		
Ø0.9	3M12	NA	400V
	3M19		250V

Product details

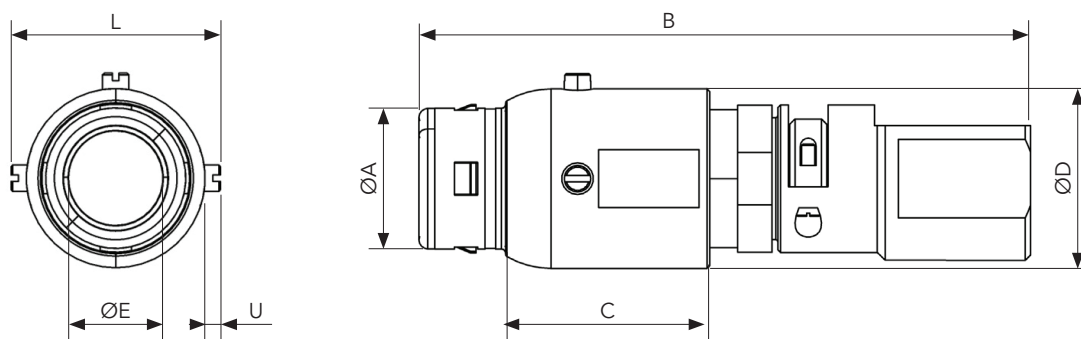
Plug - Size 3, 4 & 5 dimensions

FETFP



Shell	Size	ØA (mm)	B (mm)	C (mm)	ØD (mm)	E (mm)	U (mm)	L (mm)	ØP (mm)
FETFP	3	18	71.5	52.5	27	11	6	41	5
	4	26.5	84.5	54.5	34	18	3	48	5
	5	36	101	70	45	24	9	59	8

FLTFP

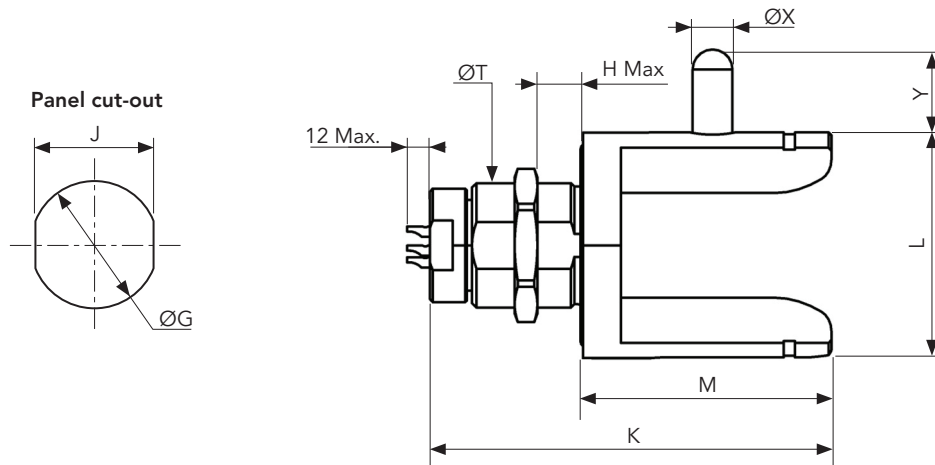


Shell	Size	ØA (mm)	B (mm)	C (mm)	ØD (mm)	ØE (mm)	U (mm)	L (mm)
FLTFP	4	26.5	125	54.5	34	18	3	48
	5	36	147	70	45	24	9	59

