NUCLEAR

SOURIAU

Power Generation

Connection Solutions for Nuclear Power Plants

SOURIAU - SUNBANK

Presentation

SOURIAU safety-related nuclear solutions include "Loss Of Coolant Accident" (LOCA) and Mild environment (non-LOCA) qualified connectors for use inside and outside reactor buildings of nuclear power generating stations. SOURIAU nuclear connectors are able to withstand the most severe radiation, temperature and pressure operating conditions. They are qualified according to RCC-E standards.

Contents

NUCLEAR
POWER GENERATION

Nuclear Power Generation

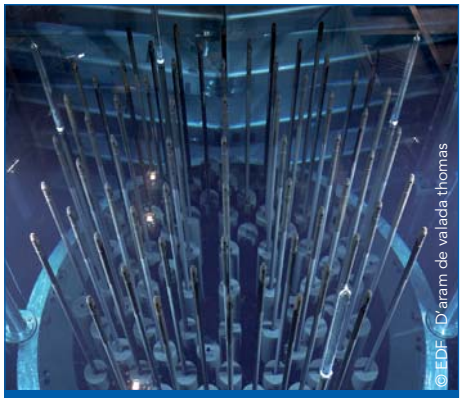
Overview

Typical Applications

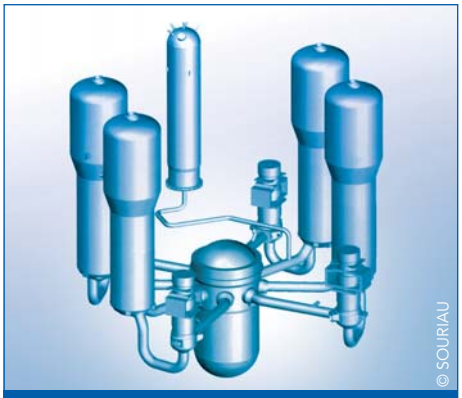
Pressure Transmitters, Temperature Sensors

Solenoid Valves, Motors, Actuators, Switches

Measurement, Control & Monitoring Systems

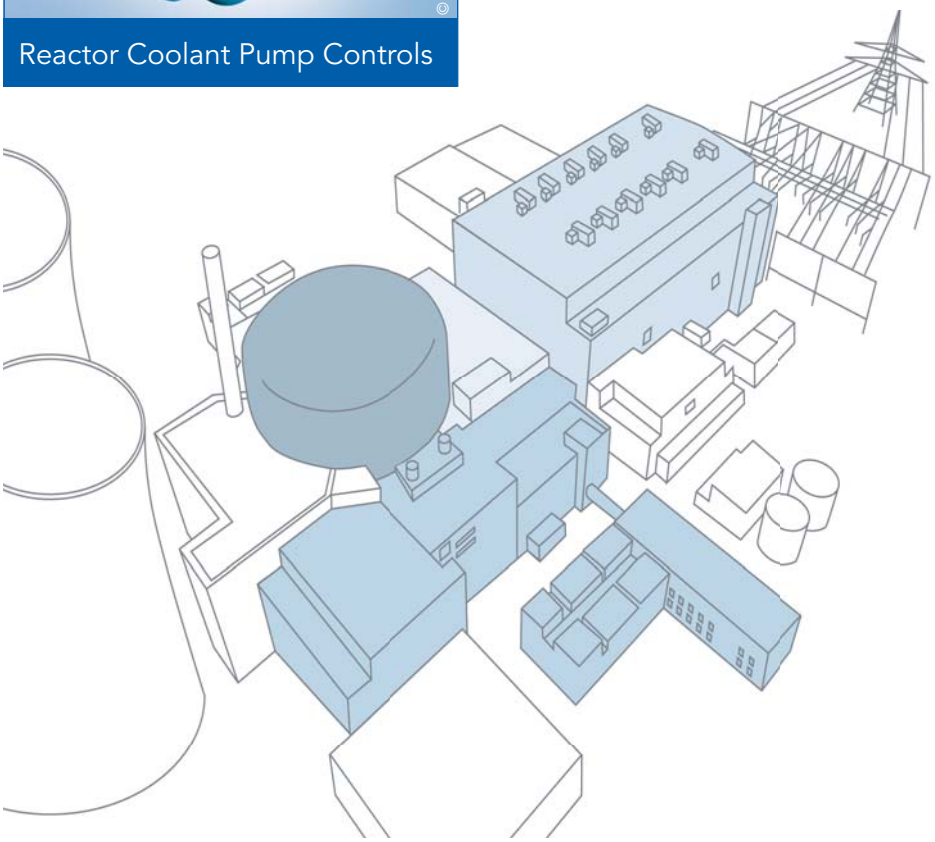


Control Rod Drive Mechanism



Reactor Coolant Pump Controls

Class 1E Safety Equipment



Nuclear range key features

EXTENSIVE RANGE

LOCA, Mild Environment and Non-classified Series

From reactor monitoring to the reactor shut down in a controlled way, SOURIAU provides LOCA, non-LOCA and non-classified connection solutions.

PROVEN DESIGN

Over 40 Years of Field Experience

Used in more than 60 PWR Nuclear Power plants over the world (all types including 900, 1300, 1450 MW reactors).

QUALITY

Approved Quality Assurance Program

SOURIAU quality assurance program meets international industrial and nuclear standards.

LOCA QUALIFIED

K1 Qualified/RCC-E 2005

8NA Series are qualified for use on safety related equipment inside reactor building, under normal, accidental and post-accidental conditions.

SIGNAL INTEGRITY

Compliant with EPR Wiring Specifications

Shielded 8NA Junction Boxes and 8N45S Series have an integrated 360° shielding mechanism. These series are compliant with the EPR wiring specification CST 74C030.02.

Detailed features & benefits

EXTENSIVE RANGE

In order to match the large variety of existing applications (sensors, probes, valves, control and regulation systems) in power generating stations, SOURIAU has developed and qualified several connector series.
Depending on the requirements, SOURIAU offers solutions from complete interconnections to field wired equipment connectors.

8NA Series	8N45(S) Series	8N35/36 Series	8NS Series	MEN Series
RCC-E K1	RCC-E K2/K3ad	RCC-E K2/K3	RCC-E K2/K3	RCC-E K2/K3
LOCA	**Mild environment**	**Mild environment**	**Mild environment**	**Mild environment**

PROVEN DESIGN

In 1952, SOURIAU conceived its first connectors for three reactors: G1, G2 ad G3 based at Marcoule (France), notably by supplying hermetic penetrators placed in the heart of the reactors and on safety devices.

Today, SOURIAU supplies more than one hundred reactors in service worldwide (France, UK, Germany, USA, South Africa, Japan and China) with qualified products.

QUALITY

SOURIAU quality assurance meets international industrial and nuclear standards:

Nuclear standards, codes and accreditation:
- RCC-E code
- IEEE 323, 344, 382 and 572
- ASME NQA-1 (10 CFR 50 App. B)
- 10 CFR 21
- HAF604 (Design & Manufacturing)

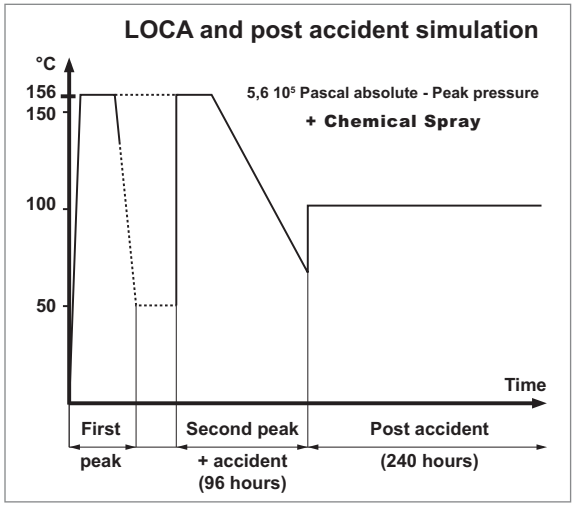
Other Certifications:
- ISO 9001/EN 9100

Detailed features & benefits

LOCA QUALIFIED

8NA connectors are LOCA qualified (K1 according to RCC-E) and suitable for safety related equipment in reactor buildings. Thanks to robust stainless steel shells and high sealing performances, 8NA is designed to operate during normal, accidental and post-accidental conditions.
Key qualification parameters:
- Steam condition during LOCA:
  - 2 peaks at +156°C (+313°F)
  - 5.6 bars (81psig).
- Post-accident conditions: +100°C (+212°F) during 240hrs

A special choice of insulator material (thermoset and elastomer) allows the 8NA range to withstand 85MRads (total integrated dose) and accelerated aging tests.



SIGNAL INTEGRITY

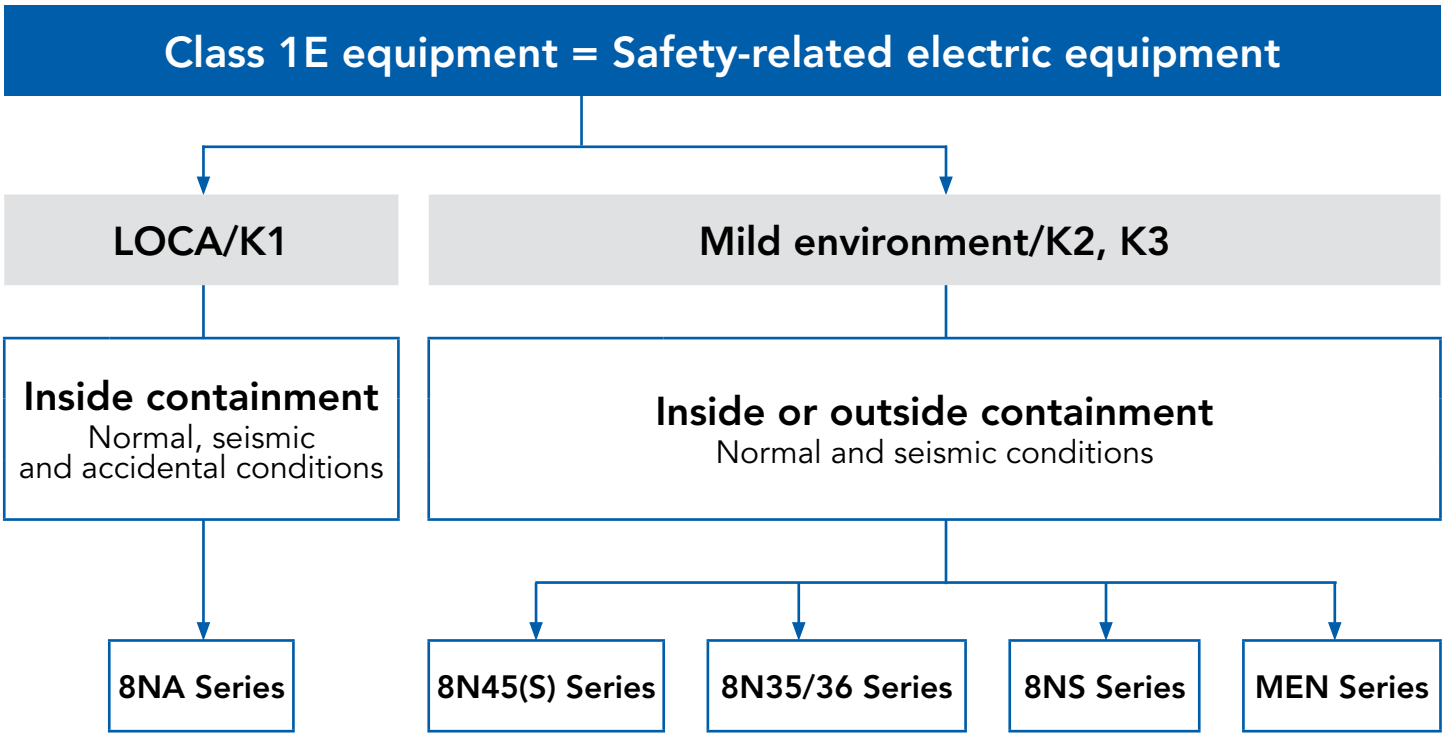
SOURIAU has re-designed and qualified new versions of the 8N45 and 8NA Series to offer enhanced shielding performances.

Thanks to the new 8N45S plug backshell and the new 8NA Junction Box cable gland, the shell to shell resistance is reduced (≤ 20 mΩ) and the EMI/RFI protection is achieved over a wide frequency range.

Selection guide

Nuclear power plants are controlled by means of equipment, designed and qualified to withstand all hypothetical conditions which could occur during the plant lifetime. Depending on their location, connectors are exposed to high temperature, high pressure and radiation.

SOURIAU offers a comprehensive range to answer class 1E equipment (safety-related electric equipment) requirements. According to international nuclear standards the SOURIAU portfolio can be described as follows:



RCC-E class 1E system, classification of safety-related electric equipment:

- **K1 category:** equipment required to perform its function under normal service conditions, earthquake, normal service radiation and accidental and post-accidental conditions.
- **K2 category:** equipment required to perform its function under normal service conditions, normal service radiation and earthquake.
- **K3 category:** equipment required to perform its function under normal conditions and earthquake.

LOCA (Loss Of Coolant Accident): safety related equipment qualified to LOCA, must continue to operate under harsh environment resulting from this design basis accident.
Mild environment: normal service radiation and seismic conditions.

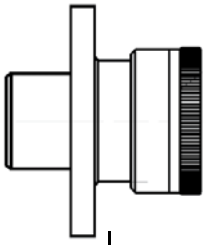
Selection guide

	8NA Series	8N45(S) Series	8N35/36 Series	8NS Series	MEN Series
					
Classification	Class 1E LOCA	Class 1E Non-LOCA	Class 1E Non-LOCA	Class 1E Non-LOCA	Class 1E Non-LOCA
Qualification	RCC-E K1	RCC-E K2/ K3ad	RCC-E K2/K3	RCC-E K2/K3	RCC-E K2/K3
Housing	Passivated stainless steel	Passivated stainless steel	Passivated stainless steel	Protected aluminum/ Passivated stainless steel	Protected aluminum
Locking system	Screw	Bayonet	Screw	Screw	Screw
Insulator	Fused glass or Thermoset	Silicone	Silicone	Thermoset	EPDM & Noryl
Contacts	Crimp & solder	Crimp	Crimp	Crimp & solder	Crimp
Seals	Metal/EPDM	Silicone	Silicone	EPDM	EPDM
Selection guide	Pages 12-13	Page 14	Page 15	Page 16	Page 17
Detailed information	Pages 19-63	Page 65	Page 83	Page 93	Page 105

LOCA, K1

Sealed or hermetic receptacle

See page 21



8NA 2G sealed receptacle

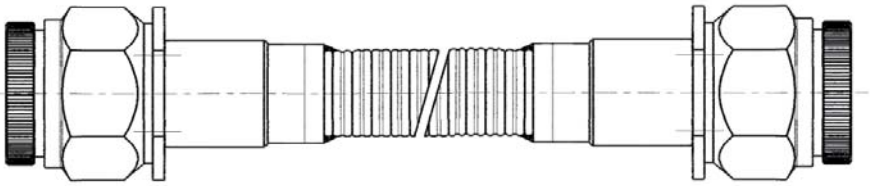
8NA 4G sealed receptacle

8NA 1Y hermetic receptacle
(Fused glass insulator)

8NA 2Y hermetic receptacle
(Fused glass insulator)

Interconnect cable plug

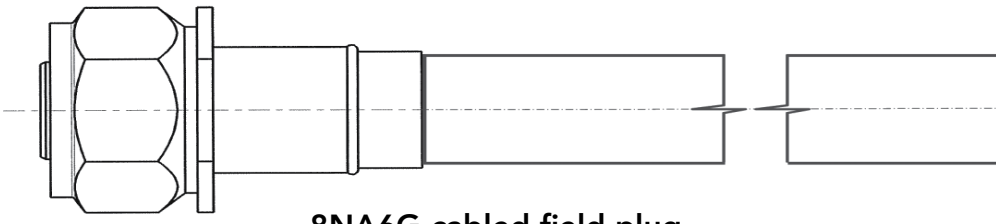
See page 24



8NA66G interconnect cable plug

Cabled field plug

See page 53

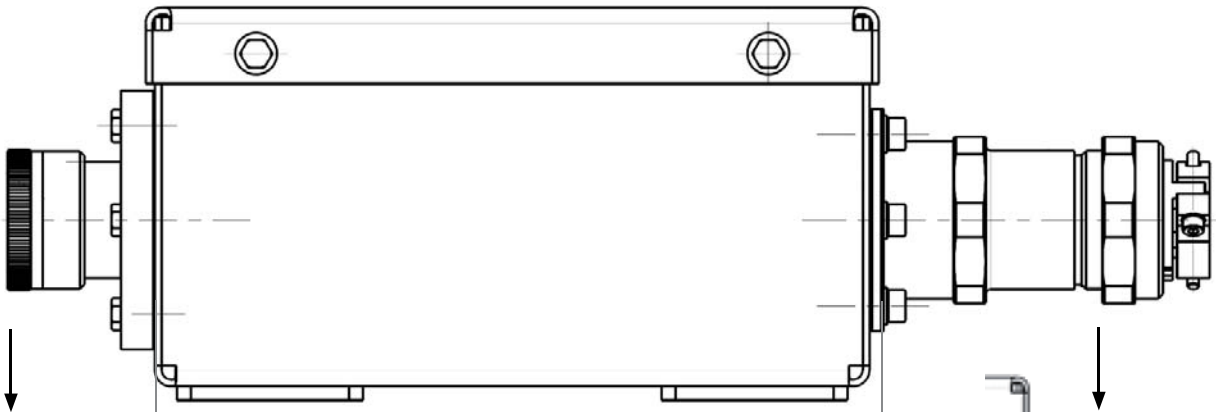


8NA6G cabled field plug

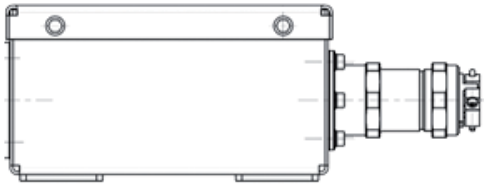
qualified connectors

Flange mounted sealed receptacle

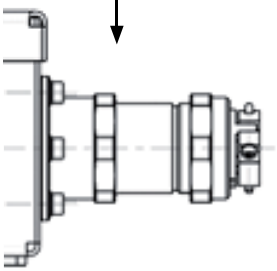
Junction box with cable gland



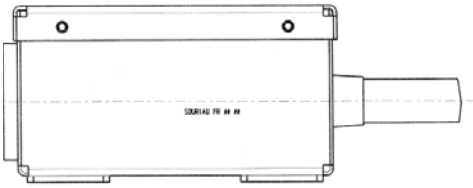
8NA3G sealed receptacle



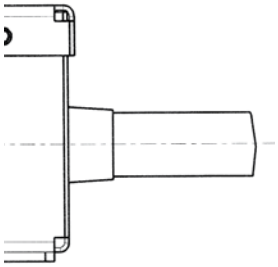
Shielded junction box
See page 29



Cable gland with 360° shield termination
See page 34



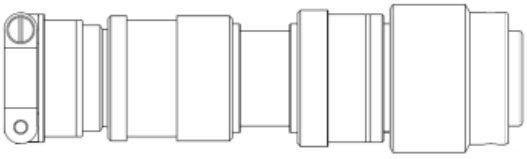
Non-shielded junction box
See page 40



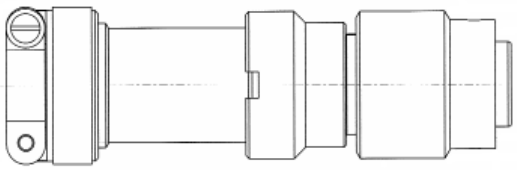
Standard cable gland
See page 41

Non-LOCA, K2 qualified connectors

8N45(S) Series Field plug

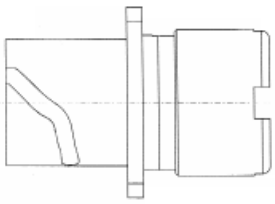


Shielded 8N45S plugs
See page 69 for available sizes



Non-shielded 8N45 plugs
See page 80 for available sizes

8N45(S) Series Receptacle



8N45(S) receptacles

8N45(S) Square flange receptacle

8N45S 1/2" NPT receptacle

8N45S M20 receptacle

8N45S 1/2" NPT adapter receptacle

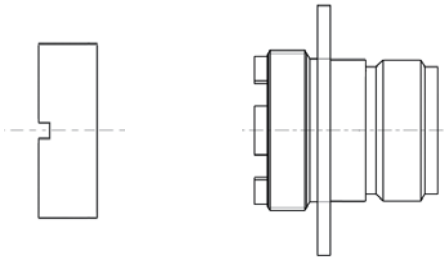
8N45S M20 adapter receptacle

8N45S 3/4" NPT receptacle

Non-LOCA, K2 qualified connectors

8N35 Series sealed Receptacle

(Silicone insulators) See page 87



Simple back-nut

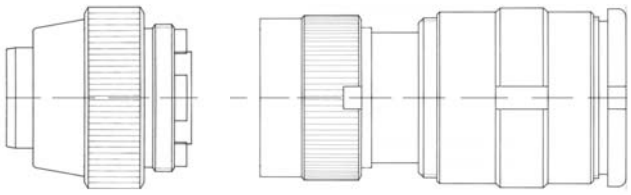
Round-flange/ screw-mounted

8N35 Series Plugs with backshell

See page 85

Plug-nose

Straight backshell

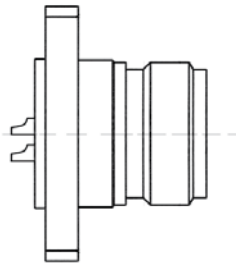


Integrated sealing-gland and cable retention mechanism

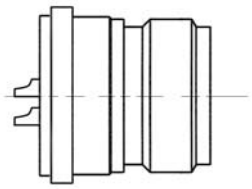
8N36 Series hermetic Receptacles

(Fused glass insulator) See page 87

Square-flange/ screw-mounted

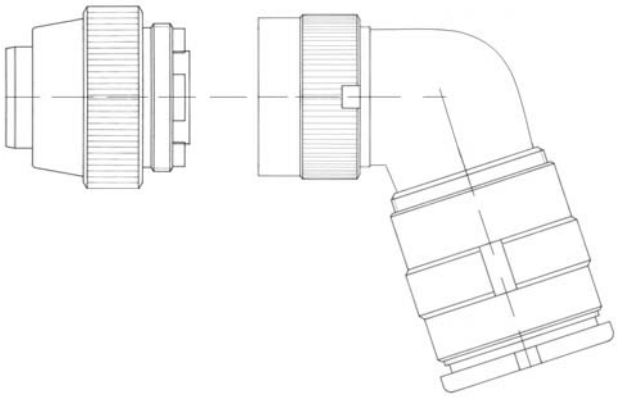


Round-flange/ welded



Plug-nose

Elbow backshell



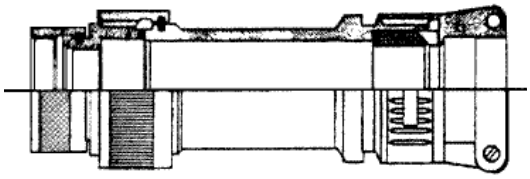
Integrated sealing-gland and cable retention mechanism

Non-LOCA, K2-K3 qualified connectors

8NS Series Receptacle
See page 96

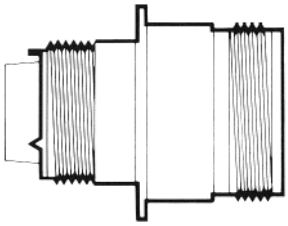
8NS Series Plug
See page 95

8NS Series Backshell
See page 98



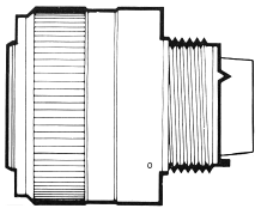
Straight with cable clamp and sealing gland

Nickel plated aluminum



Square flange

+



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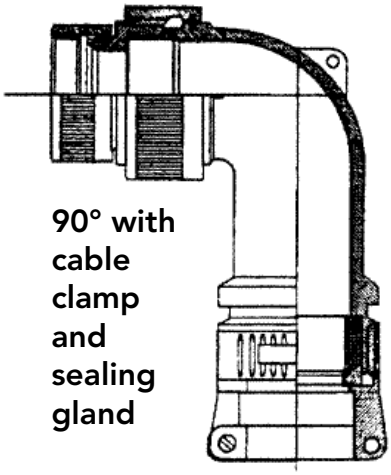
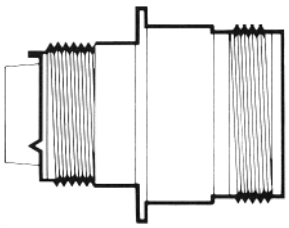


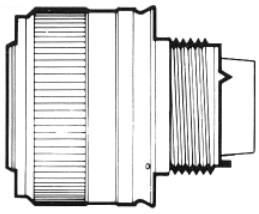
90° with cable clamp and sealing gland

Passivated stainless steel



Square flange

+



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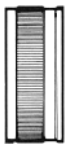
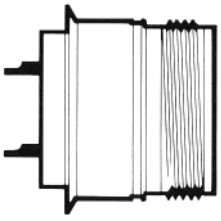
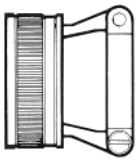


Backnut



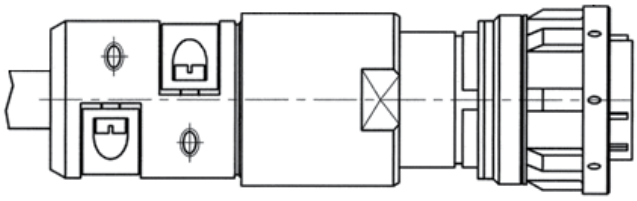
Hermetic round flange
(Fused glass insulator)



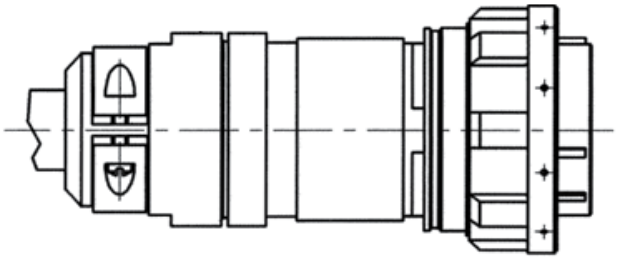
Straight backshell with cable clamp

Non-LOCA, K2 Qualified Connectors

MEN Series Plug

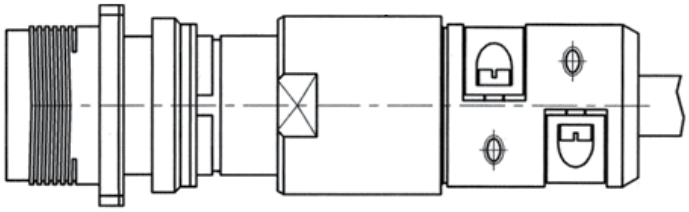


MEN 2012 plugs
See page 108 for details and cable diameter information.