Product details

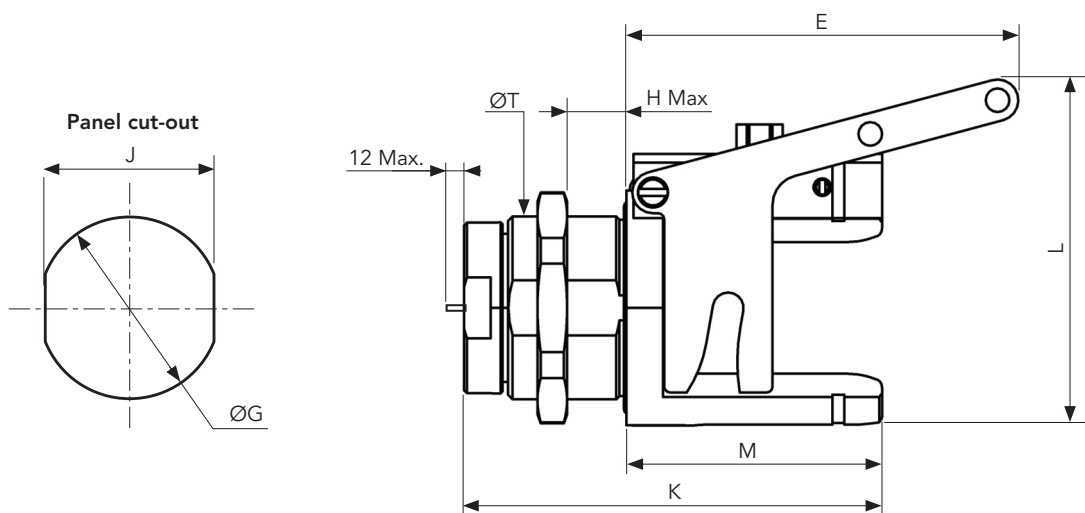
Round receptacles – Size 3, 4 & 5 dimensions

REFP



Shell	Size	M	H	ØG +0.2/-0 (mm)	J +0.2/-0 (mm)	K (mm)	L (mm)	ØT	ØX (mm)	Y (mm)
REFP	3	43.5	16	22.2	20.7	70	40	M22x1	7	15
	4	43	15	31.2	29.7	70	40	M31x1	7	18
	5	59	18	41.2	39.7	91	56	M41x1	10	21

RLFP

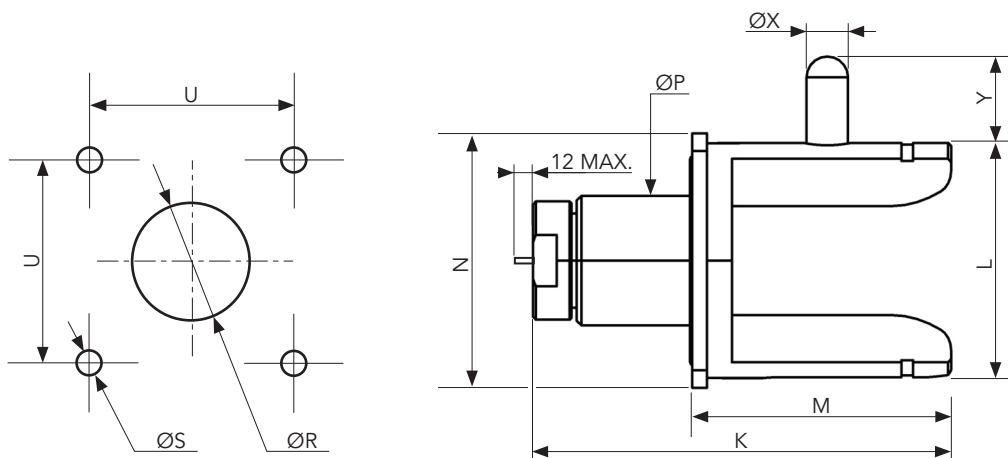


Shell	Size	M	H	ØG +0.2/-0 (mm)	J +0.2/-0 (mm)	K (mm)	L (mm) Locked	L (mm) Unlocked	ØT	E (mm)
RLFP	4	43	15	31.2	29.7	72	58.5	97	M31x1	67
	5	59	18	41.2	39.7	91	87	140	M41x1	104.5