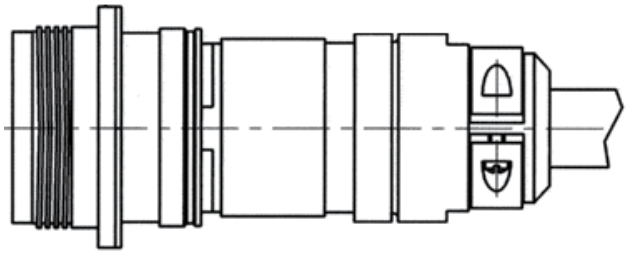


MEN 2612 plugs
Designed according to RCC-E requirements
See page 110 for details and cable diameter information.

MEN Series Receptacle



MEN 2012 receptacles
See page 108 for details and cable diameter information.



MEN 2612 receptacles
Designed according to RCC-E requirements
See page 110 for details and cable diameter information.

NUCLEAR
POWER GENERATION

Nuclear Power Generation

8NA Series Interconnect System - K1

Description

- Class 1E LOCA qualified
- Quick connect hexagonal nut screw coupling
- **Qualification standards:**
  - EDF HM63/7195, Class 1E K1
  - RCC-E 2005

Applications

- Power Plant Safety equipment
- Instrumentation, sensors, probes
- Control systems

Technical features

Electrical

- **Contacts:** #16 & #20
- **Wires section:** 0.93mm² max.
- **Wires insulation:** PEEK
- **Current rating:** 6 A
- **Test Voltage rating:**
  1500 Vrms, 50Hz, 1min
- **Insulation Resistance:**
  ≥ 1000 MΩ under 500 Vdc
- **Contact resistance:** ≤ 3 mΩ
- **Shell sizes & Contact Layouts:**
  12-03; 12-12; 16-10 or 16-24

Mechanical

- **Coupling nut tightening torque:**
  5 daN.m
- **Endurance:** 50 mating/unmating

Environmental

- **Temperature range:**
  -40°C to +85°C (-40°F to +185°F)
- **Temperature peak:** +160°C (+320°F)
- **Radiation:**
  85 MRads "gamma" at +70°C (+158°F)

Accident testing

- **Shocks:**
  Operating Basis Earthquake (OBE): 2g ZPA
  Safe Shutdown Earthquake (SSE): 4g ZPA
- **Vibration (Sine):** 10g, 58 to 500Hz, 3x2 hrs

Materials & Plating	Connector Part			
	Shells	Insulator	Seals	Contacts
Material	Stainless steel	Thermoset or Fused glass	EPDM elastomer & Stainless steel	Copper alloy
Plating	Passivated	-	-	Gold over nickel

Receptacle details

Receptacles overview

In order to match every type of applications, SOURIAU offers 5 different receptacle versions:

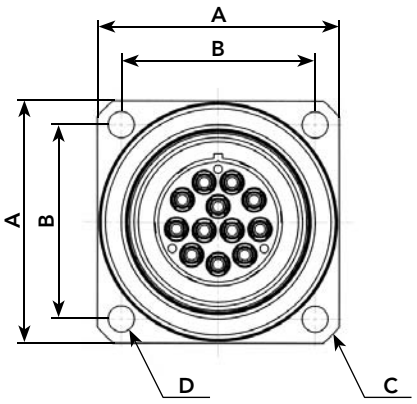
Receptacle type	Sealing/Hermeticity	Assembly	Application	Contacts layouts
2G	Sealed (compounded)	screwed	On sensor or actuator	12-03*; 12-12 16-10*; 16-24
3G		mounted	On junction Box	
4G		screwed	On sensor or actuator	12-03**; 12-12
1Y	Hermetic (Fused glass)	brazed		
2Y		screwed		

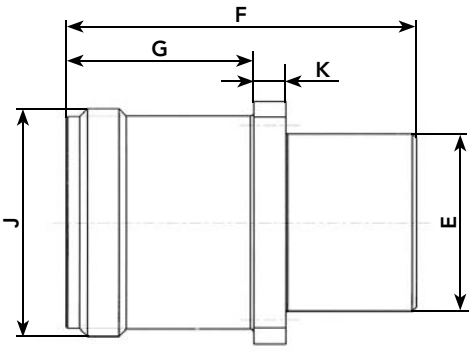
* 8NA 12-03 and 8NA 16-10 sealed receptacles are designed according to Class 1E LOCA equipment requirements. Qualification pending.
** 8NA 12-03 hermetic receptacle is designed according to Class 1E LOCA equipment requirements. Not qualified.

Contact layout	Standard cable length in cm
12-03 12-12	30 50
16-10 16-24	30 50

Note: receptacles are delivered with metal protection caps

2G Type receptacle



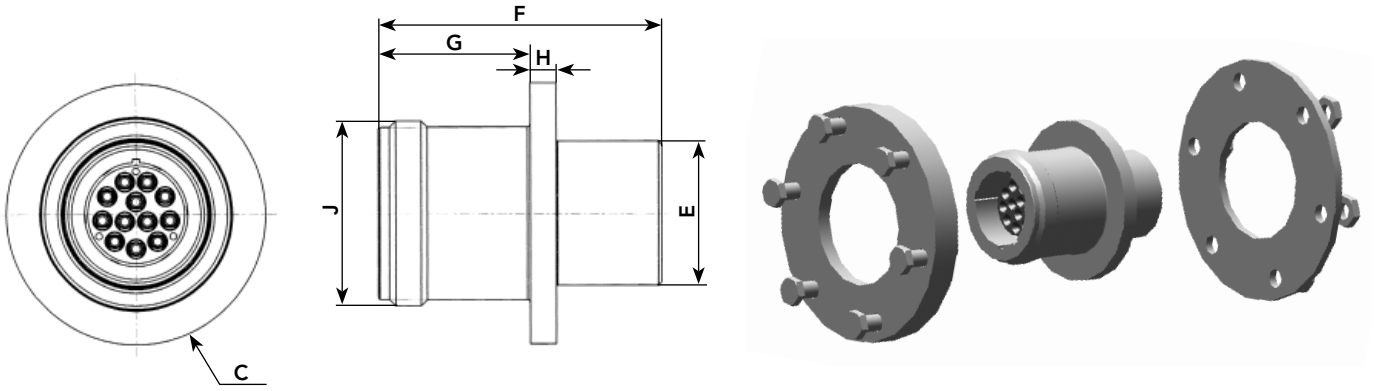


Contact layout	A ± 0.3	B	C 0/- 0.3	4 holes Ø D 0/+ 0.1	Ø E ± 0.2	F ± 0.2	G ± 0.2	H ± 0.1	Ø J max..
12-03 12-12	28.70	23.00	38.00	3.10	21.00	41.60	22.30	3.80	26.98
16-10 16-24	40.00	31.75	52.00	3.35	30.00	43.10	23.80	3.80	36.50

Note: all dimensions are in mm

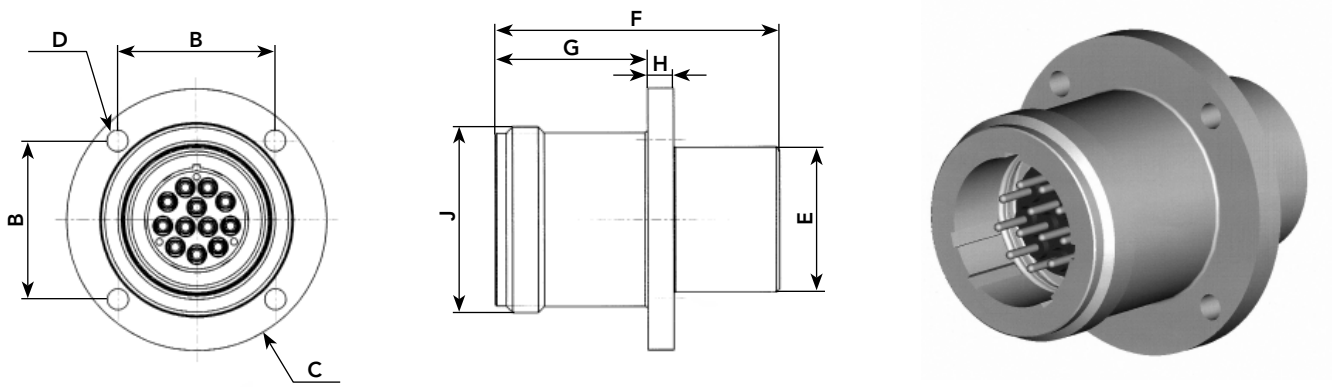
Receptacle details

3G Type receptacle



Contact layout	C 0/- 0.3	Ø E ± 0.2	F ± 0.2	G ± 0.2	H ± 0.1	Ø J max.
12-03 12-12	38.00	21.00	41.60	22.30	3.80	26.98
16-10 16-24	52.00	30.00	43.10	23.80	3.80	36.50

4G Type receptacle

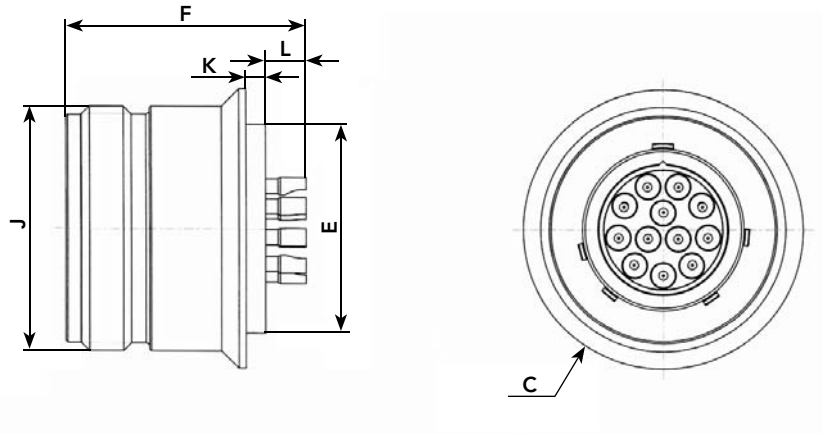


Contact layout	B	C 0/- 0.3	4 holes Ø D 0/+ 0.1	Ø E ± 0.2	F ± 0.2	G ± 0.2	H ± 0.1	Ø J max.
12-03 12-12	23.00	38.00	3.10	21.00	41.60	22.30	3.80	26.98

Note: all dimensions are in mm

Receptacle details

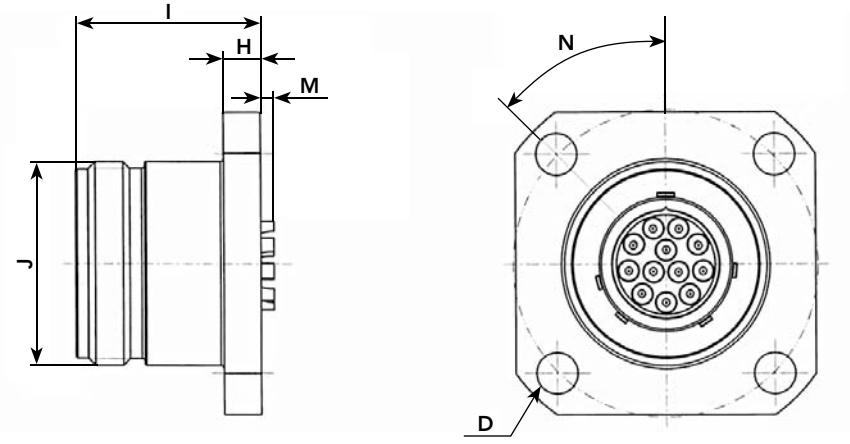
1Y Type receptacle (Fused glass insulator)



Applies to pressure transmitter, RTD, probes which require a high degree of hermeticity (10^{-8} atm.cm^3/s)

Contact layout	C +/- 0.12	Ø E ± 0.1	F max.	Ø J max.	K ± 0.15	L ± 0.45
12-03 12-12	30.80	22.90	26.5	26.98	2.20	4.00

2Y Type receptacle (Fused glass insulator)



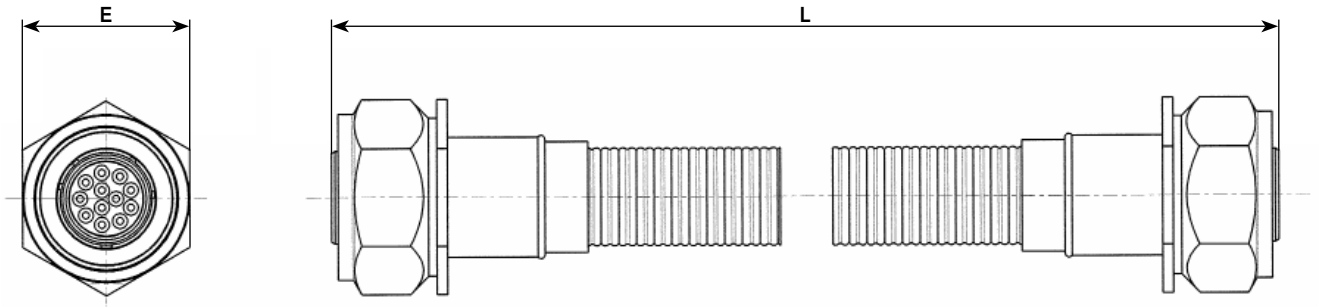
Applies to pressure transmitter, RTD, probes which require a high degree of hermeticity (10^{-8} atm.cm^3/s)

Contact layout	4 holes Ø D at 90° on Ø 41	N	I + 0.1	Ø J max.	H ± 0.1	M - 0.85
12-03 12-12	5.5	45°	24.75	26.98	5	1.70

Note: all dimensions are in mm

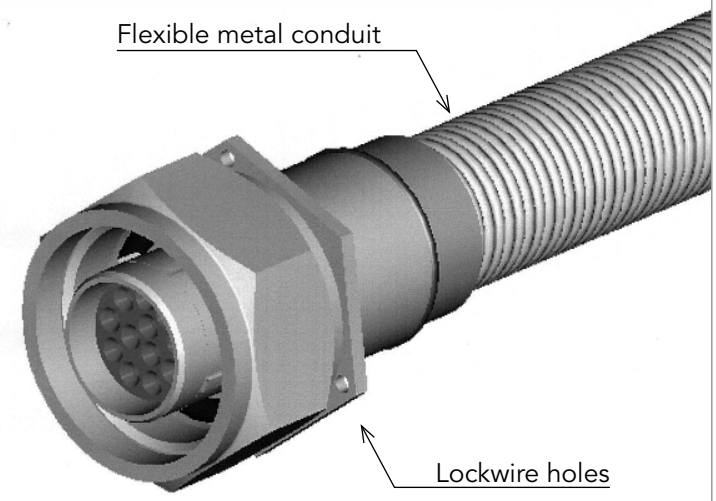
Interconnect cable plug details

Interconnect cable plug



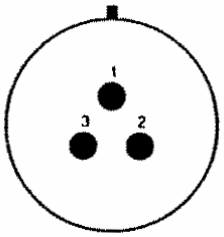
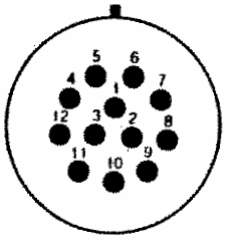
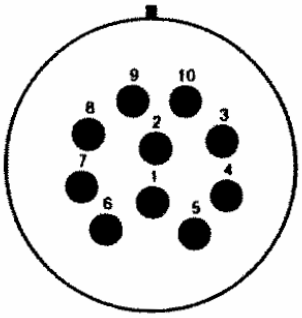
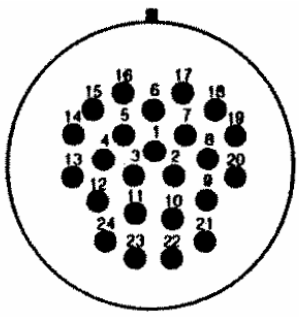
Contact layout	E ± 0.3 (mm)	L
12-03 12-12	32.00	To be specified from 130 to 400cm (refer to table hereunder for standard length)
16-10 16-24	41.00	

	Standard interconnect cable plug length (L) in cm
12-03 12-12	130 200 250 300 350 400 600
16-10 16-24	200 250



Note: Cable plugs are delivered with metal protection caps

Contact layouts

8NA 12-03 *	8NA 12-12	8NA 16-10 *	8NA 16-24
			
03 contacts # 16	12 contacts # 20	10 contacts # 16	24 contacts # 20

* 8NA 12-03 and 8NA 16-10 layouts are designed according to Class 1E LOCA equipment requirements. Qualification pending.

Ordering information

Receptacle

Basic Series	8NA	1Y	12-12	P	N	-	-	00	S		A

Receptacle type:
1Y: Hermetic, Round Flange, to be welded
2Y: Hermetic, Square Flange, screw mounted
2G: Sealed, Square Flange, screw mounted
3G: Sealed, Round Flanged
4G: Sealed, Round Flange, screw mounted

Contact layout:
12-03: Shell size 12 - 03 contacts #16
12-12: Shell size 12 - 12 contacts #20
16-10: Shell size 16 - 10 contacts #16
16-24: Shell size 16 - 24 contacts #20

Contact type:
P: Pin
S: Socket

Orientation:
N: Normal

Wiring code:
: Not wired
XX: refer to table page 26

Wire type:
: Not wired
A: EPR or PK4CZ (qualification pending)

Wire length:
00: Not wired
XX: length in cm – refer to table page 21

Specifications:
A: not compounded
C: compounded
S: hermetic

Additional specifications:
02: for 2Y type only

Qualification file: A

Interconnect cable plug

Basic Series	8NA	66	G	12-12	PS	N	4	B	200	A	

Connector type:
66: 2 plugs jumper with flexible metal conduit

Sealing:
G: Sealed

Shell size & Contact Layout:
12-03: Shell size 12 - 03 contacts #16
12-12: Shell size 12 - 12 contacts #20
16-10: Shell size 16 - 10 contacts #16
16-24: Shell size 16 - 24 contacts #20

Contact type:
PS: Male - Female interconnect cable plug

Orientation:
N: Normal

Wiring code:
XX: refer to table page 26

Wire type:
B: PEEK

Cable plug length:
XX: length in cm – refer to table page 24

Qualification file: A

Special specification: Please consult us

Wiring tables

8NA 12-12

Please follow the proposed wiring tables to ensure continuity between receptacles and cable plugs.

WIRING NUMBER	N° of PINS WIRED 1	2	3	4	5	6	7	8	9	10	11	12
01				■								
02				■					■			
03				■			■		■			
Z3				■					■		■	
Y3	■							■				■
04				■			■		■		■	
05				■	■		■		■		■	
06				■	■	■	■		■		■	
07				■	■	■	■	■	■		■	
08				■	■	■	■	■	■		■	■

■ Connected pins

] If possible, type of wiring to avoid

Note: For spare connection links, the 8 wires version (wiring N°08) allows interchangeability (except for Y3)

8NA 16-24

WIRING NUMBER	N° of pins wired 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
08				■	■	■	■	■	■	■	■													
09				■	■	■	■	■	■	■	■	■												
10				■	■	■	■	■	■	■	■	■	■											
11				■	■	■	■	■	■	■	■	■	■			■								
12				■	■	■	■	■	■	■	■	■	■			■	■							
13				■	■	■	■	■	■	■	■	■	■			■	■			■				
14				■	■	■	■	■	■	■	■	■	■			■	■			■	■			
15				■	■	■	■	■	■	■	■	■	■			■	■			■	■	■		
16				■	■	■	■	■	■	■	■	■	■			■	■			■	■	■	■	
17				■	■	■	■	■	■	■	■	■	■			■	■			■	■	■	■	■
18				■	■	■	■	■	■	■	■	■	■	■		■	■			■	■	■	■	■
19				■	■	■	■	■	■	■	■	■	■	■	■	■	■			■	■	■	■	■
20				■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■	■	■	■	■
21				■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
22			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
23		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
24	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
N4	■	■	■	■	■	■	■	■	■	■	■	■	■	■			■	■	■	■	■	■	■	

Note: For spare connection links, the 24 wires version (wiring N°24) allows interchangeability

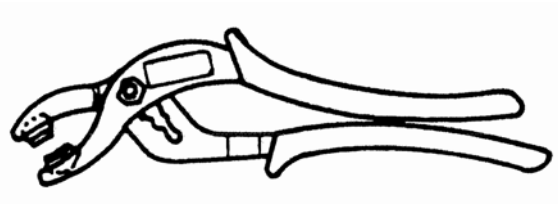
Tools

Extraction pliers for metal seals

Pliers equipped with plastic jaws for metal seal extraction.

Each time the connector is unmated, the metal seal between plug and receptacles must be changed to ensure a perfect sealing when mating again. This tool allows the operator to extract the metal seals easily and without damaging the connector.

Contact layout	Pliers (Delivered with 2 pairs of spare plastic jaws)	Spare plastic jaws
12-03 12-12	8341-91 EL	8341-94 EL
16-10 16-24		

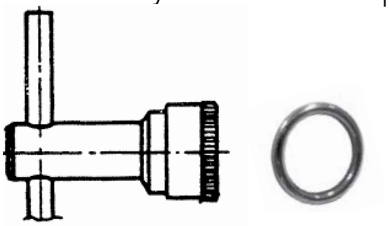


Metal seal mounting tool

Metal seal mooting tool

Each time the connector is unmated, the metal seal must be changed to ensure a perfect sealing when mating again. This tool allows the operator to mount the new metal seals easily and position it correctly on the connector plug.

Contact layout	Mounting tool	Spare metal seals
12-03 12-12	8341-5300 EL	3390 533 A EL
16-10 16-24	8341-5305 EL	3391 017 A EL



Spare parts

Metal caps & Fastening collars

Spare metal caps for plugs and receptacles:

To protect the connectors faces when unmated.

Contact layout	Spare metal cap for receptacle	Spare metal cap for plug
12-03 12-12	8341-5310 EL	8341-5311 EL
16-10 16-24	8341-5316 EL	8341-5317 EL

Fastening collar for flexible conduit.

To maintain flexible conduits.

Contact layout	Fastening collar for flexible conduit
12-03 12-12	83415320EL
16-10 16-24	8NAEZ0504A

NUCLEAR
POWER GENERATION

Nuclear Power Generation

8NA Series Junction Box - K1

Shielded K1 Qualified Junction Box

Non-shielded K1 Qualified Junction Box

Description

- Class 1E LOCA qualified
- Junction boxes with EMI/RFI cable glands
- For use with 8NA Series connectors
- Qualification standard: RCC-E 2005
- Up to 6 connections per Junction Box

Applications

- Power plant safety equipment
- Instrumentation, sensors, probes
- Control systems

Technical features

Materials & plating

- **Junction box:**
  - Passivated stainless steel
- **Cable gland:**
  - Mechanical parts: passivated stainless steel
  - Seal: elastomer
  - Sealing glands: EPDM

Electrical

- **Shielding continuity resistance between junction box and cable braid taken at the output of the cable feedthrough :**
  - Rc < 20 mΩ

Environmental performances

- **Operating temperature:**
  -40°C to +85°C (-40°F to +185°F)
- **Cumulated radiation dose:**
  85 MRads Gamma at +70°C (+158°F)
- **Vibrations (sinus):**
  5g

Accident testing

- **Seismic tests:**
  - OBE (Operating Basis Earthquake): 3g ZPA
  - SSE (Safe Shutdown Earthquake): 6g ZPA
- **Loss of Coolant Accident (LOCA):**
  - Temperature envelope: +156°C (+313°F) max.
  - Pressure envelope: 5,6 bars (81 psig) max.
- **Post accidental conditions:**
  - +100°C (+212°F) during 240 hrs

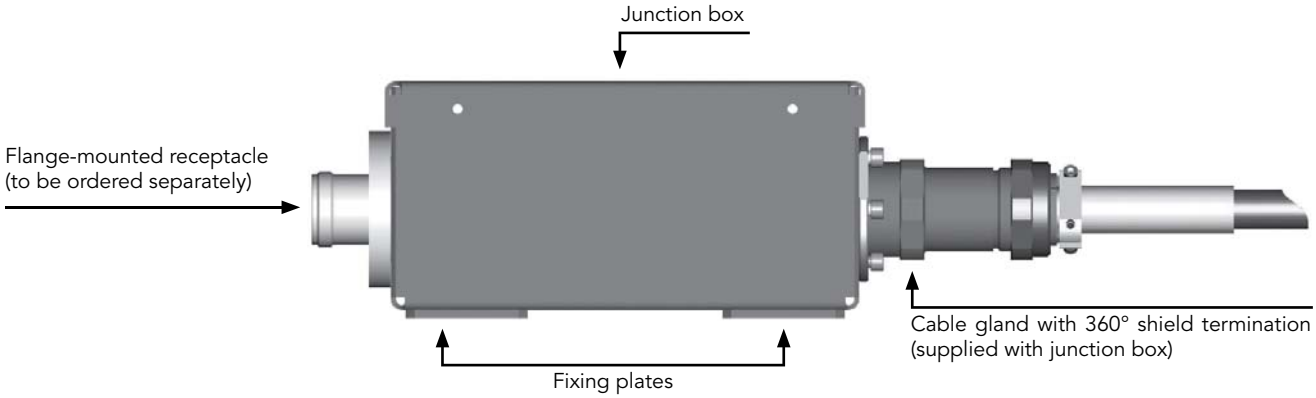
Features & benefits

Shielded junction boxes overview

8NA Series junction boxes for EPR are delivered as kits comprising:
- a stainless steel box with two fixing plates
- one or more cable glands with 360° shield termination mechanism

Connection to the equipment is made through flange-mounted receptacles, to be ordered separately
(see receptacles details on page 37).

Junction boxes faces are machined to allow the mounting of the desired number of receptacles and cable glands according to chosen configuration (see available configurations pages 32 and 33).

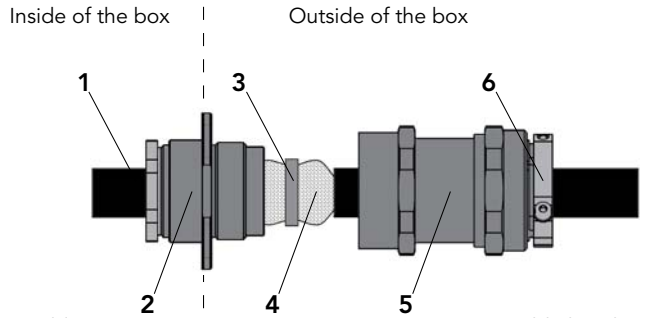


Compliant with EPR wiring specifications CST 74C030.02

To meet the new EMC requirements of EPR program, SOURIAU has developed high-performances, LOCA resistant cable glands with 360° shield termination mechanism, to be mounted on 8NA Series Junction Boxes instead of basic cable clamps.

- **360° Shield termination**
- **High shielding performances**

  over a wide frequency range
- **Total resistance ≤ 20 mΩ**
- **Perfect sealing of braid bonding zone**



1. Cable
2. Feedthrough with 360° braid bonding zone
3. Ring to maintain cable braid on bonding zone
4. Cable braid
5. Cabling chamber
6. Cable clamp

Available configurations

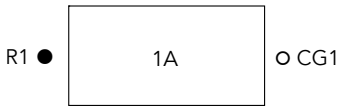
Type 02 junction boxes for 8NA 12.12/12.03 connectors

R = Receptacle CG = Cable Gland

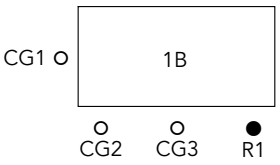
Number of receptacle	Number of cable glands	Cable gland	Admissible cable gland code*	Admissible cable diameter	Part number
1	1	CG1	1 to 4	9 to 22mm	**8NA02BSx0001AA**

Type 04 junction boxes for 8NA 12.12/12.03 connectors

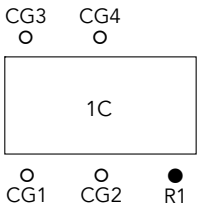
R = Receptacle CG = Cable Gland



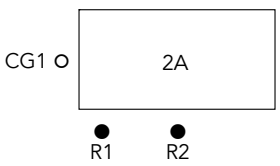
Number of receptacle	Number of cable glands	Cable gland	Admissible cable gland code*	Admissible cable diameter	Part number
1	1	CG1	1 to 7	9 to 29mm	**8NA04BSx0001AA**



Number of receptacle	Number of cable glands	Cable gland	Admissible cable gland code*	Admissible cable diameter	Part number
1	3	CG1 CG2 CG3	5 to 7 1 to 2 1 to 2	20 to 29mm 9 to 17mm 9 to 17mm	**8NA04BSxxx01BA**



Number of receptacle	Number of cable glands	Cable gland	Admissible cable gland code*	Admissible cable diameter	Part number
1	4	CG1 CG2 CG3 CG4	1 to 2 1 to 2 3 to 4 3 to 4	9 to 17mm 9 to 17mm 15 to 22mm 15 to 22mm	**8NA04BSxxxx1CA**



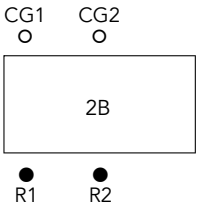
Number of receptacle	Number of cable glands	Cable gland	Admissible cable gland code*	Admissible cable diameter	Part number
2	1	CG1	5 to 7	20 to 29mm	**8NA04BSx0002AA**

* Refer to table page 34

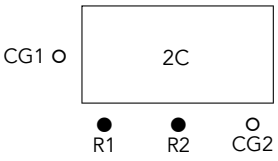
Available configurations

Type 04 junction boxes for 8NA 12.12/12.03 connectors (continued)

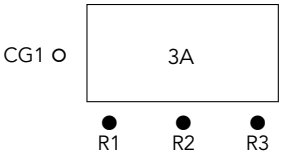
R = Receptacle CG = Cable Gland



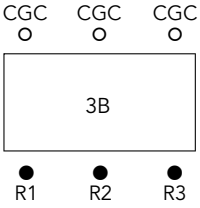
Number of receptacle	Number of cable glands	Cable gland	Admissible cable gland code*	Admissible cable diameter	Part number
2	2	CG1 CG2	3 to 4 3 to 4	15 to 22mm 15 to 22mm	**8NA04BSxx002BA**



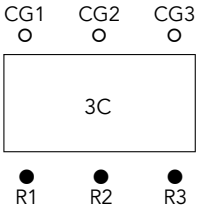
Number of receptacle	Number of cable glands	Cable gland	Admissible cable gland code*	Admissible cable diameter	Part number
2	2	CG1 CG2	5 to 7 5 to 7	20 to 29mm 20 to 29mm	**8NA04BSxx002CA**



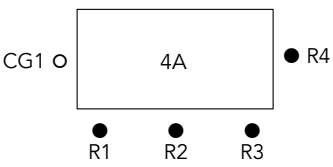
Number of receptacle	Number of cable glands	Cable gland	Admissible cable gland code*	Admissible cable diameter	Part number
3	1	CG1	5 to 7	20 to 29mm	**8NA04BSx0003AA**



Number of receptacle	Number of cable glands	Cable gland	Admissible cable gland code*	Admissible cable diameter	Part number
3	0	-	-	-	**8NA04BS00003BA**



Number of receptacle	Number of cable glands	Cable gland	Admissible cable gland code*	Admissible cable diameter	Part number
3	3	CG1 CG2 CG3	1 to 2 1 to 2 1 to 2	9 to 17mm 9 to 17mm 9 to 17mm	**8NA04BSxxx03CA**



Number of receptacle	Number of cable glands	Cable gland	Admissible cable gland code*	Admissible cable diameter	Part number
4	1	CG1	5 to 7	20 to 29mm	**8NA04BSx0004AA**

* Refer to table page 34

Cable glands with shield termination

Cable gland types and admissible cable diameters

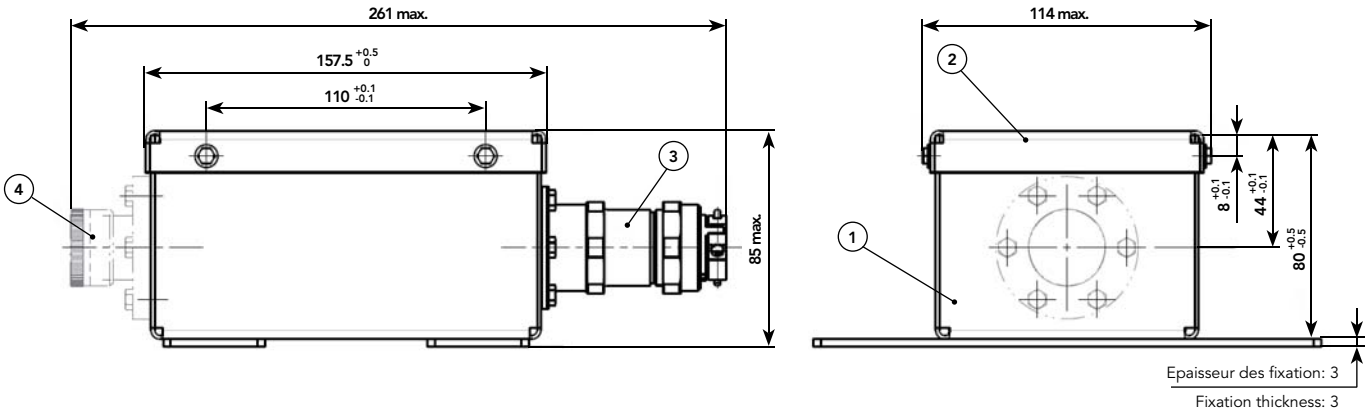
SOURIAU has developed a complete range of cable glands, comprising 3 sizes and a total of seven references for shielded cables of diameters ranging from 9 to 29mm.

Cable gland codes	Size	Admissible cable diameter (mm)		Sealing glands diameter* (mm)		1mm² EPR or PK4CZ (qualification pending) cable
		min.	max.	min.	max.	
1	1	9	14	9	11	3x1, 4x1, 5x1, 7x1
				10.5	12.5	
				12	14	
2	1	12	17	12	14	9x1
				13.5	15.5	
				15	17	
3	2	15	20	15	17	12x1, 14x1
				16.5	18.5	
				18	20	
4	2	17	22	17	19	19x1
				18.5	20.5	
				20	22	
5	3	20	25	20	22	27x1
				21.5	23.5	
				23	25	
6	3	23	28	23	25	37x1
				24.5	26.5	
				26	28	
7	3	26	29	26	28	48x1
				27.5	29	

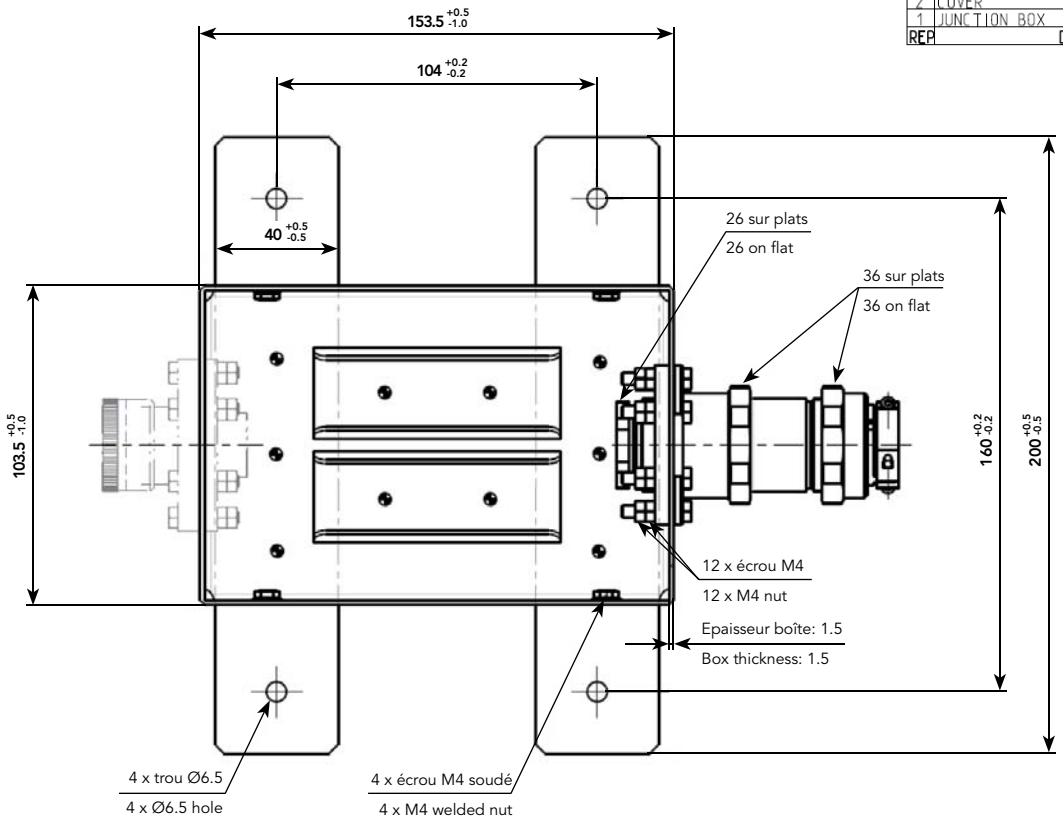
***** Cable glands are delivered with a set of 3 seals

Dimensions

Type 02 box dimensions



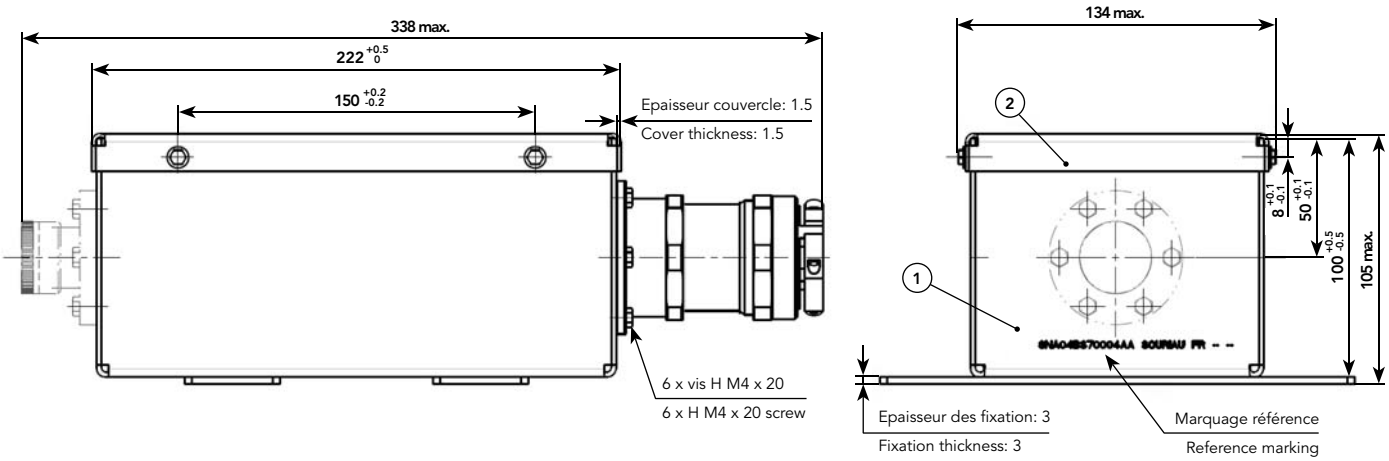
REP	DESIGNATION
4	8NA RECEPTACLE TYPE 3G (NOT DELIVERED)
3	SHIELDED CABLE GLAND
2	COVER
1	JUNCTION BOX

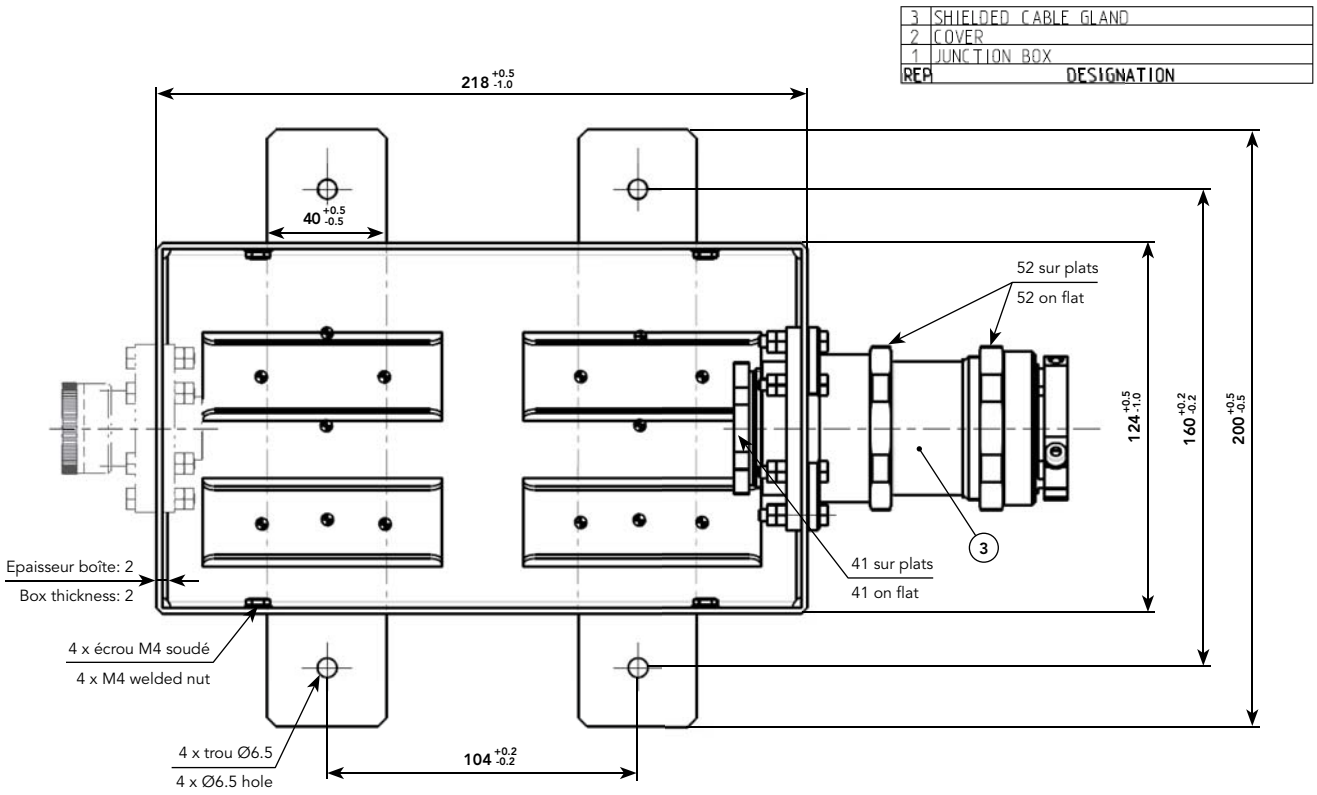


Note: all dimensions are in mm

Dimensions

Type 04 box dimensions

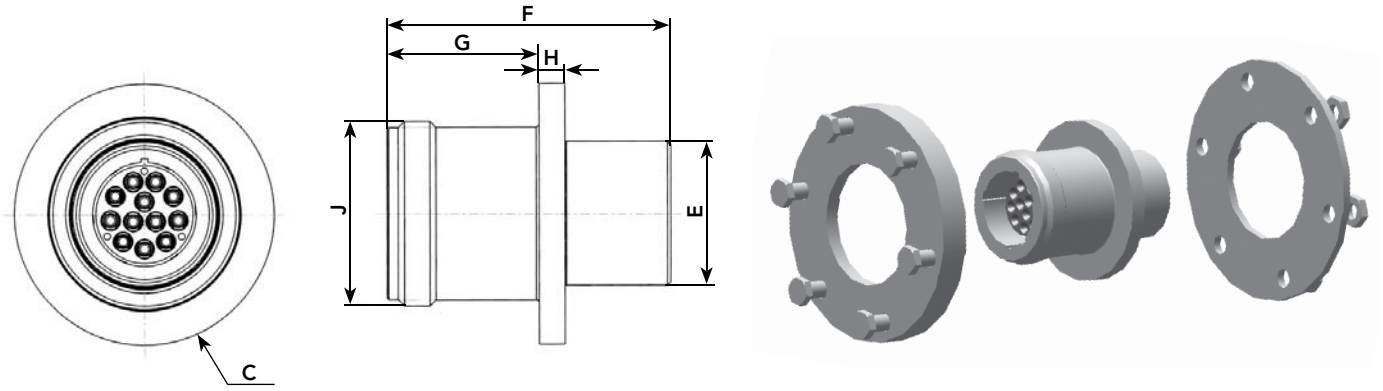




Note: all dimensions are in mm

Receptacle details

3G type receptacle

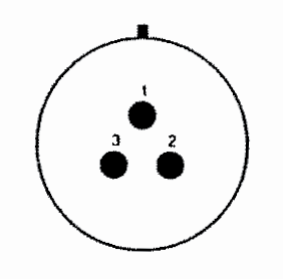
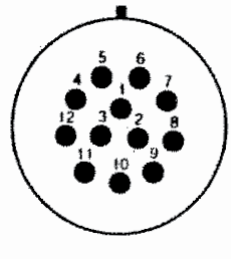
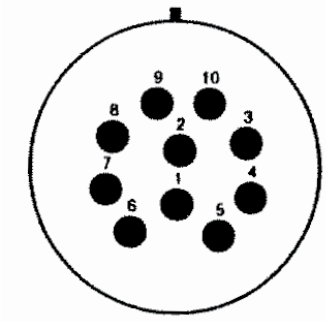
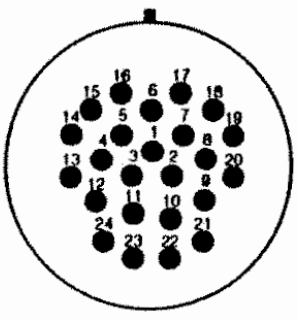


Contact layout	C 0/- 0.3	Ø E ± 0.2	F ± 0.2	G ± 0.2	H ± 0.1	Ø J max.
12-03 12-12	38.00	21.00	41.60	22.30	3.80	26.98
16-10 16-24	52.00	30.00	43.10	23.80	3.80	36.50

3G receptacles are to be ordered separately from the junction box. They are assembled (refer to opposite picture) with 6 bolts using the flange(s) supplied with the receptacles.

Note: all dimensions are in mm

Contact layouts

8NA 12-03 *	8NA 12-12	8NA 16-10 *	8NA 16-24
			
03 contacts # 16	12 contacts # 20	10 contacts # 16	24 contacts # 20

* 8NA 12-03 and 8NA 16-10 layout s are designed according to Class 1E LOCA equipment requirements. Qualification pending.

Ordering information

Junction boxes with shielded cable glands

Basic Series	Junction Box 8NA	04	B	S	1	0	0	0	1A	A

Junction Box Type:
02: Junction Box Size 1 for 8NA 12-12 and 12-03
04: Junction Box Size 2 for 8NA 12-12 and 12-03

Fixed character:

Cable Entry Type:
S: Cable gland with 360° shield termination

Cable gland N°1 code:
0: No cable gland
1-7: See admissible cable diameters p. 34

Cable gland N°2 code:
0: No cable gland
1-7: See admissible cable diameters p. 34

Cable gland N°3 code:
0: No cable gland
1-7: See admissible cable diameters p. 34

Cable gland N°4 code:
0: No cable gland
1-7: See admissible cable diameters p. 34

Inputs/Outputs configurations:
See available configurations p. 32 - 33

Qualification file

Receptacles to be mounted on junction boxes

Basic Series	8NA	3G	12-12	S	N	08	A	30	C	A

Receptacle type:
3G: Sealed, Round Flanged

Contact layout:
12-03: Shell size 12 - 03 contacts #16
12-12: Shell size 12 - 12 contacts #20
16-10: Shell size 16 - 10 contacts #16
16-24: Shell size 16 - 24 contacts #20

Contact type:
S: Socket (only Female contacts on junction box receptacles)

Orientation:
N: Normal

Wiring code:
XX: Refer to table p. 39

Wiring type:
A: EPR or PK4CZ(qualification pending)

Wiring length:
XX: in cm, refer to p. 21

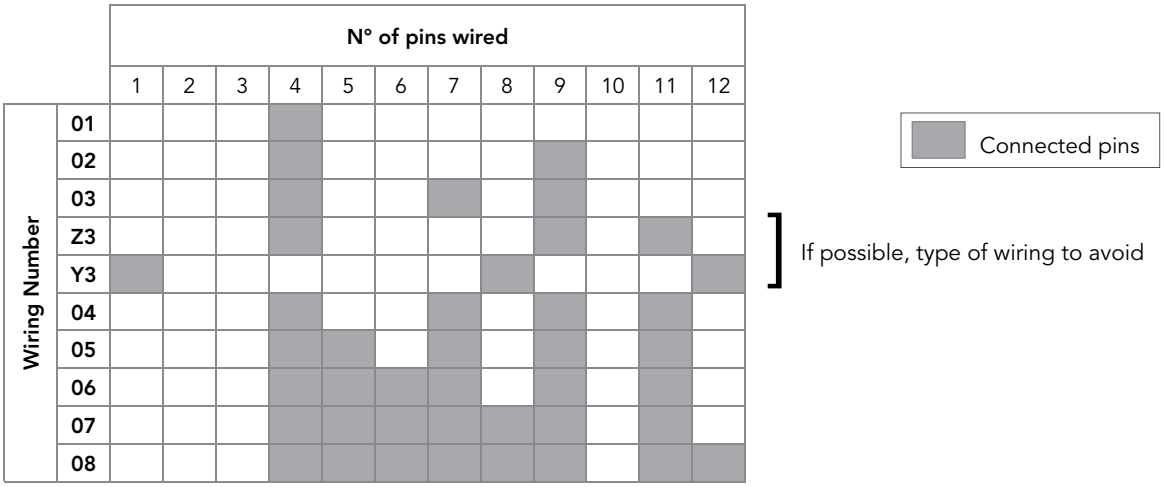
Specification:
C: Compounded

Qualification file: A

Wiring tables

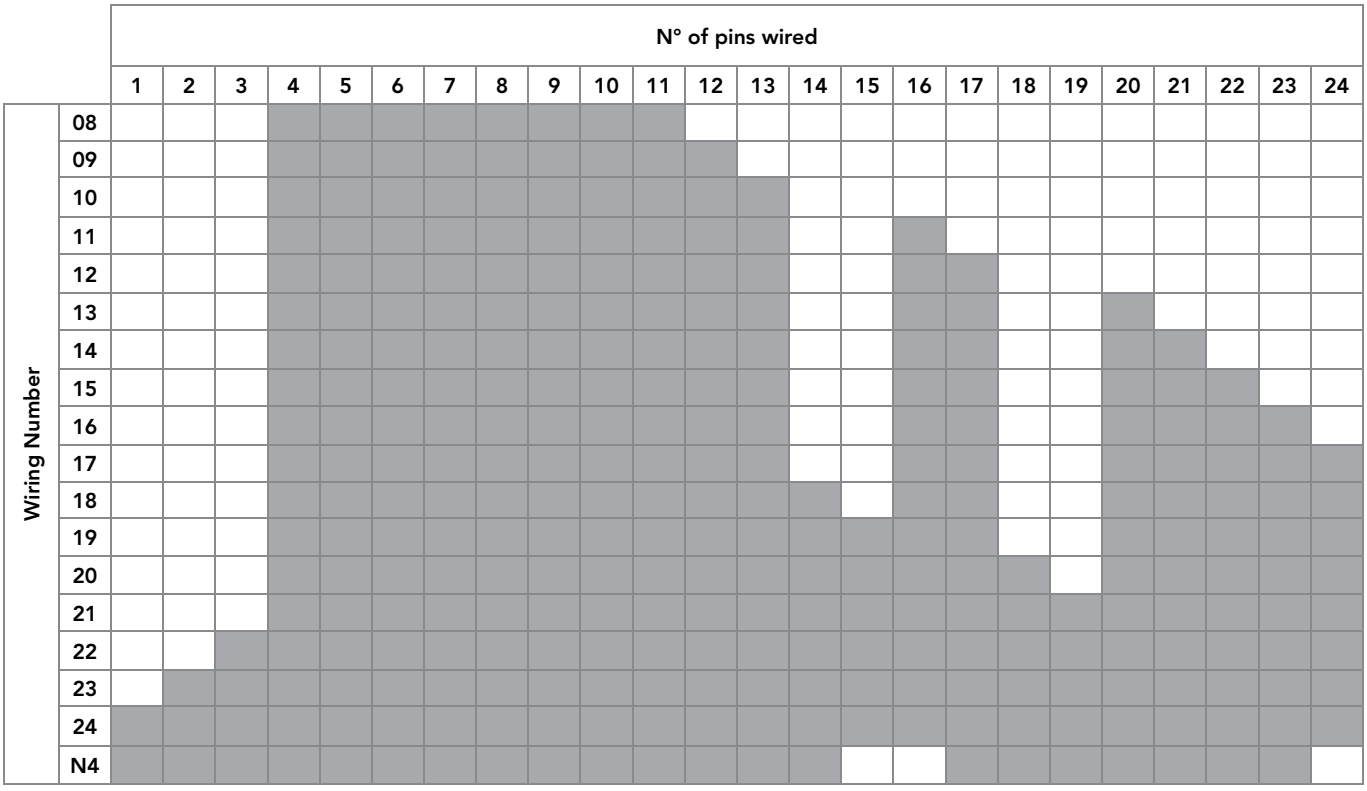
8NA 12-12

Please follow the proposed wiring tables to ensure continuity between receptacles and cable plugs.