Product details

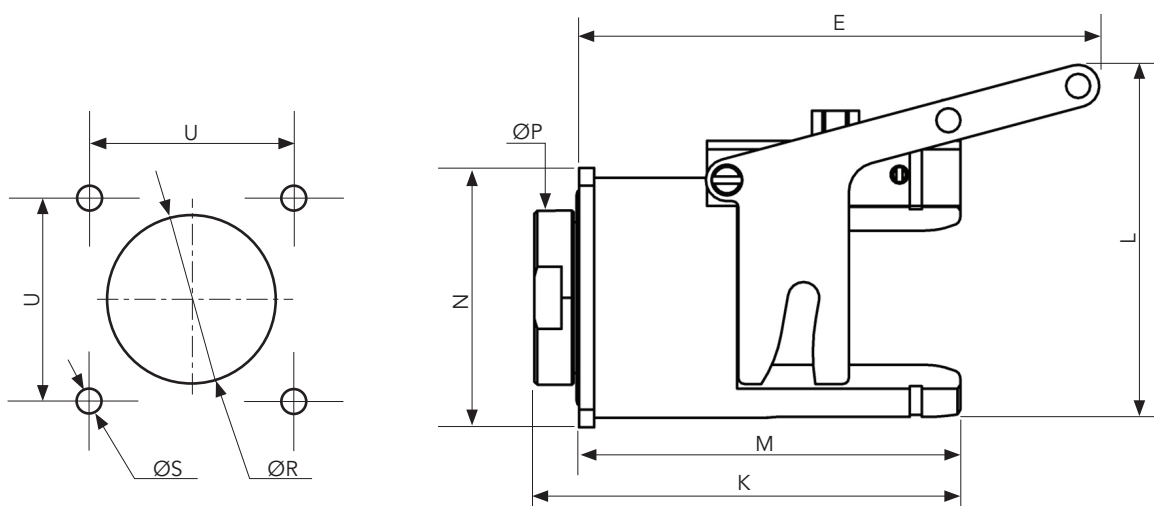
Square receptacles – Size 3, 4 & 5 dimensions

RECFP



Shell	Size	M max (mm)	N (mm)	ØR +0.2/-0 (mm)	ØS +0.2/-0 (mm)	K (mm)	L (mm)	U (mm)	ØP (mm)	ØX (mm)	Y (mm)
RECFP	3	43.5	43	22.5	4.2	70	40	35	22	7	15
	4	43	43	31.5	4.2	70	40	35	31	7	18
	5	59		41.5		91	56		41	10	21

RLCFP

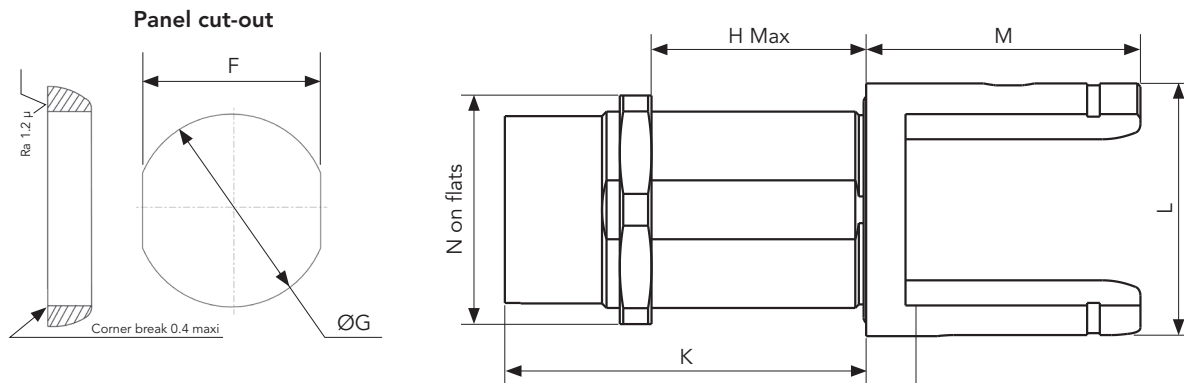


Shell	Size	M max (mm)	N (mm/)	ØR +0.2/-0 (mm)	ØS +0.2/-0 (mm)	K (mm/)	L (mm) Locked	L (mm) Unlocked	U (mm)	ØP (mm)	E (mm)
RLCFP	4	64	43	31.5	4.2	72	58.5	97	35	31	87.5
	5	83	60	44.5	5.2	91	87	140	49.1	44	128.5