Note: For spare connection links, the 8 wires version (wiring N°08) allows interchangeability (except for Y3)

8NA 16-24



Note: For spare connection links, the 24 wires version (wiring N°24) allows interchangeability

Description

- Class 1E LOCA qualified
- For use with 8NA Series connectors
- Up to 6 connections on one box to distribute signals
- **Qualification standards:**
  - RCC-E 1993 & 2002

Applications

- Power plant safety equipment
- Instrumentation, sensors, probes
- Control systems

Technical features

Materials & plating

- **Materials:** Stainless steel, Passivated

Environmental

- **Temperature range:**
  - 40°C to +85°C (-40°F to +185°F)
- **Temperature peak:** +160°C (+320°F)
- **Radiation:**
  85 MRads "gamma" at +70°C (+158°F)

Sizes & configurations

- **3 Sizes available:**
  Sizes 2 & 4:
  Compatible with 8NA 12-12 connectors
  Size 3:
  Compatible with 8NA 16-24 connectors
- **Configurations:**
  A total of 14 different boxes references with input and output made of 8NA 3G receptacles and cable clamps.
  2 optional cable clamps:
  - Standard
  - With bonding and shielding continuity

Accident testing

- **Shocks:**
  Operating Basis Earthquake (OBE): 2g ZPA
  Safe Shutdown Earthquake (SSE): 4g ZP
- **Vibration (Sine):** 10g, 58 to 500Hz, 3x2 hrs

Cable clamp details

Standard cable clamps

Junction boxes are delivered with standard cable clamps
The cable clamps maintain the cables into position.
The various boxes available can receive up to 5 K1 cables mounted with standard cable clamps.

- Maximal admissible cable diameters vary from 15 to 29mm.
- Minimal admissible cable diameters vary from 7 to 20mm.

Refer to the next pages for more details.

Cable clamp with bonding and shielding continuity

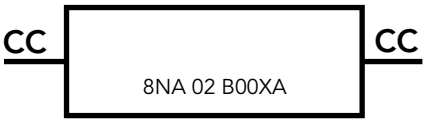
Optional premium cable clamp
These cable clamp ensures 360° bonding and shielding continuity between the K1 cables entering the box and the box itself. It also maintains the cable into position.

Mandatory for new EPR projects.
Compliant with CST cabling 74C030.02

LOCA, K1 qualified according to RCC-E 2005

Available configuration & cable diameters

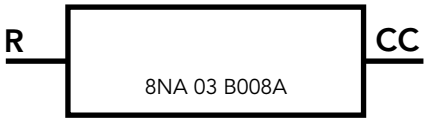
Size 2 box details - 8NA 12-12 & 12-03 connectors



R = Receptacle
CC = Cable clamp

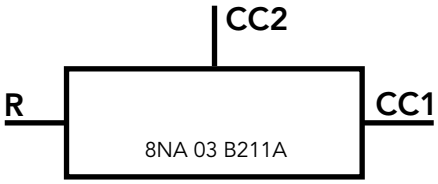
Box reference	Cable Clamp - Cable diameters range	
	Ø min.	Ø max.
8NA 02 B007A	7.00	15.00
8NA 02 B006A	14.00	20.00
8NA 02 B008A	20.00	27.00

Size 3 box details - 8NA 16-10 & 16-24 connectors



R = Receptacle
CC = Cable clamp

Box reference	Cable Clamp - Cable diameters range	
	Ø min.	Ø max.
8NA 03 B008A	20.00	27.00

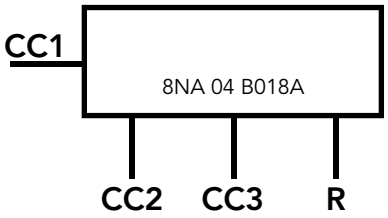


Box reference	Cable Clamp - Cable diameters range			
	CC1		CC2	
	Ø min.	Ø max.	Ø min.	Ø max.
8NA 03 B211A	14.00	20.00	20.00	27.00

Note: all dimensions are in mm

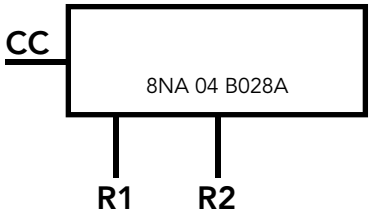
Available configuration & cable diameters

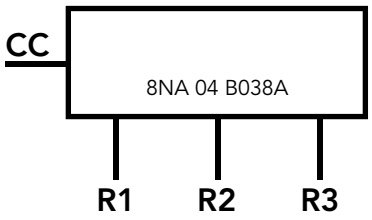
Size 4 box details - 8NA 12-12 & 12-03 connectors



R = Receptacle
CC = Cable clamp

Box reference	Cable Clamp - Cable diameters range			
	CC1		CC2/CC3	
	Ø min.	Ø max.	Ø min.	Ø max.
8NA 04 B018A	20.00	27.00	7.00	15.00



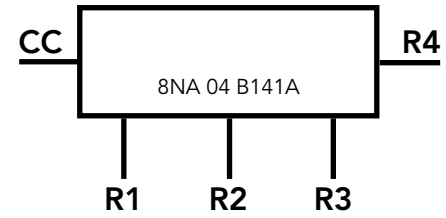


Box reference	Cable Clamp - Cable diameters range	
	Ø min.	Ø max.
8NA 04 B028A	20.00	27.00
8NA 04 B038A		

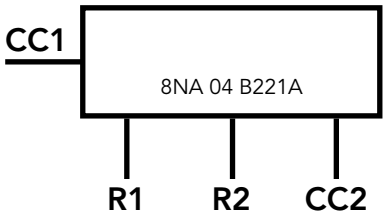
Note: all dimensions are in mm

Available configuration & cable diameters

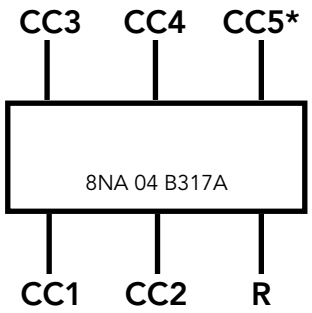
Size 4 box details - 8NA 12-12 & 12-03 connectors



R = Receptacle
CC = Cable clamp



Box reference	Cable clamp - cable diameters range (CC1/CC2)	
	Ø min.	Ø max.
8NA 04 B141A	20.00	29.00
8NA 04 B221A		



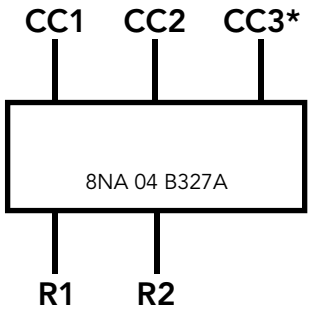
*CC5 supplied with cable clamp cap

Box reference	Cable clamp - cable diameters range			
	CC1/CC2		CC3/CC4/CC5	
	Ø min.	Ø max.	Ø min.	Ø max.
8NA 04 B317A	7.00	15.00	14.00	20.00

Note: all dimensions are in mm

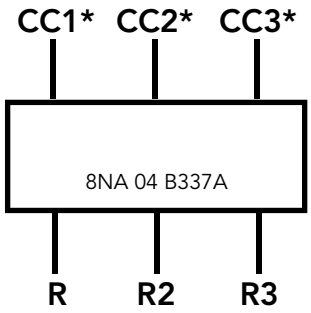
Available configuration & cable diameters

Size 4 box details - 8NA 12-12 & 12-03 connectors



R = Receptacle
CC = Cable clamp

* supplied with cable clamp cap

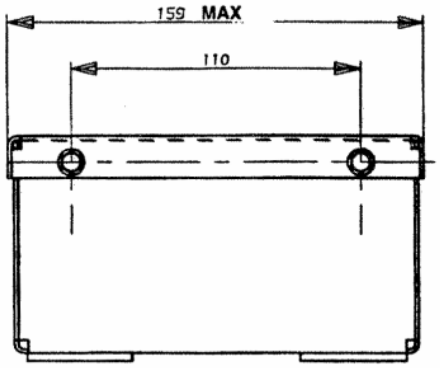


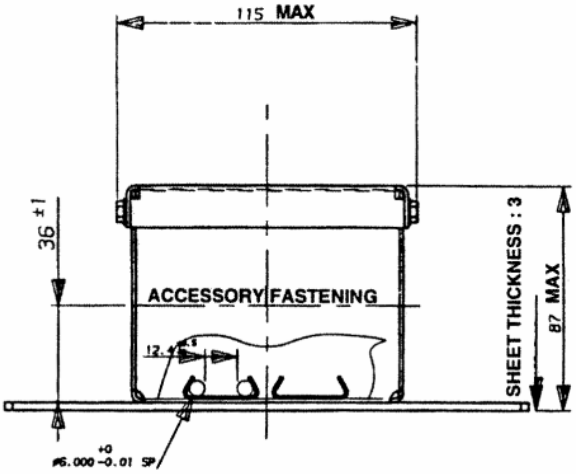
Box reference	CC1/CC2/CC3 - Cable clamp - cable diameters range	
	Ø min.	Ø max.
8NA 04 B327A	14.00	20.00
8NA 04 B337A		
8NA 04 B006A		

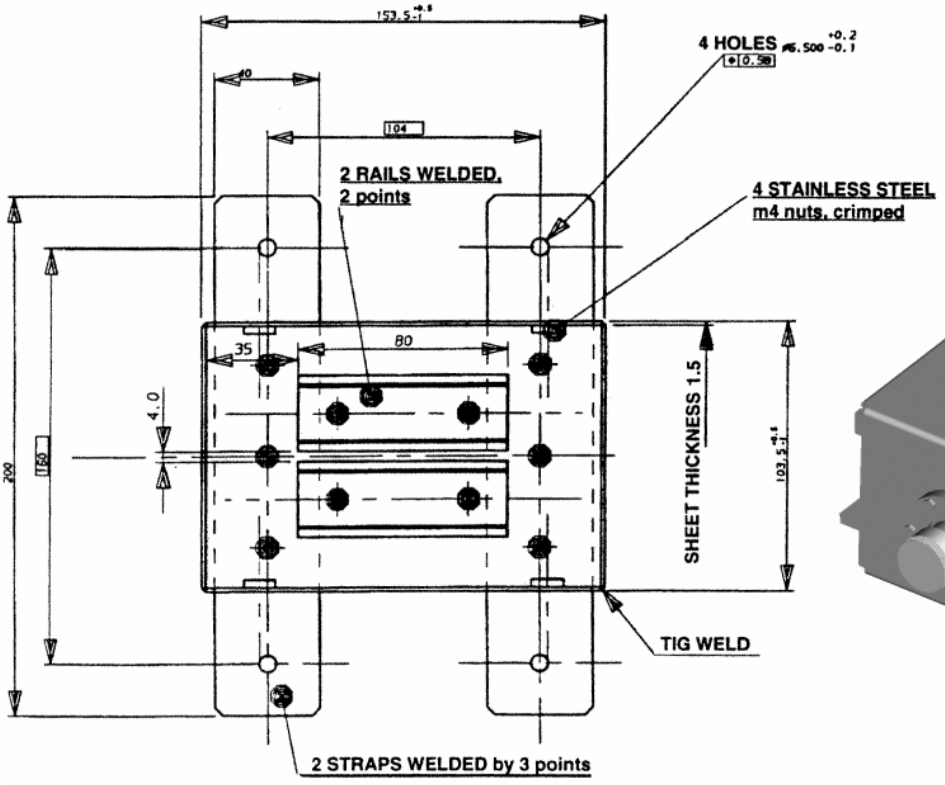
Note: all dimensions are in mm

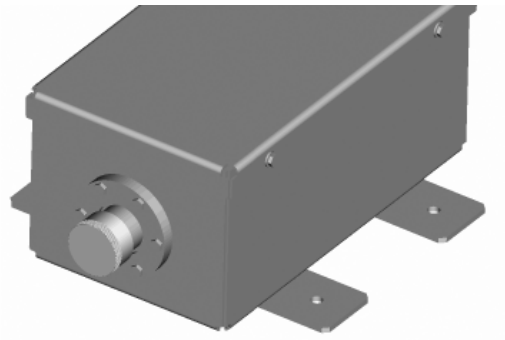
Junction boxes dimensions

Size 2 box dimensions





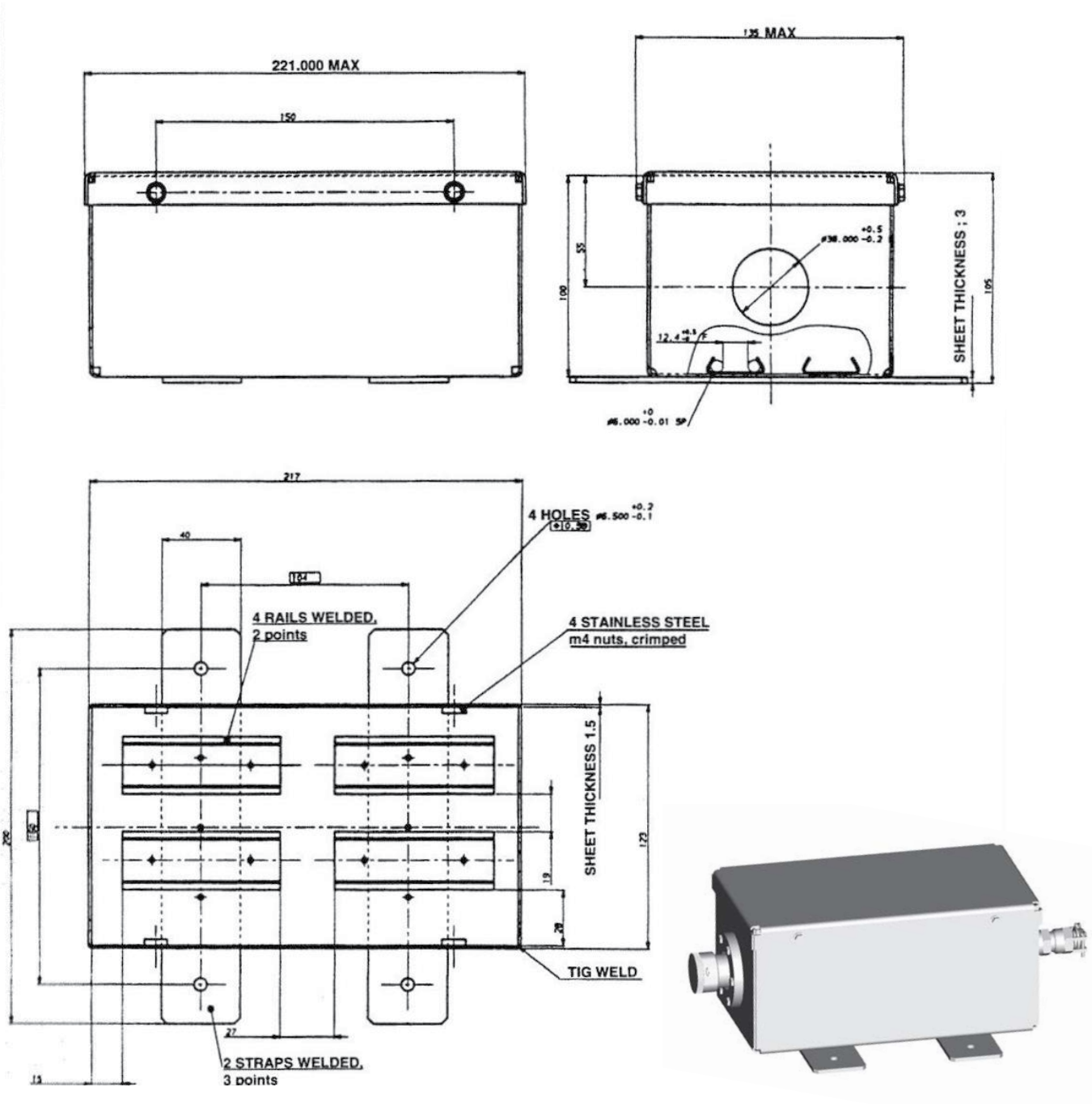




Note: all dimensions are in mm

Junction boxes dimensions

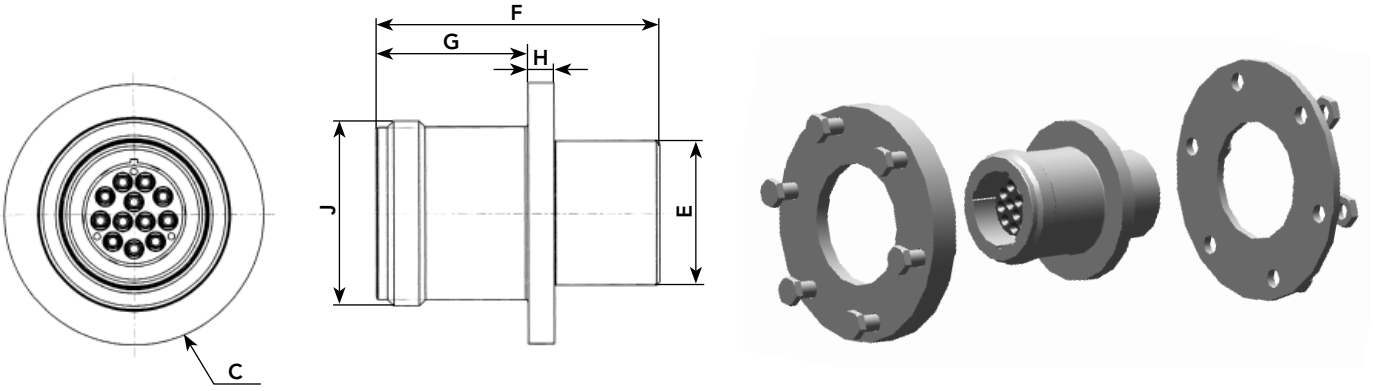
Size 3 & 4 box dimensions



Note: all dimensions are in mm

Receptacle details

3G type receptacle

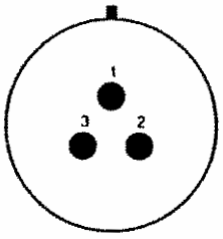
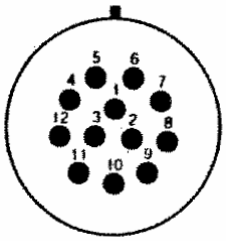
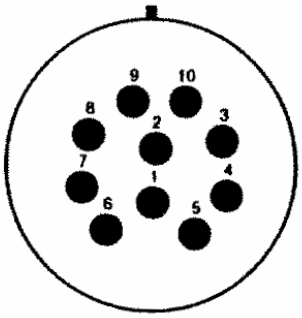
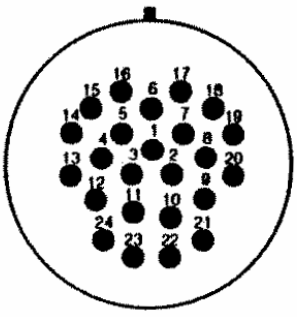


Contact layout	C 0/- 0.3	Ø E ± 0.2	F ± 0.2	G ± 0.2	H ± 0.1	Ø J max.
12-03 12-12	38.00	21.00	41.60	22.30	3.80	26.98
16-10 16-24	52.00	30.00	43.10	23.80	3.80	36.50

3G receptacles are to be ordered separately from the junction box. They are assembled (refer to picture above) with 6 bolts using the flange(s) supplied with the receptacles.

Note: all dimensions are in mm

Contact layouts

8NA 12-03 *	8NA 12-12	8NA 16-10 *	8NA 16-24
			
03 contacts # 16	12 contacts # 20	10 contacts # 16	24 contacts # 20

***** 8NA 12-03 and 8NA 16-10 layout s are designed according to Class 1E LOCA equipment requirements. Qualification pending.

Ordering information

Receptacles to be mounted on junction boxes

BASIC SERIES	8NA	3G	12-12	S	N	08	A	30	C	A

Receptacle type:
3G: Sealed, Round Flanged (See page 48)

Contact layout:
12-03: Shell size 12 - 03 contacts #16
12-12: Shell size 12 - 12 contacts #20
16-10: Shell size 16 - 10 contacts #16
16-24: Shell size 16 - 24 contacts #20

Contact type:
S: Socket (only Female contacts on junction box receptacles)

Orientation:
N: Normal

Wiring code:
XX: refer to table page 50

Wiring type:
A: EPR or PK4CZ(qualification pending)

Wiring length:
XX: in cm, refer to page 21

Specification:
C: compounded

Qualification file: A

Junction boxes

Box sizes	Box ref.	Number of 3G receptacles positions available	Number of cable clamps available	For 8NA 12-03 & 12-12 connectors	For 8NA 16-10 & 16-24 connectors
Size 2	8NA 02 B007A	1	1	YES	-
	8NA 02 B006A	1	1	YES	-
	8NA 02 B008A	1	1	YES	-
Size 3	8NA 03 B008A	1	1	-	YES
	8NA 03 B211A	1	2	-	YES
Size 4	8NA 04 B018A	1	3	YES	-
	8NA 04 B028A	2	1	YES	-
	8NA 04 B038A	3	1	YES	-
	8NA 04 B141A	4	1	YES	-
	8NA 04 B221A	2	2	YES	-
	8NA 04 B317A	1	5	YES	-
	8NA 04 B327A	2	3	YES	-
	8NA 04 B337A	3	3	YES	-
	8NA 04 B006A	1	1	YES	-

Wiring tables

8NA 12-12

Please follow the proposed wiring tables to ensure continuity between receptacles and cable plugs.