Product details

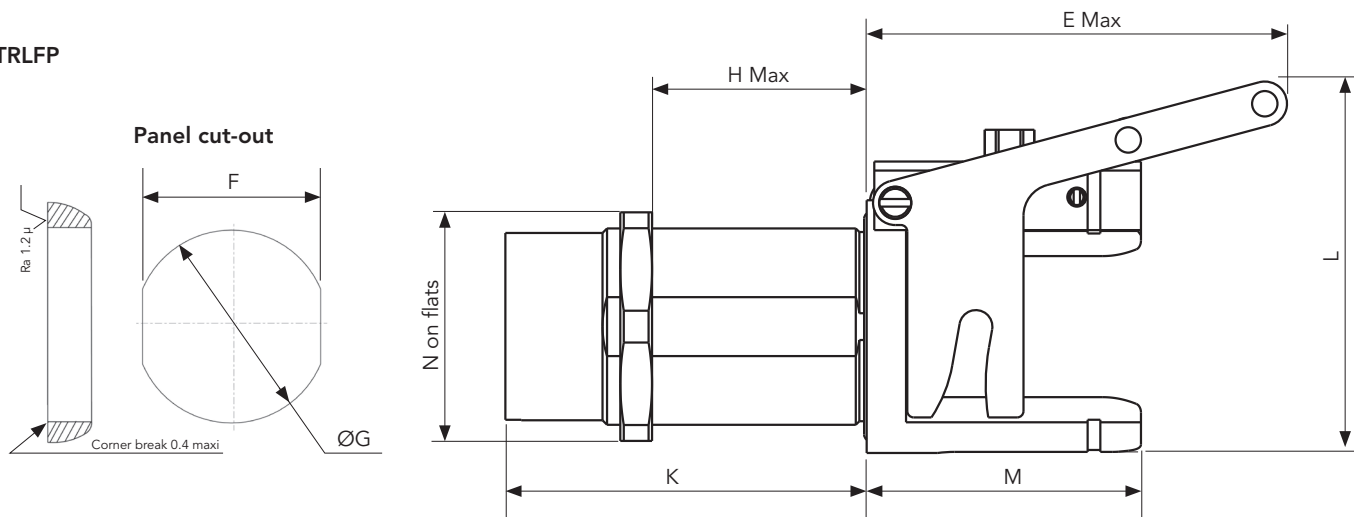
Round receptacles – Size 3, 4 & 5 dimensions

TREFP



Shell	Size (mm)	H max (mm)	K (mm)	L (mm)	M (mm)	N (mm)	E max (mm)	$\text{ØG} +0.2 -0$ (mm)	F+0.2 (mm)
TREFP	4	21	40	40	43	36	N/A	31.1	29.7
	5	21	40	56	59	46		41.1	39.7

TRLFP

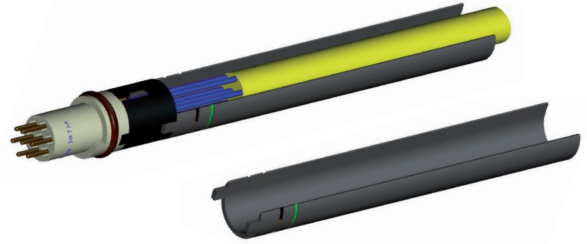


Shell	Size (mm)	H max (mm)	K (mm)	L locked (mm)	L unlocked (mm)	M (mm)	N (mm)	E max (mm)	$\text{ØG} +0.2 -0$ (mm)	F+0.2 (mm)
TRLFP	4	21	40	58.5	97	43	36	67	31.1	29.7
	5	21	40	87	140	59	46	104.5	41.1	39.7

Accessories

Plug assembly tool (for connector without T3 option)

Shell size	Reference
3	OUTULCXME3
4	OUTULCXME4
5	OUTULCXME5



EPDM protective cap

Shell	Plug cap	Receptacles cap
3	ULCTBEFT3C802	ULCTBERT3C802
4	ULCTBEFT3C802	ULCLBRE4C
5	ULCLBFE5C	ULCLBRE5C



Basic series	ULC	L	BE	F	T	3	C	802
ULC Series								
Shell material L: Brass T: Titanium								
Cap type F: Plug R: Receptacle								
Shell sizes 3, 4, 5								
Fixing type C: Eyelet fixing T: Collar fixing								

Notes

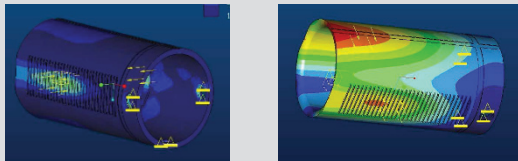
A large grid of graph paper for taking notes, consisting of 20 columns and 30 rows of small squares.

Product range extension

Longer Shells For Power Manipulator

Connectors with lengthened forks and strengthened backshell.

Perfect mechanical resistance to the high clamping forces:
.Design done with FEA and validated through customer manipulation



High corrosion resistant stainless steel shell



Pistol Plug and large Fork Receptacle

Mechanically enhanced plugs and strengthened receptacles.

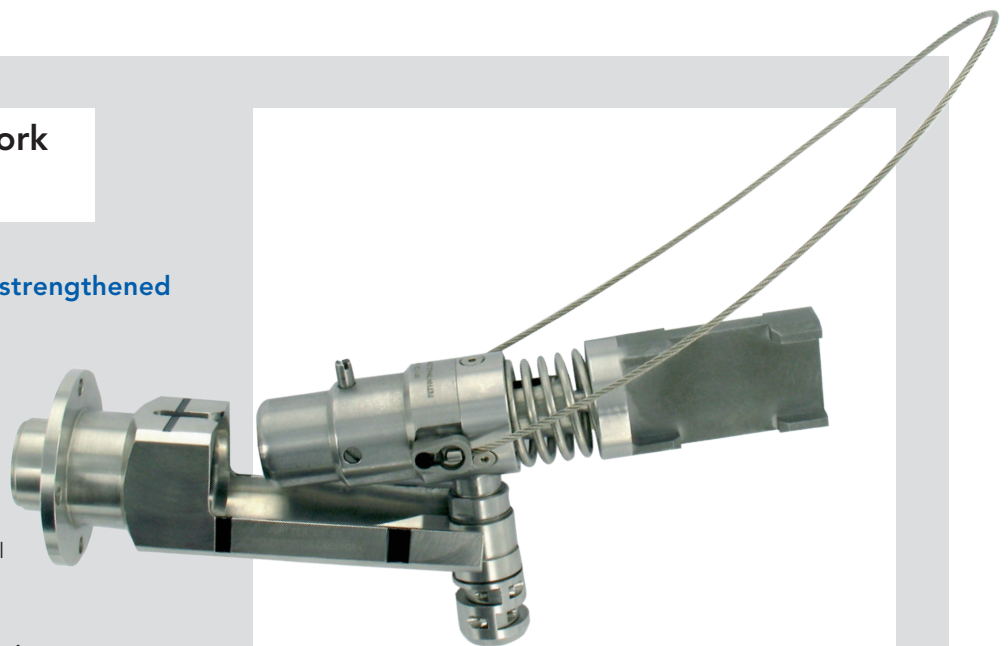
Premium guiding system:

- .Enlarge forks on the receptacle
- .Grip with multiple degrees of freedom
- .Lanyard for easy disconnection
- .90° Cable output

Strongest design:

- . High corrosion resistant stainless steel shell
- . Enlarged gripping faces
- . Glass insulators available

Patented Solution awarded by the Japan Society of Mechanical Engineers for the Excellent Product Award 2018



Other products from the same series

Push-pull Brass & Titanium Connectors

A large Push-Pull Brass & Titanium connectors range for glovebox applications

Field proven:

- . Used for more than 50 years in gloveboxes and hot cells world wide

Large range:

- . 4 Shell sizes with material choice
- . More than 35 layouts available

Hermetic feedthroughs:

- . Allowing to pass electrical signal and power through the glovebox walls safely



Junction Boxes

Essential elements to optimize the cabling inside gloveboxes.

Sealed:

- . IP55

Optimize the cabling:

- . Up to 8 connectors on one box
- . For sizes 3 & 4 ULC connectors

Custom built:

- . make your junction boxes according to your specifications with 4 sets of components



Other Products from the same series

Feedthrough with Replaceable Core

A Feedthrough solution allowing an easy maintenance.

Hermetic :

- . Leakage rate $\leq 10^{-6}$ atm.cm³/s

Replaceable core:

- . For a quick and reliable maintenance
- . Maintains the high hermetic level at any time of the replacement process.

Simplify the design of gloveboxes:

- . Quick change of layouts if needed
- . Dummy core without electrical contacts available for when the design is not fully defined



See «ULC Series Remote Manipulated Connectors» datasheet on www.souriau.com

www.souriau.com/applications/energy/nuclear
technical.emear@souriau.com (Europe - Asia - Africa)
technical.americas@souriau.com (North America)