Wiring Number	N° of pins wired											
	1	2	3	4	5	6	7	8	9	10	11	12
01				■								
02				■					■			
03				■			■		■			
Z3				■					■		■	
Y3	■							■				■
04				■			■		■		■	
05				■	■		■		■		■	
06				■	■	■	■		■		■	
07				■	■	■	■	■	■		■	
08				■	■	■	■	■	■		■	■

■ Connected pins

] If possible, type of wiring to avoid

Note: For spare connection links, the 8 wires version (wiring N°08) allows interchangeability (except for Y3)

8NA 16-24

Wiring Number	N° of pins wired																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
08				■	■	■	■	■	■	■	■													
09				■	■	■	■	■	■	■	■	■												
10				■	■	■	■	■	■	■	■	■	■											
11				■	■	■	■	■	■	■	■	■	■			■								
12				■	■	■	■	■	■	■	■	■	■			■	■							
13				■	■	■	■	■	■	■	■	■	■			■	■			■				
14				■	■	■	■	■	■	■	■	■	■			■	■			■	■			
15				■	■	■	■	■	■	■	■	■	■			■	■			■	■	■		
16				■	■	■	■	■	■	■	■	■	■			■	■			■	■	■	■	
17				■	■	■	■	■	■	■	■	■	■			■	■			■	■	■	■	■
18				■	■	■	■	■	■	■	■	■	■	■		■	■			■	■	■	■	■
19				■	■	■	■	■	■	■	■	■	■	■	■	■	■			■	■	■	■	■
20				■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■	■	■	■	■
21				■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
22			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
23		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
24	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
N4	■	■	■	■	■	■	■	■	■	■	■	■	■	■			■	■	■	■	■	■	■	

Note: For spare connection links, the 24 wires version (wiring N°24) allows interchangeability

Notes

NUCLEAR
POWER GENERATION

Nuclear Power Generation

8NA Series Cabled Field Plugs

Description

- Class 1E LOCA connectors
- Quick connect hexagonal nut screw coupling
- Intermateable with existing 8NA receptacles
- **Qualification standards:**
  - RCC-E 2005
  - I-EEE 323, 344, 382, 572 **(pending)**

Applications

- Power Plant Safety equipment
- Instrumentation, sensors, probes
- Control systems

Technical features

Electrical

- **Contacts:** #16 & #20
- **Wires section:** 0.93mm² max
- **Wires insulation:** PEEK
- **Current rating:** 6 A
- **Test Voltage rating:** 1500 Vrms, 50Hz, 1min
- **Insulation Resistance:** ≥ 1000 M under 500 Vdc
- **Contact resistance:** ≤ 3 m
- **Shell sizes & Contact Layouts:** 12-03; 12-12; 16-10

Mechanical

- **Coupling nut tightening torque:** 5 daN.m
- **Endurance:** 50 mating/unmating

Environmental

- **Temperature range:** - 40°C to +85°C (-40°F to +185°F)
- **Temperature peak:** +160°C (+320°F)
- **Radiation:** 85 MRads "gamma" at +70°C (+158°F)

Accident testing

- **Shocks:** Operating Basis Earthquake (OBE): 3g ZPA Safe Shutdown Earthquake (SSE): 6g ZPA
- **Vibration (Sine):** 3g, 58 to 500Hz, 3 axes, 20 cycles

Materials & plating	Connector part			
	Shells	Insulator	Seals	Contacts
Material	Stainless steel	Thermoset or Fused glass	Stainless steel	Copper alloy
Plating	Passivated	-	-	Gold over nickel

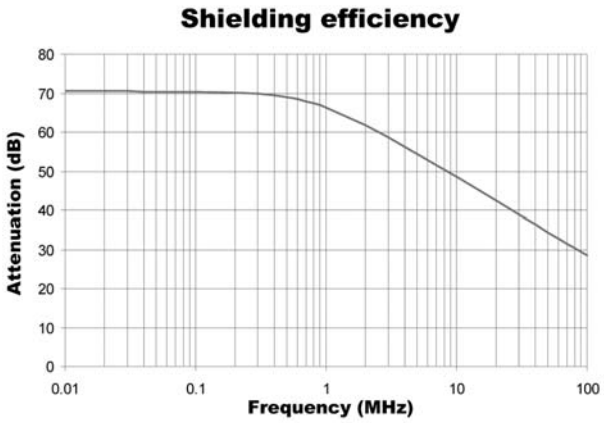
Features & benefits

Cabled field plug - Shielded connector

Shielded connector

The 8NA cabled field plug answers the shielding continuity required for the new EPR projects. It is equipped with a shielding collet that clamps the cable braid and ensures a 360° continuity. Thus high performances are achieved:

- Enhanced shielding efficiency over a wide frequency range.
- Reduced shell to shell resistance to less than 20mΩ.



Cabled field plug - A robust cable clamp

Robust cable clamp:

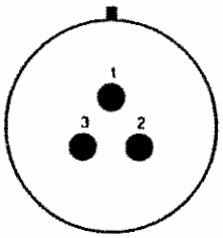
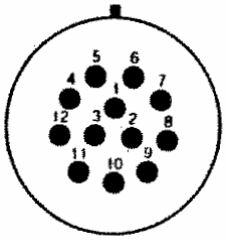
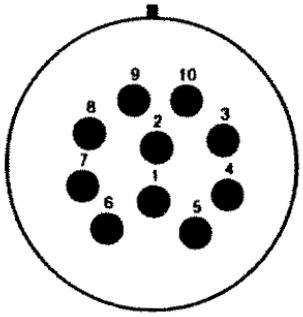
The plug is also equipped with a robust cable clamp. A ring covers the clamp to ensure the operator safety. This system guarantees an outstanding reliability of the cable to plug connection. It can withstand a 10daN pulling force and 5N.m torsion load.

Intermateable with existing 8NA receptacles

One single coupling pattern for the whole 8NA range!

For maintenance purposes, this new 8NA cable field plugs are 100% inter-matable with existing 8NA receptacles. When required a cable field plug can replace an interconnection system made of a 2 plug jumper and a junction box.

Contact layouts

8NA 12-03*	8NA 12-12	8NA 16-10*
		
03 contacts # 16	12 contacts # 20	10 contacts # 16

* 8NA 12-03 and 8NA 16-10 layout s are designed according to Class 1E LOCA equipment requirements. Qualification pending

Receptacle details

Receptacles overview

In order to match every type of applications, SOURIAU offers 4 different receptacle versions:

Receptacle type	Sealing/Hermeticity	Assembly	Application	Contacts layouts
2G	Sealed (compounded)	screwed	On sensor or actuator	12-03; 12-12; 16-10
4G		screwed	On sensor or actuator	12-03*; 12-12
1Y	Hermetic (Fused glass)	brazed		
2Y		screwed		

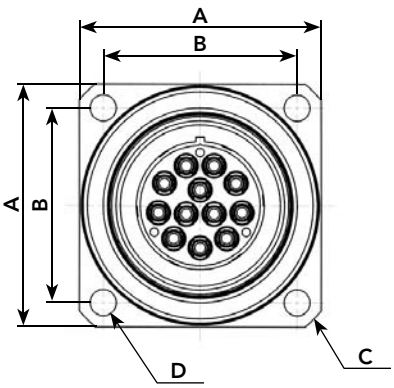
* 8NA 12-03 hermetic receptacle is designed according to Class 1E LOCA equipment requirements. Not qualified

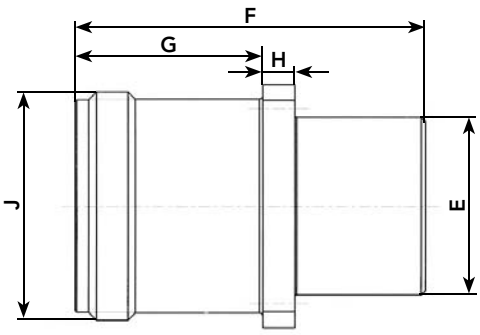
Contact layout	Standard cable length in cm
12-03	30
12-12	50
16-10	100

Note: receptacles are delivered with metal protection caps

Receptacle details

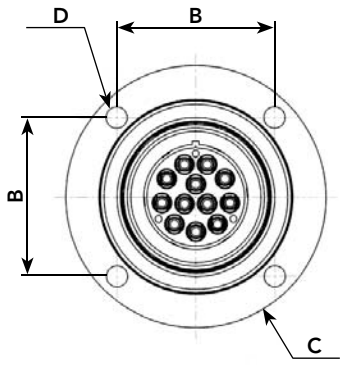
2G type receptacle

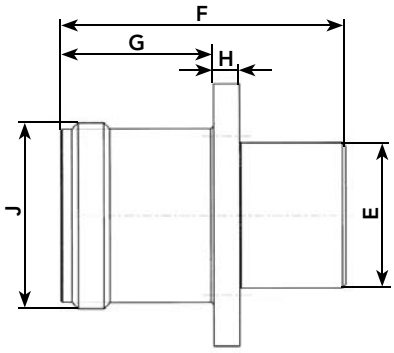




Contact layout	A ± 0.3	B	C 0/- 0.3	4 holes Ø D 0/+ 0.1	Ø E ± 0.2	F ± 0.2	G ± 0.2	H ± 0.1	Ø J max.
12-03 12-12	28.70	23.00	38.00	3.10	21.00	41.60	22.30	3.80	26.98
16-10 16-24	40.00	31.75	52.00	3.35	30.00	43.10	23.80	3.80	36.50

4G type receptacle



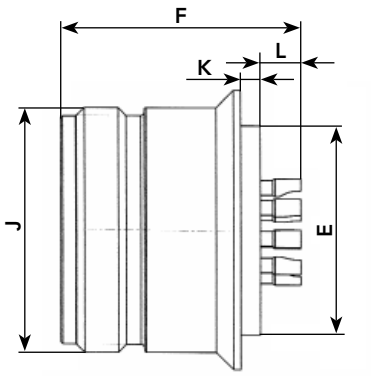


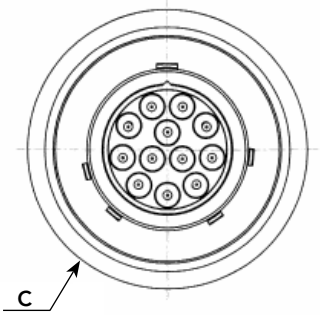
Contact layout	B	C 0/- 0.3	4 holes Ø D 0/+ 0.1	Ø E ± 0.2	F ± 0.2	G ± 0.2	H ± 0.1	Ø J max.
12-03 12-12	23.00	38.00	3.10	21.00	41.60	22.30	3.80	26.98

Note: all dimensions are in mm

Receptacle details

1Y type receptacle (Fused glass insulator)

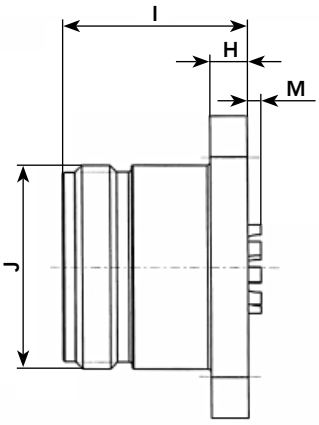


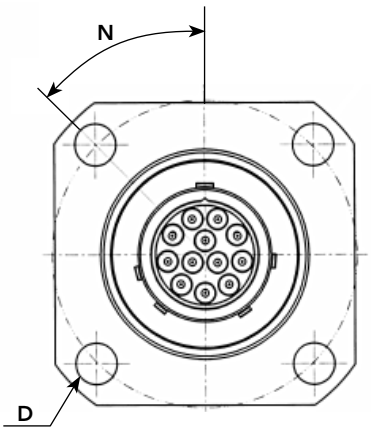


Applies to pressure transmitter, RTD, probes which require a high degree of hermeticity (10^{-8} atm.cm^3/s)

Contact layout	C +/- 0.12	Ø E ± 0.1	F max.	Ø J max.	K ± 0.15	L ± 0.45
12-03 12-12	30.80	22.90	26	26.98	2.20	4.00

2Y type receptacle (Fused glass insulator)





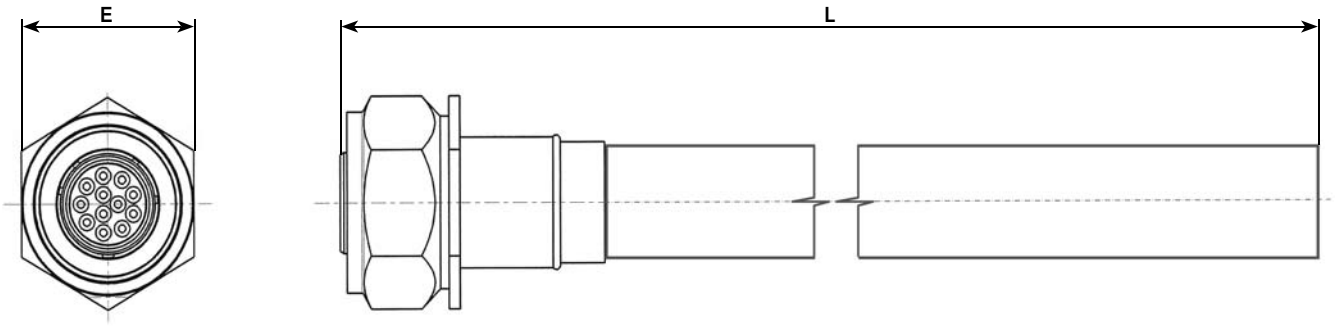
Applies to pressure transmitter, RTD, probes which require a high degree of hermeticity (10^{-8} atm.cm^3/s)

Contact layout	4 holes Ø D at 90° on Ø 41	N	I + 0.1	Ø J max.	H ± 0.1	M - 0.85
12-03 12-12	5.5	45°	24.75	26.98	5.00	1.70

Note: all dimensions are in mm

Cabled field plug details

Cable plug



Contact layout	E ± 0.3 (mm)	L
12-03 **12-12**	32.00	To be specified from x to Xcm (refer to table hereunder for standard length)
16-10	41.00	

Contact layout	Standard cable length (L) in cm
12-03 **12-12** **16-10**	100 200 300 500 1000

Cable details:

The 8NA cabled field plugs are factory equipped with PRYSMIAN or NEXANS cables answering the CST 74 C 068 00 requirements.
Cables main specifications:

- Conductor:
  - Plain copper
  - Circular
  - Temperatures: +90°C in continuous duty and +250°C in short duty
- Insulation: XLPE
- Cores identified from 1 to X

Note: plugs are delivered with metal protection caps

Ordering information

Receptacles

Basic Series	8NA	1Y	12-12	P	N	04	A	50	S	A	02

Receptacle type:
- **1Y:** Hermetic, Round Flange, to be welded
- **2Y:** Hermetic, Square Flange, screw mounted
- **2G:** Sealed, Square Flange, screw mounted
- **4G:** Sealed, Round Flange, screw mounted

Contact layout:
- **12-03:** Shell size 12 - 03 contacts #16
- **12-12:** Shell size 12 - 12 contacts #20
- **16-10:** Shell size 16 - 10 contacts #16

Contact type:
- **P:** Pin
- **S:** Socket

Orientation:
- **N:** Normal

Wiring code:
- **:** Not wired
- **XX:** refer to table page 62

Wire type:
- **:** Not wired
- **A:** EPR or PK4CZ(qualification pending)

Wire length:
- **00:** Not wired
- **XX:** length in cm – refer to table page 59

Specifications:
- **A:** not compounded
- **C:** compounded
- **S:** hermetic

Qualification file: A

Aditionnal specifications:
- **02:** for type 2Y only

Ordering information

Plug & cable

Basic Series	8NA6G	12-12	S	N	04	S	18	200	A

Shell size & Contact Layout:
- **12-03:** Shell size 12 - 03 contacts #16
- **12-12:** Shell size 12 - 12 contacts #20
- **16-10:** Shell size 16 - 10 contacts #16

Contact type:
- **P:** Pin
- **S:** Socket

Orientation:
- **N:** Normal

Wiring code:
- **XX:** refer to table page 62

Cable type:
- **S:** Shielded

Wire gage:
- **14*:** AWG #14 (Shell size 12-03 & 16-10)
- **16*:** AWG #16 (Shell size 12-03 & 16-10)
- **18:** AWG #18 (All shell sizes)
- **20:** AWG #20 (Shell size 12-12)

Cable plug length:
- **XX:** length in cm

Qualification file: A

*For these wire gage, qualification pending

Wiring tables

8NA 12-03

Please follow the proposed wiring tables to ensure continuity between receptacles and cable plugs.

Wiring number	N° of pins wired 1	2	3
01	■		
02	■	■	
03	■	■	■

■ Connected pins

8NA 12-12

Please follow the proposed wiring tables to ensure continuity between receptacles and cable plugs.

Wiring number	N° of pins wired 1	2	3	4	5	6	7	8	9	10	11	12
02				■					■			
03				■			■		■			
Z3				■					■		■	
Y3	■							■				■
07				■	■	■	■	■	■		■	
12	■	■	■	■	■	■	■	■	■	■	■	■

] If possible, type of wiring to avoid

	Standard offer
02	Wired with a 2 wire cable
03	Wired with a 3 wire cable
Z3	
Y3	
07	Wired with a 7 wire cable
12	Wired with a 12 wire cable

Note: For spare connection links, the 12 wires version (wiring N°12) allows interchangeability (except for Y3)

8NA 16-10

Please follow the proposed wiring tables to ensure continuity between receptacles and cable plugs.

Wiring number	N° of pins wired 1	2	3	4	5	6	7	8	9	10
01		■								
02		■					■			
03		■			■		■			
04		■			■		■		■	
05		■			■		■		■	
06		■	■	■	■		■		■	
07		■	■	■	■	■	■		■	
08		■	■	■	■	■	■		■	■
09		■	■	■	■	■	■	■	■	■
10	■	■	■	■	■	■	■	■	■	■

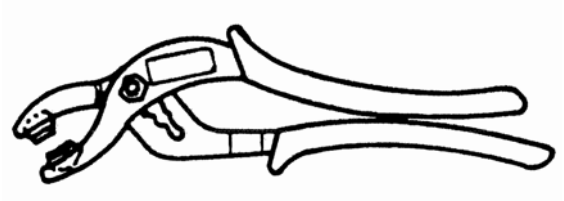
Tools

Extraction pliers for metal seals

Pliers equipped with plastic jaws for metal seal extraction.

Each time the connector is unmated, the metal seal between plug and receptacles must be changed to ensure a perfect sealing when mating again. This tool allows the operator to extract the metal seals easily and without damaging the connector.

Contact layout	Pliers P/N	Spare plastic jaws P/N
12-03 12-12	8341-91 EL	8341-94 EL
16-10 16-24		

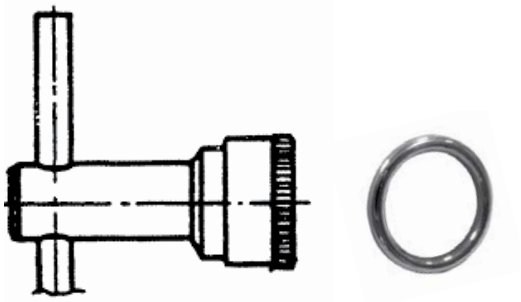


Metal seal mounting tool

Metal seal mooting tool

Each time the connector is unmated, the metal seal must be changed to ensure a perfect sealing when mating again. This tool allows the operator to mount the new metal seals easily and position it correctly on the connector plug.

Contact layout	Mounting tool	Spare metal seals
12-03 12-12	8341-5300 EL	3390 533 A EL
16-10 16-24	8341-5305 EL	3391 017 A EL



Spare parts

Metal caps

Spare metal caps for plugs and receptacles:

To protect the connectors faces when unmated

Contact layout	Spare metal cap for receptacle	Spare metal cap for plug
12-03 12-12	8341-5310 EL	8341-5311 EL
16-10 16-24	8341-5316 EL	8341-5317 EL

NUCLEAR
POWER GENERATION

8N45(S) Series - K2 Qualified Connectors

Shielded K2 qualified connectors

Non-Shielded K2 qualified connectors

Description

- Class 1E qualified connectors
- Quick connect ¼ turn bayonet coupling
- High shielding performances
- **Qualification standards:**
  - H-M2A-2007-01218-FR
  - RCC-E 2005

Applications

- Instrumentation, sensors, probes
- Mandatory for new EPR programs

Technical features

Electrical

- **Current rating:** 11 A max
- **Peak current:** 50A/30ms
- **Test voltage rating:** 2000 Vrms
- **Insulation resistance:** ≥ 5000 MΩ under 500 Vdc
- **Contact resistance:** 5 mΩ
- **Shielding resistance:** ≤ 20 mΩ

Mechanical

- **Mating/Unmating effort:** 0.12 daN.m
- **Endurance:** 500 mating/unmating
- **Cable clamp resistance:** Traction 100 N/ Torsion 0.5 Nm

Seism/Vibration

- **Seism:**
  - Operating Basis Earthquake (OBE): 3g ZPA
  - Safe Shutdown Earthquake (SSE): 6g ZPA
- **Vibration (Sine):** 10 to 500Hz

Environmental

- **Ambient temperature:**
  - 35°C to +70°C (-31°F to +140°F)
- **Ambient humidity:** 75% max.
- **Steam test:** +100°C (+212°F)/1bar/ 100% HR/100h (with Raychem sheath)
- **Cumulated radiation:** 250 kGy (25 MRads)/ +70°C (+158°F)
- **Dry heat test:** +40°C (+104°F)/93% HR/504h
- **Salt spray resistance:** 168h
- **Protection against water penetration:**
  - IP X6
  - IP 68

Materials & plating	Connector part			
	Shells	Insulator & grommet	Seals	Contacts
Material	Stainless steel	Silicon	Silicon	Copper alloy (Zinc/Lead)
Plating	Nickel (locally)	-	-	Gold over nickel

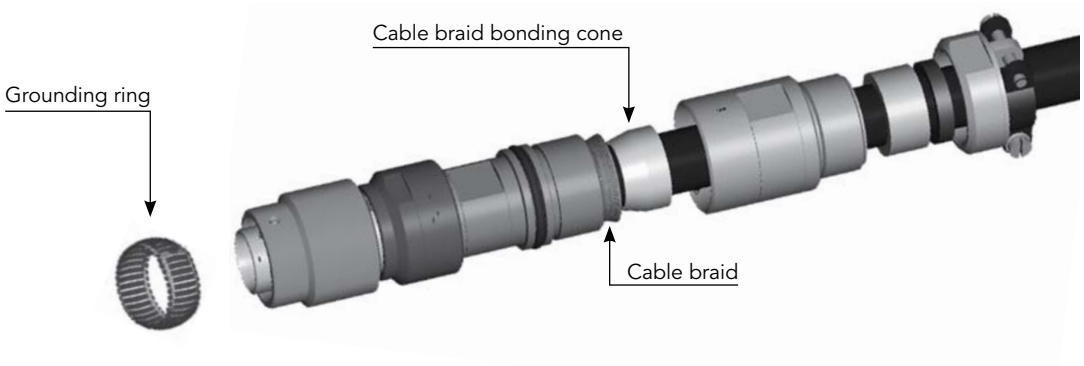
Features & benefits

Compliant with EPR wiring specification CST 74C030.02

Wiring specifications applicable for EPR program (CST 74C030.02) state new requirements for 360° shielding continuity at connector level.

8N45S Series meets these new requirements thanks to:

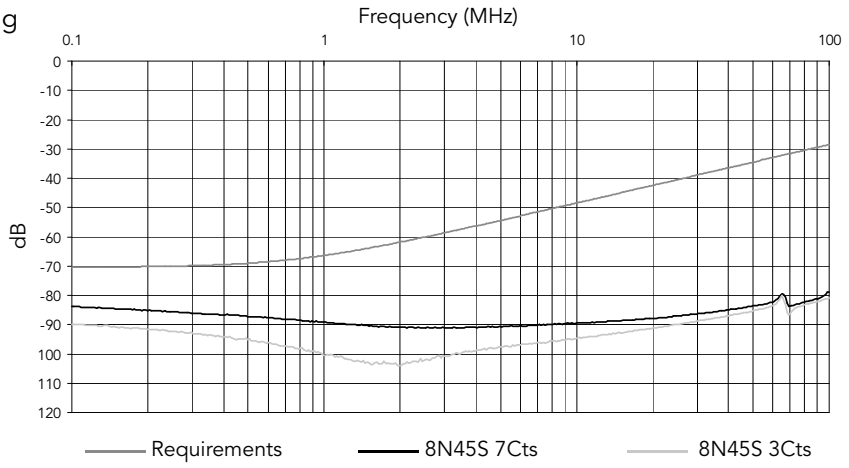
- **Bonding cone** integrated to the plug's backshell, that ensures perfect continuity between cable braid and connector shell.
- **Grounding ring** integrated into the plug's nose, that ensures perfect shell to shell continuity between plug and receptacle over 360°.



High performance shielding and ground continuity

Thanks to these new features, high shielding performances are achieved:

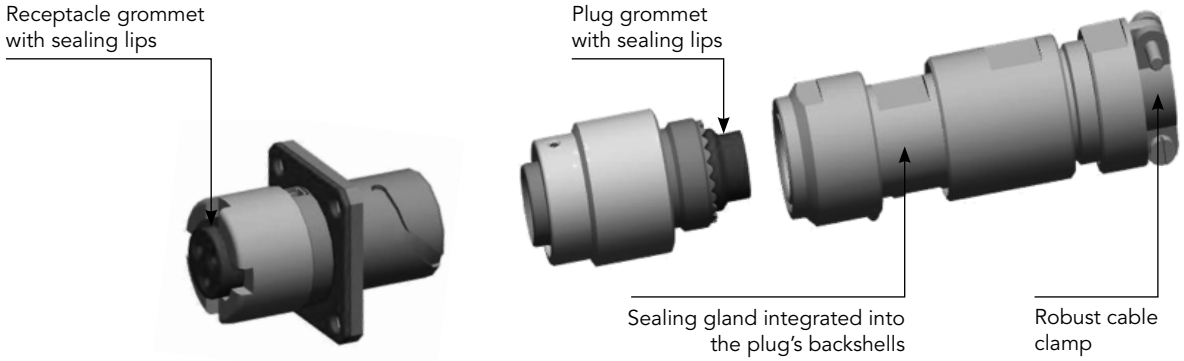
- **EMI/RFI protection** over a large frequency range
- **Reduced shell to shell resistance** to less than 20mΩ
- **Nickel plating** on receptacles ensures that those performances are maintained over time.



Features & benefits

High performance sealing and mechanical retention

- **True sealing on wires** is achieved thanks to grommets with sealing lips located at the rear of the insulators on both receptacle and plug nose.
- **Perfect sealing on cable jacket** is achieved thanks to compression of a pressure gland integrated into the plug's backhell.
- **True mechanical retention of cable** is achieved thanks to robust cable clamp located at the rear of the plug's backshell.



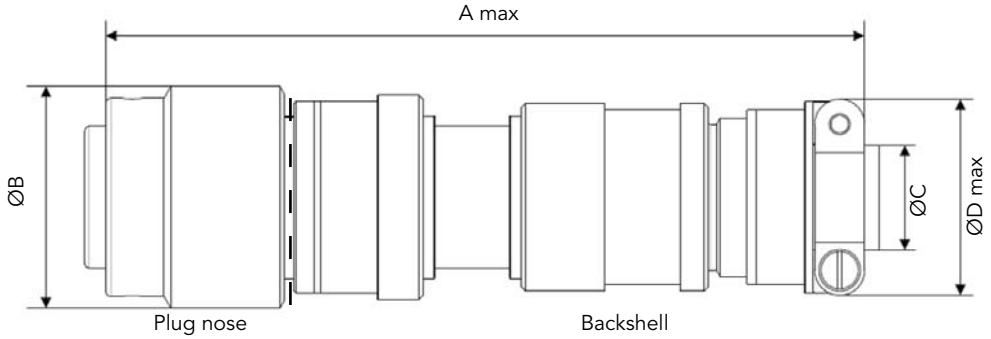
Easy wiring and installation

- **Safe contacts technology:** to avoid any risk of damaging the insulators when inserting the contacts.
- **Dismountable insulators:** to allow an easy replacement in case of bad wiring operation.
- **Smart backshell design with flats:** mounting without need for specific tooling nor dummy receptacles.
- **No need to install shrinkable sheath:** with dedicated equipment (thermogun), except for use in steam conditions.

Field plug characteristics

Dimensions and admissible cable diameters

8N45S Series field plugs have been especially designed for use with nuclear qualified shielded cables from Nexans and Prysmian used on EPR program.
The plugs comprise two separate elements: the plug nose that contains the insulator and the contacts, and the backshell that contains the cabling chamber with shielding continuity mechanism.
Several backshell sizes are available to fit all cable sizes, as show in the table below:



Shell size	Backshell type	Ø C		Max. number of wired contacts	A max.	Ø B	Ø D max.
		min.	max.				
1	30	7.50	9.00	3	95	23.00	23.20
	31	9.00	10.40				
	301*	7.50	9.00				
		9.00	10.40				
	32	10.50	12.20				
2	30	7.50	9.00	4		27.00	
	31	9.00	10.40				
	301*	7.50	9.00				
		9.00	10.40				
	32	10.50	12.20	7			
	70	8.50	11.00				24.70
	71	11.00	12.30				
	72	12.40	14.00				
	712*	11.00	12.30				
		12.40	14.00				
	73**	13.40	15.00				N/A
	74**	14.80	16.40				

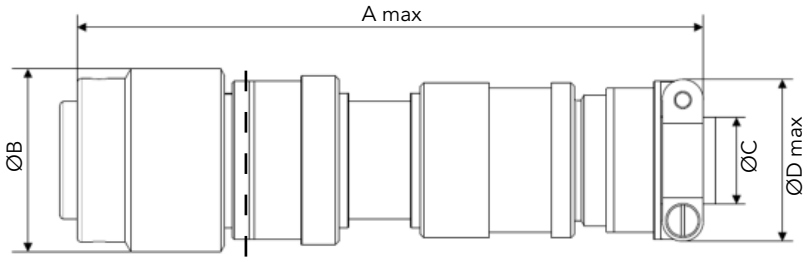
***** P/N delivered with a set of two sealing glands and compression rings.
****** New backshell sizes. Qualification pending.

Note: all dimensions are in mm

Field plug characteristics

Dimensions and admissible cable diameters

Several backshell sizes are available to fit all cable sizes, as show in the table below:



Shell size	Ø C 1/10		Max. number of wired contacts	A max.	Ø B	Ø C
	min	max				
3	110	125	12	129	37	34
	125	140				
	140	155				
	155	170				
	170	185				
4	115	130	7	129	42	34
	130	145				
	145	160				
	160	175				
	175	190				
	190	205				
	205	220				
5	190	205	37	129	54	50
	205	220				
	220	235				
	235	255*				
	255	270				
	270	285				
	285	300				
	300	315				
6	210	225	31	129	68	47
	225	240				
	240	255				
	255	270				

Example part number:
If you have a cable with 8 wires, Ø from 13.1 to 15.4mm, choose:

8N45S 31 85 B 125 155

- 8N45S: Product Series
- 31: Shell size & Contact layout (see p.77)
- 85: Plug
- B: Backshell
- 125: Min. diameter required, choose from ØC min. (table above)
- 155: Max. diameter required, choose from ØC max. (table above)

Contact type (see p.78)

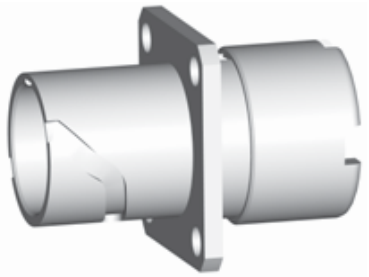
***** 2 Sealing glands
Note: For other shell sizes backshell, please consult us

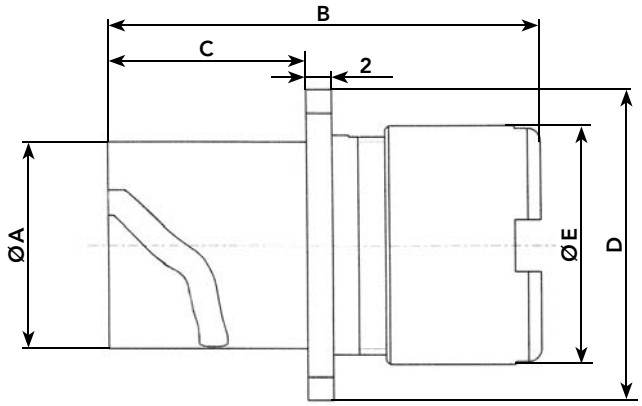
Note: all dimensions are in mm

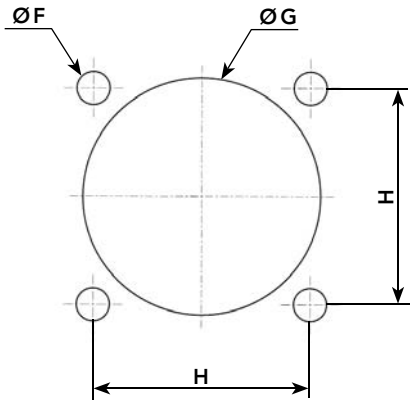
Receptacle characteristics

Square flange receptacle

2 types of receptacle backshells are available:
- Simple backnut (represented & described hereunder)
- Straight with cable clamp and sealing gland (refer to plug description on p. 69)





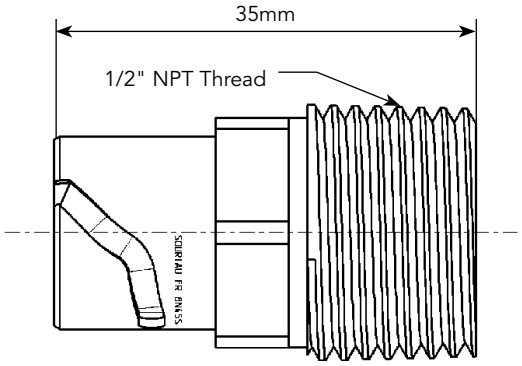


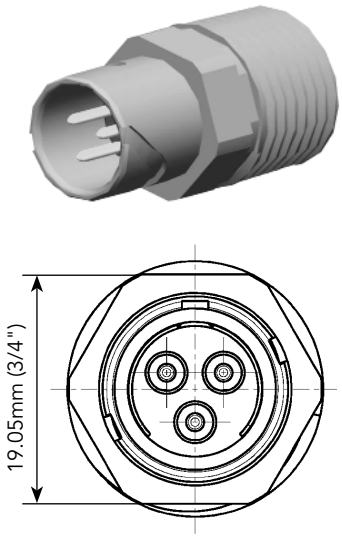
Shell size	Ø A	B	C	D	Ø E	Ø F	Ø G	H
1	16.00	33.50	15.40	24.00	18.60	3.2	19.00	18.00
2	20.00	33.50	15.40	27.00	22.60	3.2	23.00	21.00
3	26.00	33.5	16.00	31.00	27.50	3.2	28.00	25.00
4	31.00	33.50	15.50	44.00	33.50	4.5	34.00	35.00
5	43.00	46.5	16.50	54.00	45.00	5.5	45.50	43.00
6	57.00	46.5	15.50	66.00	59.00	5.5	59.50	53.00

Note: all dimensions are in mm

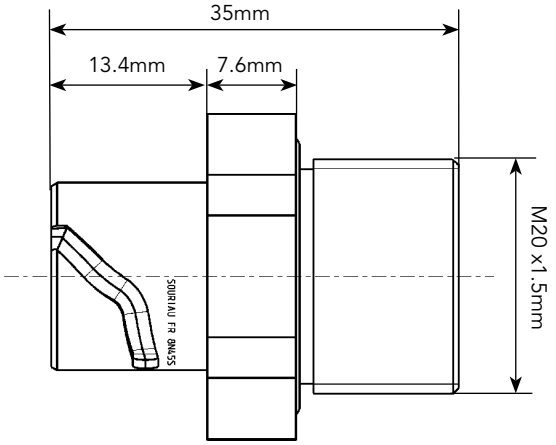
Receptacle characteristics

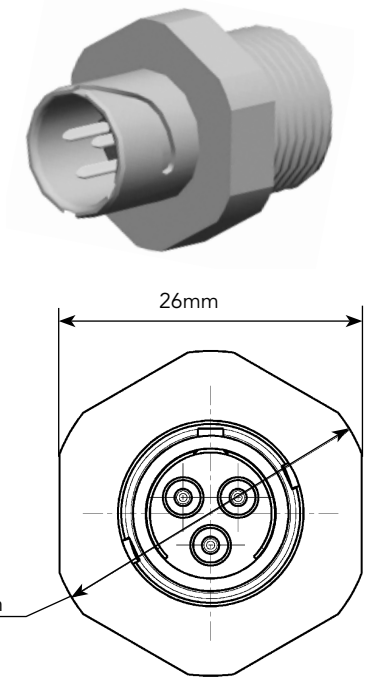
½"NPT receptacle (shell size 1 only)





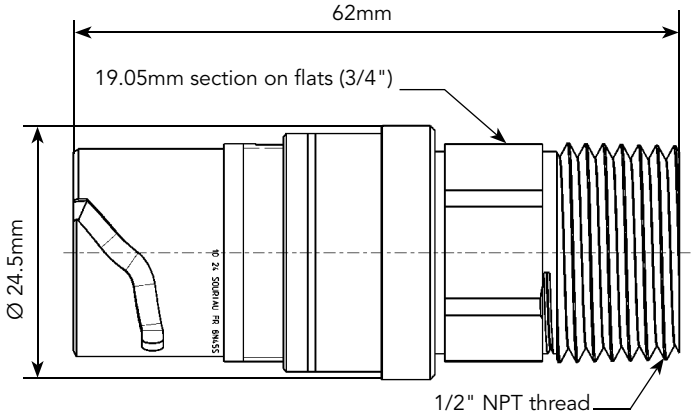
M20 receptacle (shell size 1 only)

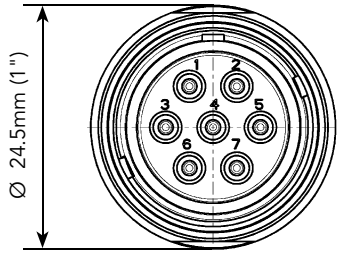




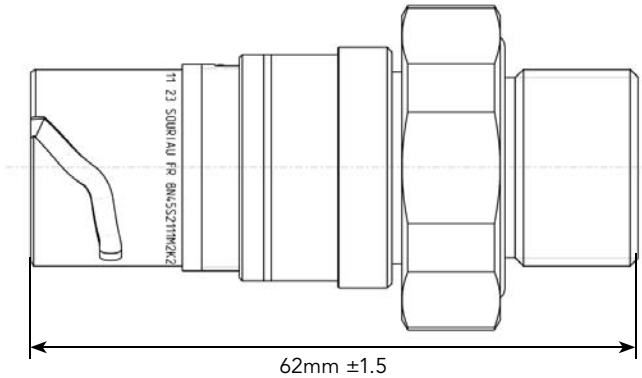
Receptacle characteristics

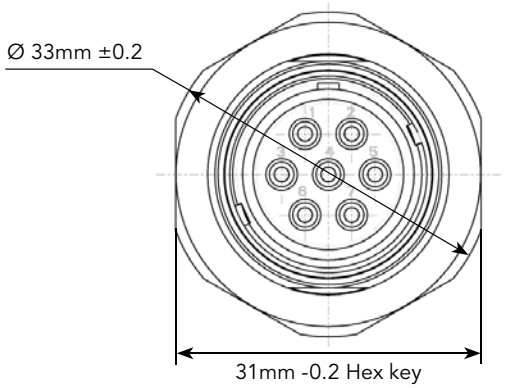
½" NPT adaptor receptacle (shell size 2 only)





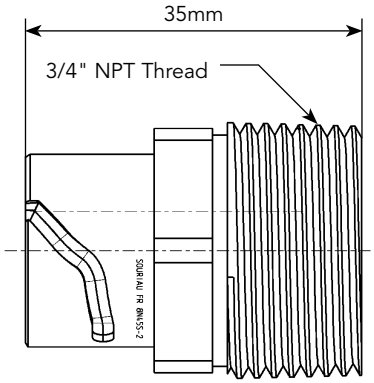
M 20 adaptor (shell size 2 only)

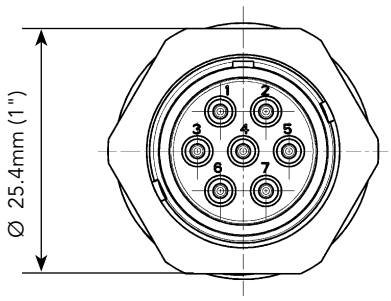




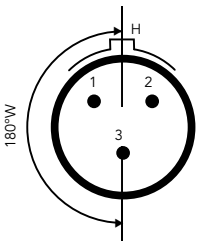
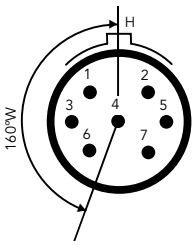
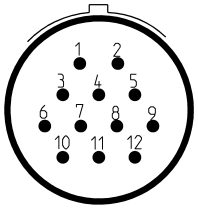
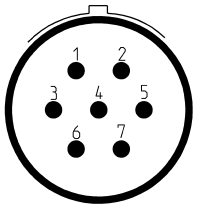
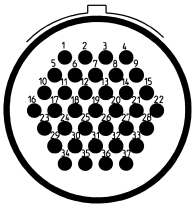
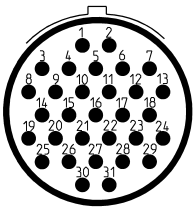
Receptacle characteristics

¾”NPT receptacle (shell size 2 only)





Contact layouts

Shell sizes and contact layouts					
Shell size 1	**Shell size 2**	**Shell size 3**	**Shell size 4**	**Shell size 5**	**Shell size 6**
					
3 contacts Ø 1.5mm	7 contacts Ø 1.5mm	12 contacts Ø 1.5mm	7 contacts Ø 2.4mm	37 contacts Ø 1.5mm	31 contacts Ø 2.4mm

Contact characteristics

Admissible wire sections and sleeving diameters

Shell size	Contact type	Admissible wire section min./max. (mm²)	Admissible sleeving diameters (mm)
1, 2, 3 & 5	Ø 1.5mm small barrel	0.38/0.93	1.9/3.3
	Ø 1.5mm Large barrel	0.93/1.91	1.9/3.3
4 & 6	Ø 2.4mm	1.91/3.18	2.7/3.7

Ordering informations

Basic Series	8N45S	11	1	1	25	_	_	_	_	K2

Shell size/Contact layout
- **11:** Shell Size 1, 3 contacts Ø1.5mm
- **21:** Shell Size 2, 7 contacts Ø1.5mm
- **31* :** Shell size 3, 12 contacts Ø 1.5mm
- **47** :** Shell size 4, 7 contacts Ø 2.4mm
- **51* :** Shell size 5, 37 contacts Ø 1.5mm
- **65** :** Shell size 6, 31 contacts Ø 2.4mm

Shell type:
- **1:** Receptacle
- **8:** Plug

Contact type:
- **1:** Male, Large Barrel
- **2:** Male, Small Barrel
- **5:** Female, Large Barrel
- **6:** Female, Small Barrel

Backshell/Interface type:
- **25:** Simple backnut (receptacles only)
- **M2:** M20 Interface (receptacle size 1 only or M20 adaptor (receptcle size 2 only)
- **05:** 1/2" NPT Interface (receptacle size 1 only) or 1/2" NPT adaptor (receptacle size 2 only)
- **07:** 3/4" NPT Interface (receptacle size 2 only)
- **15:** Cable clamp Ø12mm (receptacle size 2 only)
- **XX:** Straight backshell (shell size 1 & 2 only) see definition table p.69
- **B XXX XXX:** Straight backshell (shell size 3 to 6) see definition table p.70

Wiring code:
- **Blank:** not wired
- **XX:** egal to the maximum number of contacts in the layout (**e.g.: 03** for size 1, 07 for size 2...)

Wire type:
- **Blank:** not wired
- **A:** PK4CZ

For other wire type, please consult us.

Wire gage:
- **Blank:** not wired
- **18:** AWG #18

For other wire gage, please consult us

Wire lentgh:
- **Blank:** not wired
- **XXX:** lenght in cm (030 for 30 cm or 050 for 50 cm)

Classification***:**
- **K2:** K2 qualified connectors according to RCC-E 2005
- **NC :** Non-classified connectors

*****8N45S31 and 8N45S51 are designed according to RCC-E 2005 K2 requirements. Qualification pending.
******8N45S47 and 8N45S65 are designed according to RCC-E 2005 K2 requirements.
******* K2 connectors are manufactured with specific traceability and delivered with End of Manufacturing Report, according to RCC-E 2005. NC connectors are manufactured with standard traceability and delivered with Certificate of Conformity only.

Tools

Crimping, insertion & extraction tools

SOURIAU offers a large range of tools to prepare the connectors for use.

The tools listed hereunder perfectly suit the 8N45 Series connectors.




Shell size	Crimping tool	Locators	Insertion tools for pin & socket contacts	Extraction tools - pin contacts	Extraction tools - socket contacts
1 & 2	8365EL	8365-02EL	8400-1475EL	8400-448EL	8400-446EL

Note: Please consult us for other tools.

Spare parts

Panel gaskets

Panel gaskets to seal receptacle on panel.

Shell size	1	2	3	4	5	6
Part numbers	8N45SPJ0303AEL	8N45SPJ0304AEL	8N45SPJ0545AEL	8N45SPJ0616AEL	8N45SPJ0540AEL	8N45SPJ0513AEL

Contacts for re-ordering (sets of 10 contacts)

Shell size	Contact type	Set of 10 male contacts P/N	Set of 10 female contacts P/N
1, 2, 3	Ø1.5mm crimp Small barrel	8400-307 AKMEL	8400-9019-900EL
	Ø1.5mm crimp Large barrel	8400-144 AKMEL	8400-9018-900EL
4	Ø2.4mm crimp	8N45SEC0530AEL	8N45SEC0531AEL
5	Ø1.5mm crimp Large barrel	8400-242AKMEL	8400-9020-900EL
6	Ø2.4mm crimp	8N45SEC0532AEL	8N45SEC0533AEL

Description

- Class 1E qualified connectors
- Quick connect ¼ turn bayonet coupling
- **Qualification standards:**
  - EDF HM63/7195
  - RCC-E 1993 & 2002

Applications

- Instrumentation, sensors, probes

Technical features

Electrical

- **Current rating:** 11 A max
- **Peak current:** 50A/30ms
- **Test voltage rating:** 2000 Vrms
- **Insulation resistance:** ≥ 5000 MΩ under 500 Vdc
- **Contact resistance:** 5 mΩ
- **Shielding resistance:** ≤ 20 mΩ

Mechanical

- **Mating/Unmating effort:** 0.12 daN.m
- **Endurance:** 500 mating/unmating
- **Cable clamp resistance:**
  Traction 50 N/Torsion 0.5 Nm

Seism/Vibration

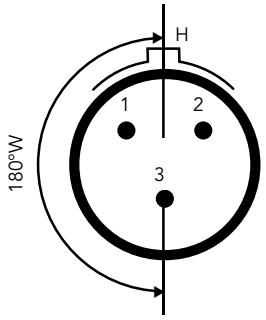
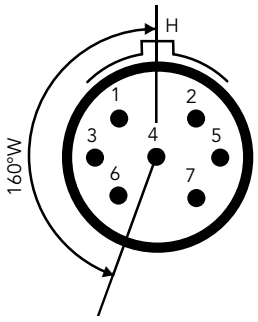
- **Seism:**
  - Operating Basis Earthquake (OBE): 3g ZPA
  - Safe Shutdown Earthquake (SSE): 6g ZPA
- **Vibration (Sine):** 10 to 2000Hz; 0.35mm; 5g

Environmental

- **Ambient temperature:**
  -10°C to +70°C (+14°F to +158°F)
- **Max temperature:** +85°C (+185°F)
- **Ambient humidity:** 75% max.
- **Cumulated radiation:** 250 kGy (25 MRads)/ +70°C (+158°F)
- **Dry heat test:** +40°C (+104°F)/93% HR/504h
- **Salt spray resistance:** 168h
- **Protection against water penetration:**
  - IP X6
  - IP 68

Materials & plating	Connector part			
	Shells	Insulator & grommet	Seals	Contacts
Material	Stainless steel	Silicon	Silicon	Copper alloy (Zinc/Lead)
Plating	Nickel (locally)	-	-	Gold over nickel

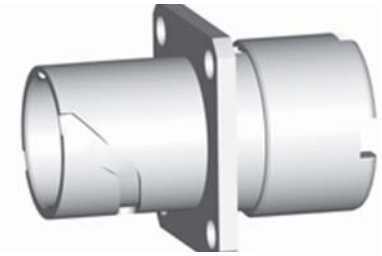
Contact layouts

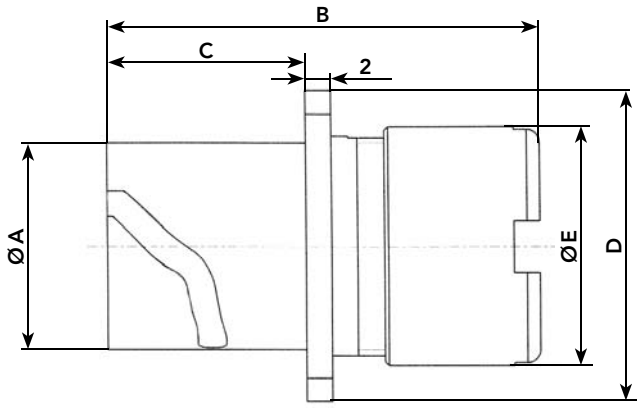
Shell sizes and contact layouts	
Shell size 1	**Shell size 2**
	
3 contacts Ø 1.5mm	7 contacts Ø 1.5mm

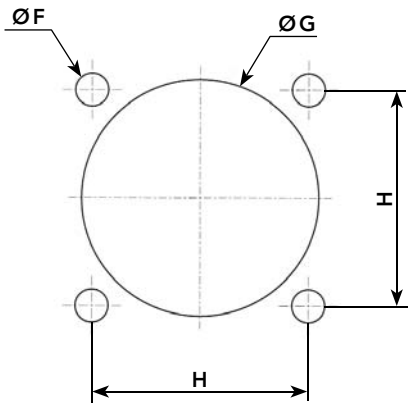
Receptacle & backshell details

8N45 Square flange receptacle

2 types of receptacle backshells are available:
- Simple backnut (represented & described hereunder)
- Straight with cable clamp and sealing gland (refer to plug description on next page)







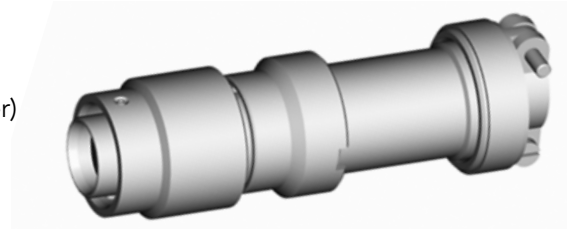
Shell size	Ø A	B	C	D	Ø E	Ø F	Ø G	H
1	16.00	33.50	15.40	24.00	18.60	3.2	19.00	18.00
2	20.00	33.50	15.40	27.00	22.60	3.2	23.00	21.00

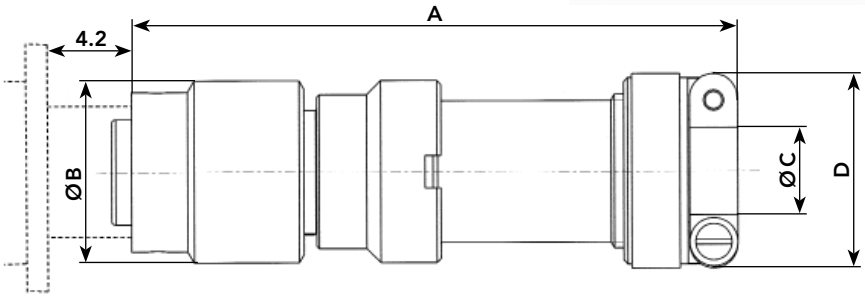
Note: all dimensions are in mm

Plug & backshell details

8N45 Plug details

2 types of plug backshells are available
- Simple backnut (refer to receptacle description on previous page)
- Straight with cable clamp and sealing gland (described here under)





Shell size	Type *	A	Ø B	Ø C min.	Ø C max.	D
1	**21**	80	22.50	7.50	9.50	23.00
	51	80	22.50	10.50	12.00	23.00
2	**21**	80	26.50	10.50	12.00	23.00

***** 2 types of straight backshells with cable clamp and sealing gland are available for shell size 11 depending on cable diameter.

Note: all dimensions are in mm

Ordering information

Basic Series	**8N45**	**11**	**1**	**1**	**21**	**_**	**_**
Shell size/Contact layout **11:** (3 contacts) **21:** (7 contacts)							
Shell type **1:** Receptacle **8:** Plug							
Contact type **1:** Pin **5:** Socket							
Backshell/Interface type **25: Simple** Backnut (receptacles only) **21*:** Straight backshell (Shell size 1 & 2) **51*:** Straight backshell (Shell size 1 only)							
Wiring code: **Blank:** note wired **XX:** egal to the maximum number of contacts in the layout (e.g/03 for size 1, 07 for size 2...)							
Classification** **Blank:** K2 qualified product according to RCC-E code **NC:** Non-classified product							

***** See definition in the table above - ****** K2 connectors are manufactured with specific traceability and delivered with End of Manufacturing Report, according to RCC-E code. NC connectors are manufactured with standard traceability and delivered with Certificate of Conformity only.

Tools

Crimping, insertion & extraction tools

SOURIAU offers a large range of tools to prepare the connectors for use.

The tools listed hereunder perfectly suit the 8N45 Series connectors.




Shell size	Crimping tool	Locators	Insertion tools for pin & socket contacts	Extraction tools - pin contacts	Extraction tools - socket contacts
1 & 2	8365EL	8365-02EL	8400-1475EL	8400-448EL	8400-446EL

Spare parts

Panel gasket

Shell size	Part numbers
1	8400-2222 EL
2	8400-2223 EL

Contacts for re-ordering (sets of 10 contacts)

Shell size	Contact type	Set of 10 male contacts P/N	Set of 10 female contacts P/N
1 & 2	Ø1.5mm crimp Small barrel	8400-307 AKMEL	8400-9019-900EL
	Ø1.5mm crimp Large barrel	8400-144 AKMEL	8400-9018-900EL

NUCLEAR
POWER GENERATION

Nuclear Power Generation

8N35/36 Series - K2 Qualified Connectors

Description

- RCC-E K2 Qualified Nuclear Grade Connectors
- Screw coupling mechanism
- Design and manufacturing standard: RCC-E code, 1993 & 2002 edition

Applications

- Safety instrumentation and control equipments inside reactor building

Technical features

Electrical

- **Current rating:** 11 A max
- **Peak current:** 50 A/30 ms
- **Test voltage rating:** 2000 Vrms
- **Insulation resistance:** ≥ 5000 MΩ under 500 Vdc
- **Contact resistance:** ≤ 20 mΩ

Mechanical

- **Tightening torque:** 8.5 Nm
- **Endurance:** 500 mating/unmating
- **Cable clamp resistance:** Traction 50 N/Torsion 0.5 Nm

Accident testing

- **Shocks:**
  - Operating Basis Earthquake (OBE): 3g ZPA
  - Safe Shutdown Earthquake (SSE): 6g ZPA
- **Vibration (Sine):** 5g, 10 to 2000Hz, 3.5mm

Environmental

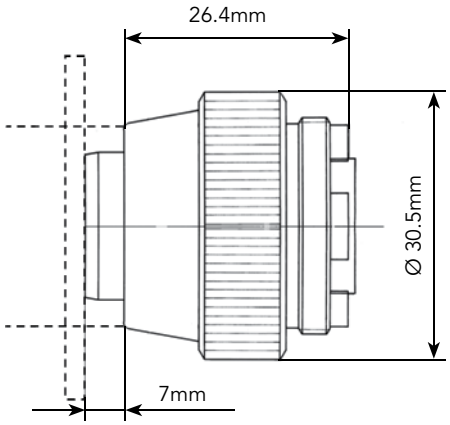
- **Temperature range:** -10°C to +70°C (+14°F to +158°F)
- **Ambient humidity:** 75% max
- **Dry heat test:** + 40°C (+104°F)/93% HR/504h
- **Cumulated radiations:** 250 kGy (25 MRads)/+70°C (+158°F)
- **Salt spray resistance:** 168 hrs
- **Protection against water penetration:** IPX6 (100 l/min, 3 min)
- **Qualified lifetime:** 40 years

Materials & plating	Connector part			
	Shells	Insulator & grommet	Seals	Contacts
Material	Stainless steel	Silicon (8N35) Fused glass (8N36)	Silicon	Copper alloy
Plating	Nickel (locally)	-	-	Gold over nickel

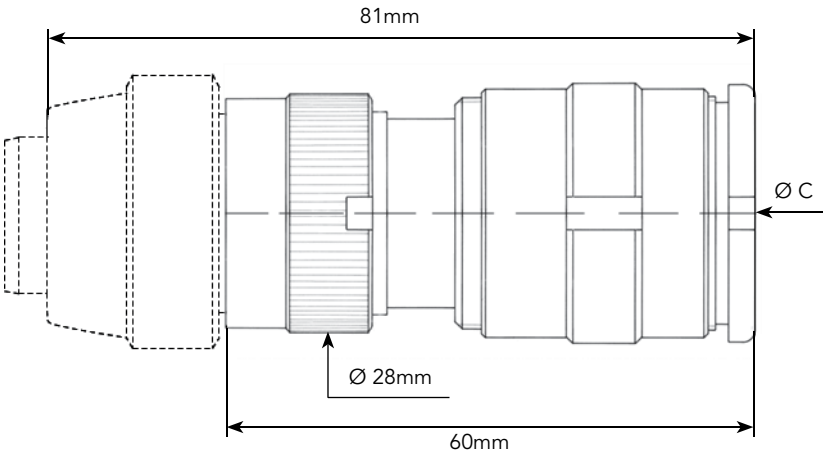
Dimension & characteristics

8N35 Series plugs and backshells

Plug

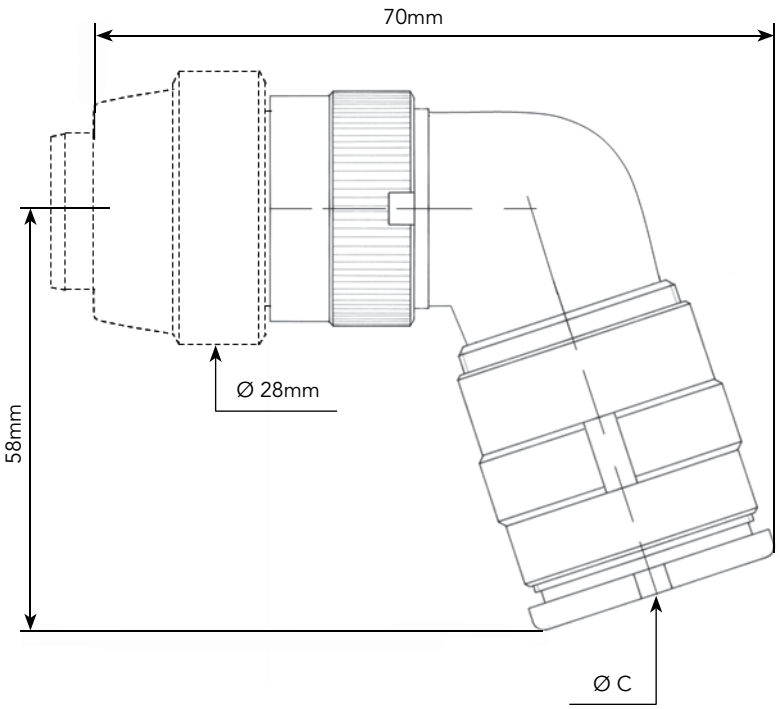


Straight backshell



Admissible cable diameter (Ø C)	Backshell identification code
14 to 15mm	A
12 to 14mm	B
10 to 12mm	C
6mm	D
7.5 to 9mm	E

Elbow backshell

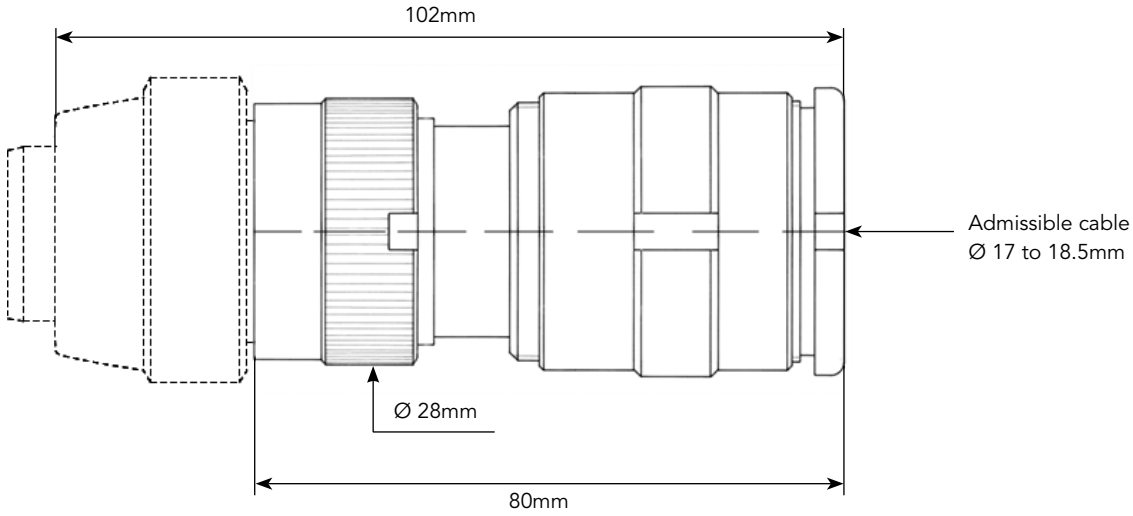


Dimension & characteristics

SN2265 Series plugs (non-qualified)

SN2265 Series Plugs are non-qualified plugs with straight backshells for large cable diameters up to 18.5mm. They are fully compatible with 8N35/8N36 Series receptacles.

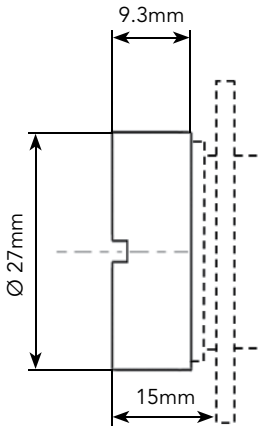
Note: SN2265 Series are delivered without contacts. Contacts have to be ordered separately.



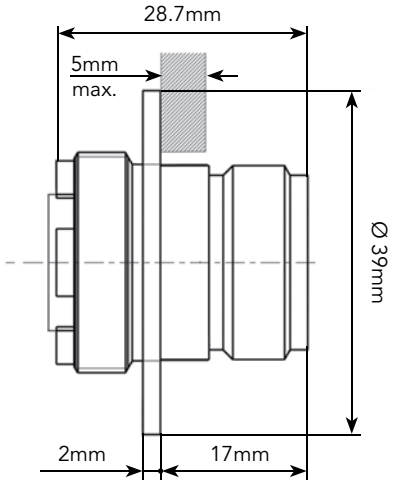
Dimension & characteristics

8N35 Series sealed receptacles

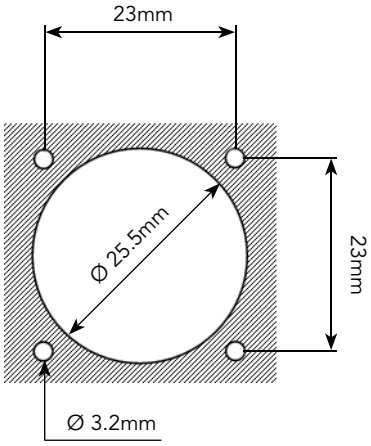
Back-nut



Receptacles

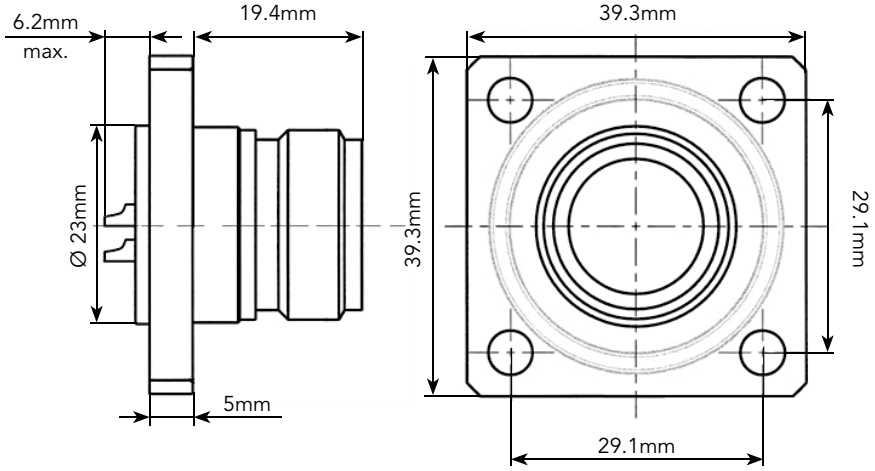


Panel cut-out

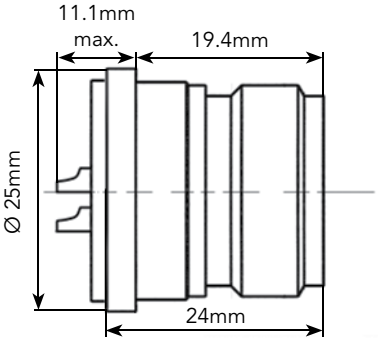


8N36 Series hermetic receptacles (Fused glass insulator)

Type 1: Square flange, screwed receptacle

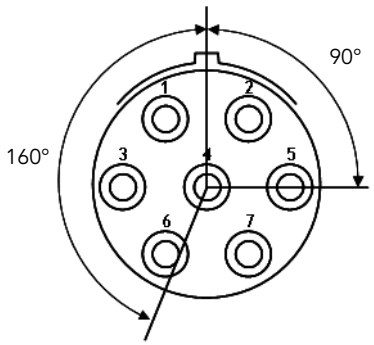
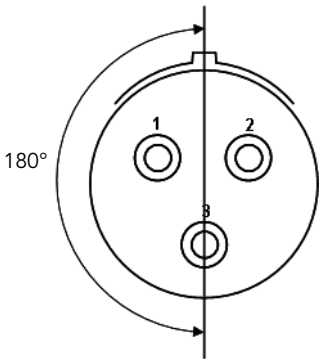


Type 2: Round flange, welded receptacle



Contact layouts

Available contact layouts

Layout 21	Layout 26
	
7 contacts Ø 1.5mm	3 contacts Ø 1.5mm

Contacts characteristics

Connector	Type of contacts	Admissible wire section	Maximum sleeving diameter
8N35 Series plugs and receptacles	Ø 1.5mm, crimp	Small barrel contacts: 0.38 to 0.93mm²	3.3mm
		Large barrel contacts: 0.93 to 1.91mm²	
SN2265 Series plugs	Ø 1.5mm, crimp	Small barrel contacts: 0.38 to 0.93mm²	3.3mm
		Large barrel contacts: 0.93 to 1.91mm²	
8N36 Series receptacles	Ø 1.5mm, solder	1.91mm²	3.3mm

Ordering information

8N35 Series receptacles and plugs

Basic Series	8N35	21	8	5	7	D	3S	_
Contact layout **21:** 7 contacts Ø 1.5mm **26:** 3 contacts Ø 1.5mm								
Shell type **1:** Receptacle, round flange, screw mounting **8:** Plug								
Contact type **1:** Male **5:** Female								
Backshell type **0:** Without backshell **2:** Simple backnut **1:** Straight backshell with collet and sealing gland **7:** Elbow backshell with collet and sealing gland								
Admissible cable diameter **Blank:** Connector without backshell or with simple backnut **A:** 14 to 15mm **B:** 12 to 14mm **C:** 10 to 12mm **D:** 6mm **E:** 7.5 to 9mm								
Contact type **Blank:** Small barrel contacts **XS:** Large barrel contacts (X = Number of contacts)								
Classification*: **Blank:** K2 classified according to RCC-E 1993 & 2002 **NC:** non-classified connectors								

* K2 connectors are manufactured with specific traceability and delivered with End of Manufacturing Report, according to RCC-E code. NC connectors are manufactured with standard traceability and delivered with Certificate of Conformity only.

8N35 Series backshells

Basic Series	8N3520	002	A	_
Backshell type **002:** Simple backnut **001:** straight backshell with collet and sealing gland **007:** elbow backshell with collet and sealing gland				
Admissible cable diameter **Blank:** Connector without backshell or with simple backnut **A:** 14 to 15mm **B:** 12 to 14mm **C:** 10 to 12mm **D:** 6mm **E:** 7.5 to 9mm				
Classification*: **Blank:** K2 classified according to RCC-E 1993 & 2002 **NC:** non-classified connectors				

* K2 connectors are manufactured with specific traceability and delivered with End of Manufacturing Report, according to RCC-E code. NC connectors are manufactured with standard traceability and delivered with Certificate of Conformity only.

Ordering information

8N36 Series receptacles

Type	8N36	21	1	3	0	
Contact layout **21:** 7 contacts Ø 1.5mm **26:** 3 contacts Ø 1.5mm						
Receptacle type **1:** Square flange receptacle mounted with 4 screws **2:** Round flange receptacle to be welded on equipment						
Contact type **3:** Male, soler						
Backshell type **0:** Without backshell						
Classification*: **Blank:** K2 classified according to RCC-E 1993 & 2002 **NC:** non-classified connectors						

* K2 connectors are manufactured with specific traceability and delivered with End of Manufacturing Report, according to RCC-E code. NC connectors are manufactured with standard traceability and delivered with Certificate of Conformity only.

SN2265 Series plugs with backshell*

Type	SN2265	21	1	01	L	P
Contact layout **21:** 7 contacts Ø 1.5mm						
Backshell type **1:** Straight backshell with collet sealing gland						
Admissible cable diameter **01:** 17 to 18.5mm						
Contact type **L:** Delivered without contact						
Insulator gender **P:** insulator for male contacts** **S:** insulator for female contacts**						

***** Non qualified.
****** Contacts to be ordered separately.

Tools

Crimping, insertion and extraction tools



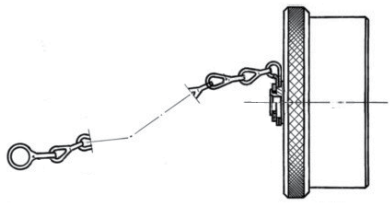

Crimping tool	Locator	Insertion tool for male and female contacts	Extraction tool	
			Male contact	Female contacts
8365EL	8365-02EL	8400-1475EL	8400-448EL	8400-446EL

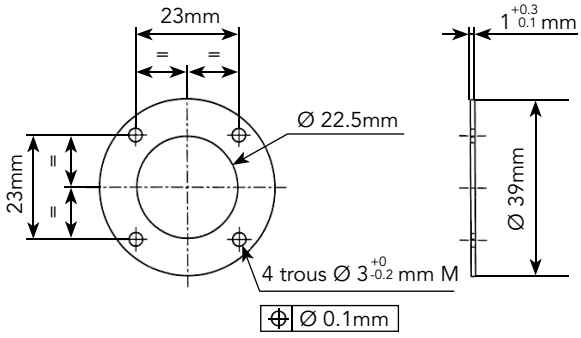
Spare parts

Contacts for re-ordering (sets of 10 contacts)

Type of contacts	Set of 10 male contacts P/N	Set of 10 female contacts P/N
Ø 1.5mm small barrel, crimp	8400-307 AKMEL	8400-9019-900EL
Ø 1.5mm large barre, crimp	8400-144 AKMEL	8400-9018-900EL

Dust caps and panel gaskets





Dust caps	Plugs	Receptacles
	8N35-2022	8N35-2012

Panel gaskets for receptacles (8N35)
8300-474

NUCLEAR
POWER GENERATION

Nuclear Power Generation

8NS Series - K2 - K3 Qualified Connectors

Description

- Class 1E qualified connectors
- Quick connect screw coupling

Applications

- Connection of control units of valve power actuators

Qualification standards

- EDF HM63/7195, Class 1E K2
- RCC-E 1993 & 2002

Technical features

Electrical

- **Contacts:** Crimp or Solder
- **Wires section:** ø1.5mm (AWG 14-16)
- **Test voltage rating:** 1500 Vrms, 50Hz, 1mn
- **Insulation resistance:** ≥ 5000 MΩ under 500 Vdc
- **Shell sizes & contact layouts:** page 100
- **Max current rating per contact:** #20 = 7.5A; #16 = 13A

	Contact resistance	
	Sealed version	**Hermetic version**
#20	≤ 5 mΩ	≤ 20 mΩ
#16	≤ 0.3 mΩ	≤ 11 mΩ

Mechanical - Endurance

- **Aluminum version:** 300 mating/unmating
- **Stainless steel version:** 500 mating/unmating

Accident testing

- **Vibration (Sine):** 10g, 58 to 500Hz, 3x2 hrs

Environmental

- **Temperature range:** -55°C to +160°C (-67°F to +320°F)
- **Temperature peak:** +200°C (+392°F)
- **Radiation:** 25 MRads "gamma" at +20°C (+68°F)
- **Hermeticity (hermetic version):** leak ≤1.03 10-7cm³/s under a helium air differential pressure of 0.1MPa

Materials & plating	**Connector part**			
	Shells	**Insulator**	**Seals**	**Contacts**
Material	Passivated stainless steel or Nickel plated aluminium	Thermoset or Fused glass	EP Elastomer	Copper alloy
Plating		-	-	Gold over nickel

Class 1E connector

Class 1E qualified

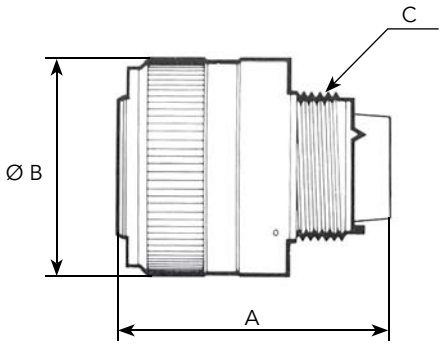
8NS 16-24 protected aluminium connectors are K2 qualified and 8NS 16-24 passivated stainless steel version is K3 qualified according to RCC-E 2002. 8NS 12-03, 12-12 & 16-10 are designed in accordance with RCC-E Class 1E, K2 equipment requirements, they are not qualified.

Thanks to a robust mechanical design, they are built to operate during normal and seismic conditions.

These connectors are equipped with crimp contacts or solder contacts for the hermetic receptacle version.

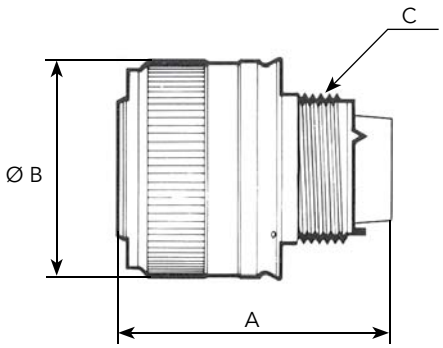
Plug details

Aluminium plug (6R)



Shell size	A	ØB	C
12	34.5	27.40	3/4" - 20 UNEF.2A
16	34.5	32.20	1" - 20 UNEF.2A

Stainless steel plug (6G)



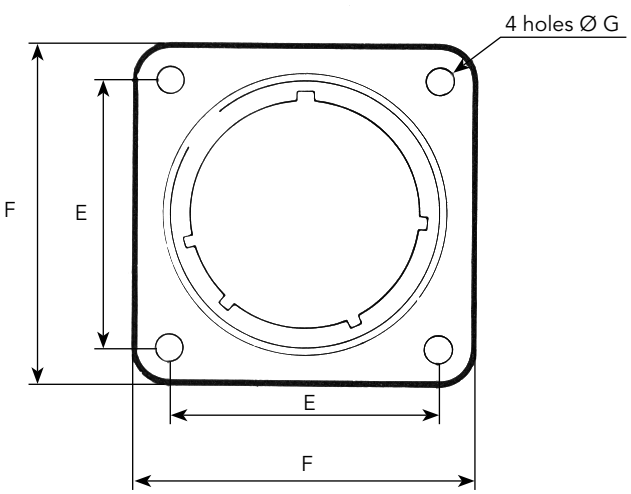
Shell size	A	ØB	C
12	34.5	27.40	3/4" - 20 UNEF.2A
16	34.5	32.20	1" - 20 UNEF.2A

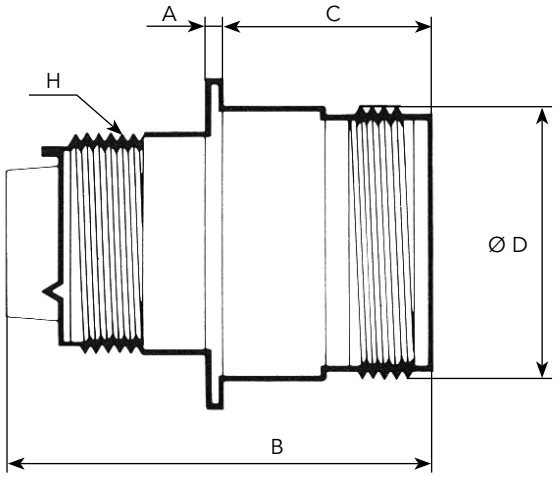
Note: all dimensions are in mm

Receptacle details

0G & 0R type: Square flanged sealed receptacle

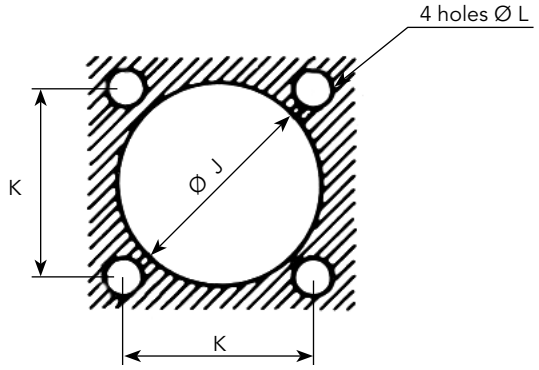
Receptacle

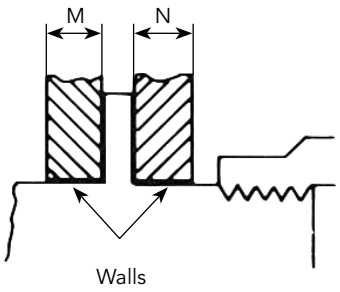




Shell size	A	B	C	Ø D	E	F	Ø G	H
12	1.45	36.00	18.35	22.19	20.62	26.31	3.10	3/4" - 20 UNEF.2A
16				26.95	31.88	31.88		1" - 20 UNEF.2A

Mounting





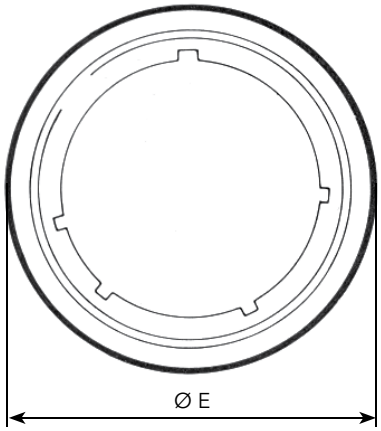
Shell size	Ø J	K	L	M max.	N max.
12	21.70	20.62	3.20	3.17	3.17
16	28.30	24.61			

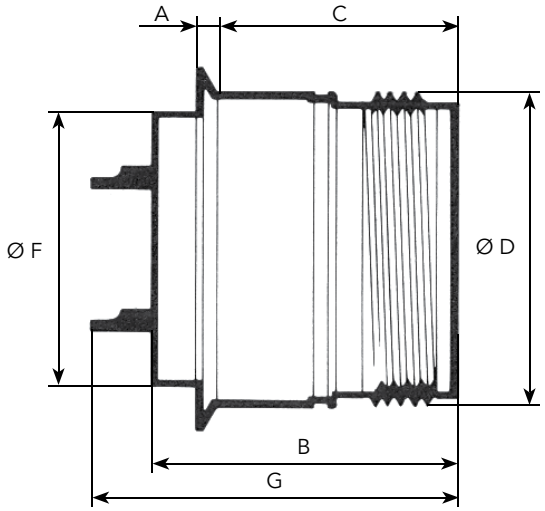
Note: all dimensions are in mm

Receptacle details

1Y Type: Hermetic receptacle (Fused glass insulator)

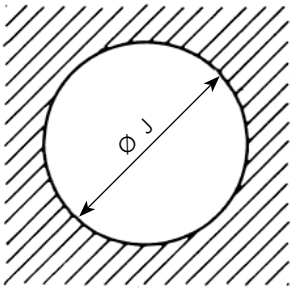
Receptacle

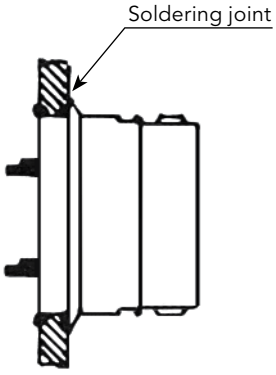




Shell size	A	B	C	Ø D	Ø E	Ø F	G
12	1.45	22.05	18.45	22.19	26.57	19.00	26.50
16				26.95	30.92	23.79	

Mounting





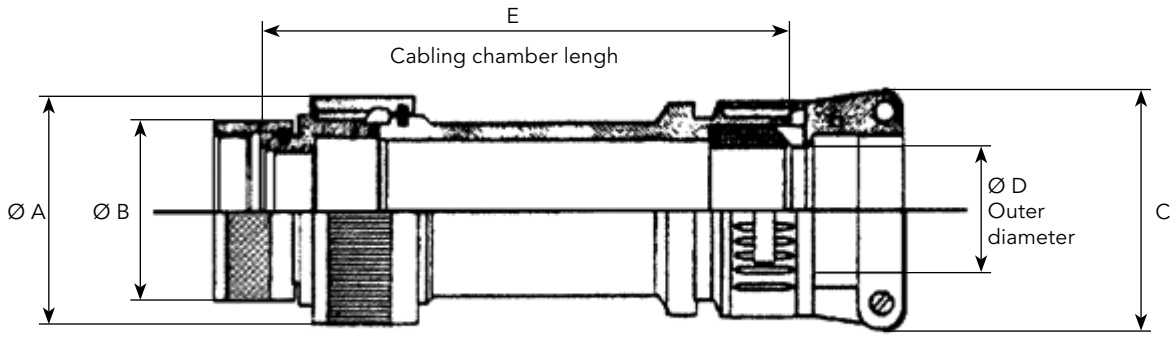
Shell size	Ø J
12	19.18
16	23.93

Note: all dimensions are in mm

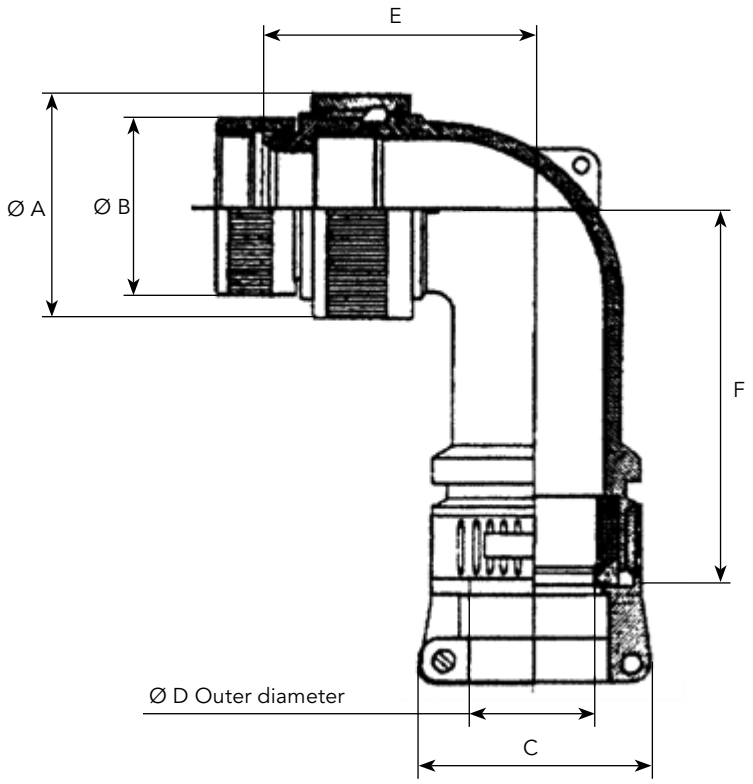
Backshell details

Aluminum backshells

Straight backshell with cable clamp and sealing gland



90° backshell with cable clamp and sealing gland



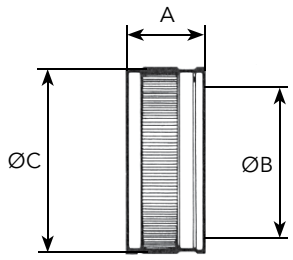
Shell size	Ø A max.	Ø B max.	C max.	Ø D		E max.	Ø F max.	L	
				min.	max.			Standard	Long
16	37.30	28.30	52.00	15.88	23.80	44.50	89.00	69.86	95.25

Note: all dimensions are in mm

Backshell details

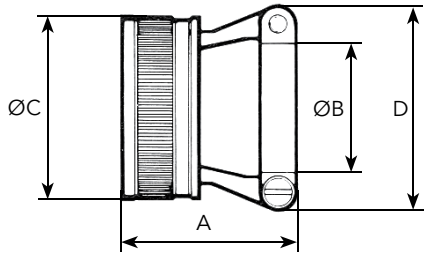
Stainless steel backshells

Backnut



Shell size	A	Ø B max.	Ø C
12	12.70	12.90	21.50
16		18.05	28.10

Straight backshell with cable clamp

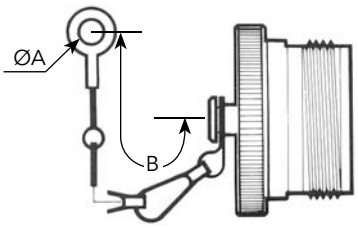


Shell size	A	Ø B	Ø C	D
12	28.55	7.39	21.50	25.10
16	31.70	12.72	28.10	33.50

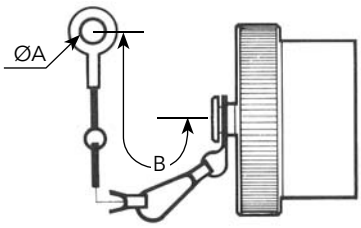
Caps details

Plug & receptacle caps

Plug cap



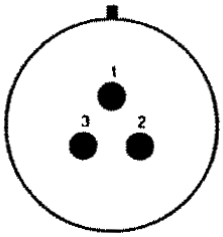
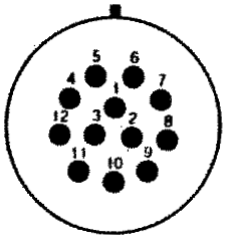
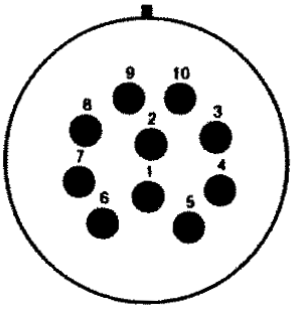
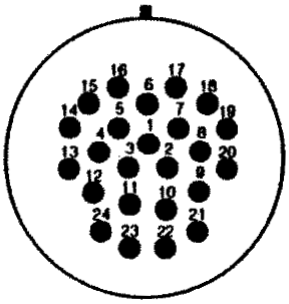
Receptacle cap



Shell size	Ø A max.	B max.
12	3.20	134.00
16		

Note: all dimensions are in mm

Contact layouts & Orientations

8NS 12-03 (2) (3)	8NS 12-12 (2)	8NS 16-10 (2) (3)	8NS 16-24 (1)
			
03 contacts # 16	12 contacts # 20	10 contacts # 16	24 contacts # 20

(1) 8NS 16-24 protected aluminium is K2 qualified according to RCC-E 1993 & 2002.
8NS 16-24 passivated stainless steel is K3 qualified acc. to RCC-E 2002.
(2) 8NS 12-03, 12-12 & 16-10 layouts are designed according to RCC-E Class 1E, K2 equipment requirements. Not qualified.
(3) For 8NS 12-03 & 16-10 availability, please contact us.

Orientations

List of orientations possible for pins and insulators

		Orientations								
		N	1	2	3	4	5	6	7	8
Shell sizes	12	■	■	■	■	■	■	■		
	16	■	■	■	■	■	■	■	■	■

■ Orientations available

Contact details

Type	Size	Diameter (mm)	Part number	Admissible section				Outer sleeve diameters (mm)	
				Section (mm²)		AWG			
				min.	max.	min.	max.	min.	max.
Male	20	1.00	8526-1348	0.21	0.60	24	20	1.02	2.11
	20*	1.00	8341-5345	0.38	1.00	22	-	1.02	2.11
	16	1.60	8526-1349	0.60	1.34	20	16	1.34	2.62
	16*	1.60	8522-6179A	0.31	1.91	18	14	1.34	2.62
Female	20	1.00	8526-1344	0.21	0.60	24	20	1.02	2.11
	20*	1.00	8341-5340	0.38	1.00	22	-	1.02	2.11
	16	1.60	8526-1346A	0.60	1.34	20	16	1.34	2.62
	16*	1.60	8522-6180B	0.93	1.91	18	14	1.34	2.62

***** Large barrels

Ordering information

Plugs & receptacles

Basic Series	8NS	-	6	G	16-24	S	N	A	
Specificity index									
Body type **0:** Square flange receptacle with panel gasket **6:** Plug **1:** Soldered hermetic receptacle **X:** Specific (contact us)									
Material & plating **G:** Passivated stainless steel **R:** Nickel-plated aluminum **Y:** Passivated stainless steel (hemetic receptacles)									
Shell sizes & contact layouts **12 - 03*:** Shell size 12 - 03 contacts #16 **12 - 12*:** Shell size 12 - 12 contacts #20 **16 -10*:** Shell size 16 - 10 contacts #16 **16 -24:** Shell size 16 - 24 contacts #20									
Type of contact **P:** Pin **S:** Socket									
Orientation **N (Standard), 1 to 8:** Refer to page 100									
Mandatory specification for K2 or K3 products **A**									
Contact specification **:** Standard contacts **01:** Large barrel contacts									

Aluminum backshells

Basic Series	8NS	02	R	16	A
Backshell type **01:** Backnut **02:** Straight backshell with cable clamp and sealing gland **03:** 90° backshell with cable clamp and sealing gland					
Plating **R:** Nickel plated aluminium					
Shell size **16:** Shell size 16					
Specification: : For backshell type 01 **A:** Standard chamber for backshell type 02					

***** Designed according to RCC-E Class 1E, K2 equipment requirements. Not qualified.

Ordering information

Stainless steel backshells

Basic series	8527-	02	16	A
Backshell type **01:** Backnut **02:** Straight backshell with cable clamp				
Shell size **12:** Shell size 12 **16:** Shell size 16				
Specification **:** For backshell type 01 **A:** Mandatory for backshell type 02				

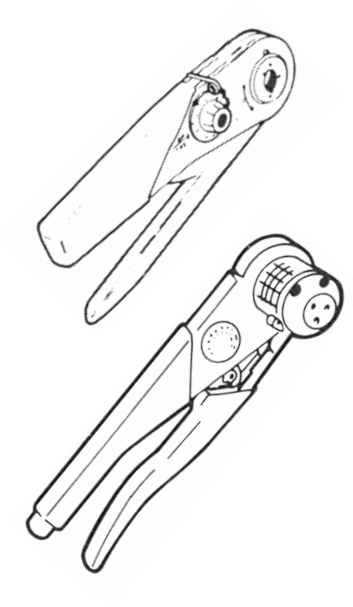
Caps

Basic series	8NS	-	22	G	16	S
Specificity index						
Cap type **21:** Cap for receptacle **22:** Cap for plug						
Material & plating **G:** Passivated stainless steel **R:** Nickel-plated aluminium						
Shell sizes **12:** Shell size 12 **16:** Shell size 16						
Specific requirements *						

Tools

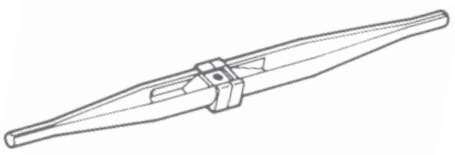
Crimping tools

Contact Sizes	Cables		Part numbers	
	Min	AWG	Crimping pliers	Locator
20	0.93	18	8365 (M22520 1.01) or 8476-01 (M22520 2.01)	8365-02 (M22520 1.02) or 8476-02 (M22520 2.02)
	0.60	20		
	0.38	22		
	0.21	24		
16	1.91	14	8365 (M22520 1.01)	8365-02 (M22520 1.02)
	1.34	16		
	0.93	18		
	0.60	20		
	0.38	22		



Insertion & extraction tools

Contact Sizes	Part numbers	Colour
20	(M 81969-14-02) 8522-20	Red
16	(M 81969-14-03) 8522-16	Blue

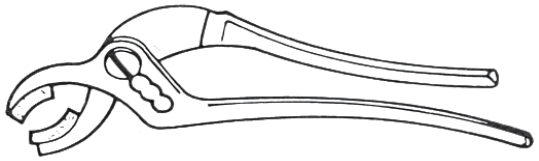


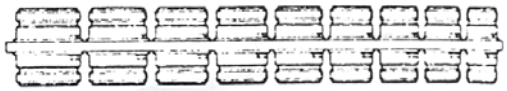
Other useful tools & equipments

Tightening pliers for rear accessories – Ref: 8498-03

Spare jaws (set of 2) – Ref: 8500-1015

Tightening holders:
- Aluminum version – Ref: 8533-1150
- Stainless steel version – Ref: 8533-1151





NUCLEAR
POWER GENERATION

Nuclear Power Generation

MEN Series

Description

- Class 1E qualified connectors
- Screw coupling
- 2 shell sizes: 2012 or 2612

Application

- Power and control devices
- Ideal for Reactor Control & Limitation System (RCLS)

Qualification standards

- EDF HM63/7195, Class 1E K2
- RCC-E 1993 & 2002

Technical features

Electrical

- **Contacts:** crimp
- **Contacts diameter:** 2mm (2012); 5mm(2612)
- **Current rating:** 10 A (2012); 50 A (2612)
- **Test voltage rating:** 2500 Vrms
- **Insulation resistance:** ≥ 5000 MΩ under 500 Vdc
- **Contact resistance:** ≤ 5 mΩ under 50mA

Mechanical - Endurance

- **Un/Mating effort:** 2.2 daN.m
- **Endurance:** 500 mating/unmating

Accident testing

- **Shocks:**
  - Operating Basis Earthquake (OBE): 3g ZPA
  - Safe Shutdown Earthquake (SSE): 6g ZPA
- **Vibration (Sine):** 5g, 10 to 2000Hz

Environmental

- **Temperature range:** -15°C to +110°C (+5°F to +212°F)
- **Radiation:** 25 MRads «gamma» at +70°C (+158°F)
- **Salt spray resistance:** 5% of sodium chloride
- **Sealing:** 0.5MPa (IP68 coupled)

Materials & plating	Connector part			
	Backshells	Locking screws	Insulator & grommet	Contacts
Material	Aluminium alloy	Brass	EPDM & Noryl	Brass
Plating	Nickel Kanigen® & tin nickel	Tin nickel	-	Gold over nickel

Features & benefits

Class 1E connector

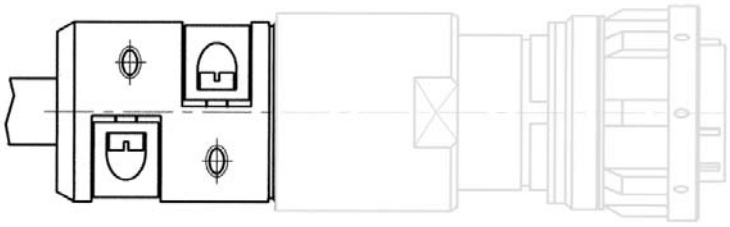
Class 1E qualified

MEN 2012 connectors are K2 qualified according to RCC-E. MEN 2612 is designed according to RCCE requirements. Thanks to a ruggedized mechanical design, they can operate during normal and seismic conditions.

Robust cable clamp

Reliable and durable cable clamping

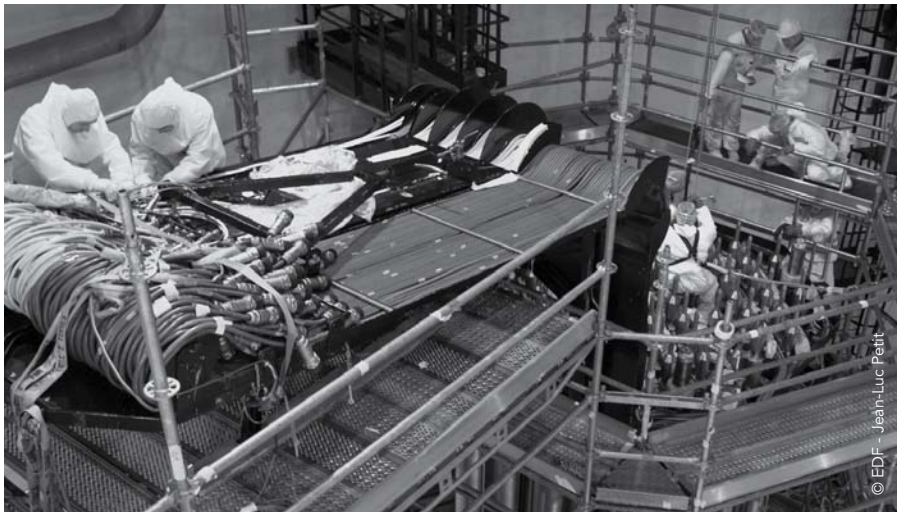
MEN connectors feature a robust cable clamp that ensures heavy cables will be durably maintained in position.



High sealing level

IP68

When mated and thanks to a large sealing gland the MEN connectors achieve a high sealing level (IP68).

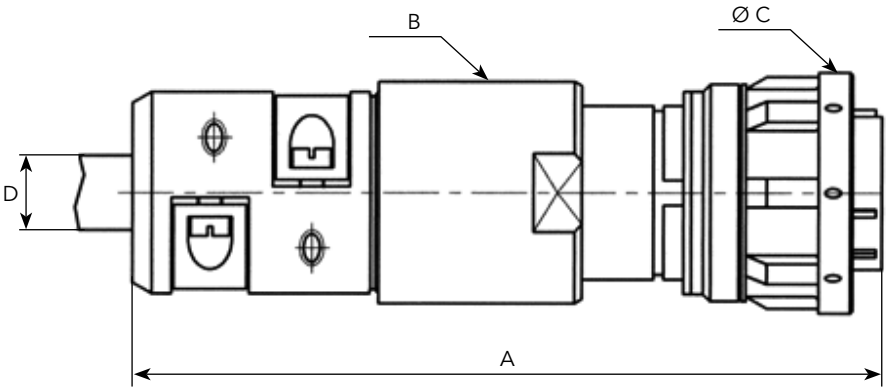


MEN Series connectors used in the CRDM system.

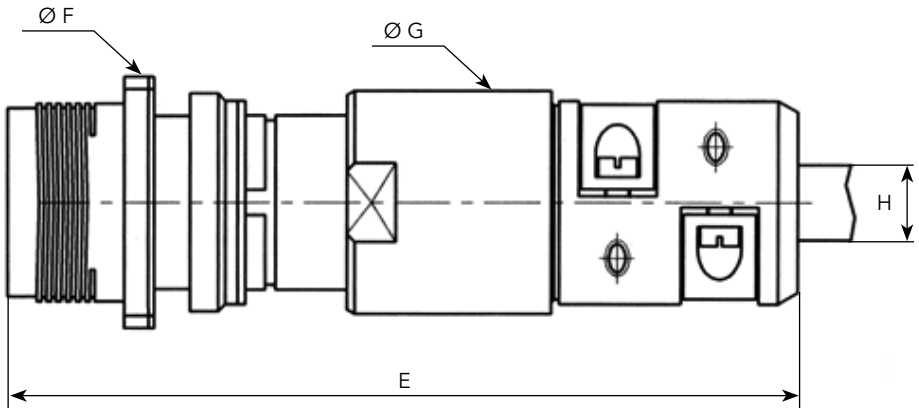
Plug & receptacle dimensions

MEN 2012 details

Plug details

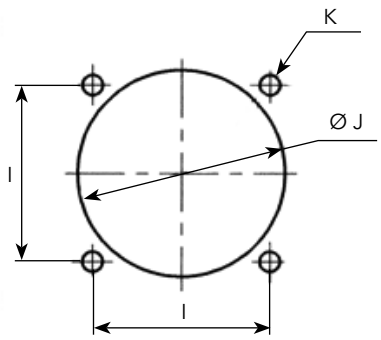


Receptacle details



	A	Ø B	Ø C	E	F	Ø G
Dimensions	$155^{+2/-2}$	46	50	$162^{+2/-2}$	52	46

Panel cut-out

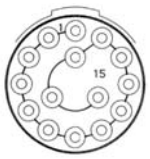


	I	Ø J	K
Dimensions	$40^{+0.1/-0.1}$	$47^{+0.2/-0.2}$	4 holes for M5 screws

Note: all dimensions are in mm

MEN 2012 plug & receptacle ordering information

Contact layouts

M12	M15
	
12 contacts Ø 2mm	15 contacts Ø 2mm

Wires section	M12	M15
Plug (pin contacts)	0.38 to 0.93mm² or 0.93 to 1.91mm² (FEM2012M12173 only)	0.93 to 1.91mm²
Receptacle (socket contacts)	0.93 to 1.91mm²	0.93 to 1.91mm²

Max./min. cable diameters

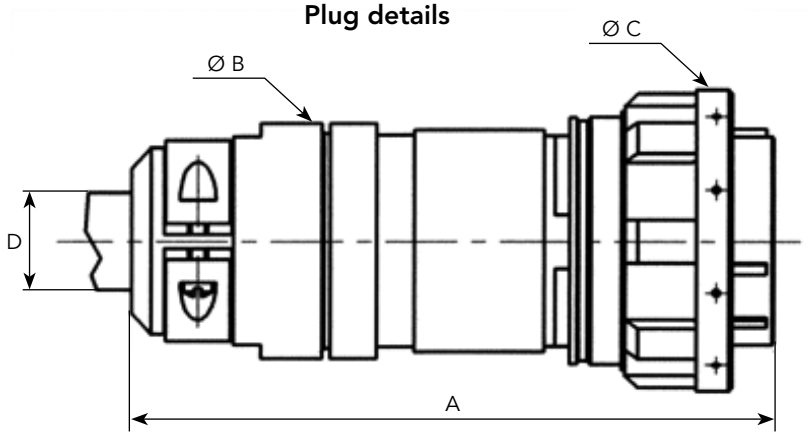
Reference	Plug designation	D		Receptacle designation	H	
		max.	min.		max.	min.
2012 M12	FE2012M12	17	14.5	RECSC2012M12	25.5	22
	FEDM2012M12SC295	29.5	27.5	RECSCF2012M12240	24	22
	FEM2012M12173	17.3	-	RECSCF2012M12230	23	20.5
2012 M15	FE2012M15	20.5	-	RECSC2012M15	26.5	-
	FEM2012M15192	19.2	17.7	RECSCF2012M15252	25.2	22.9

Note: all dimensions are in mm

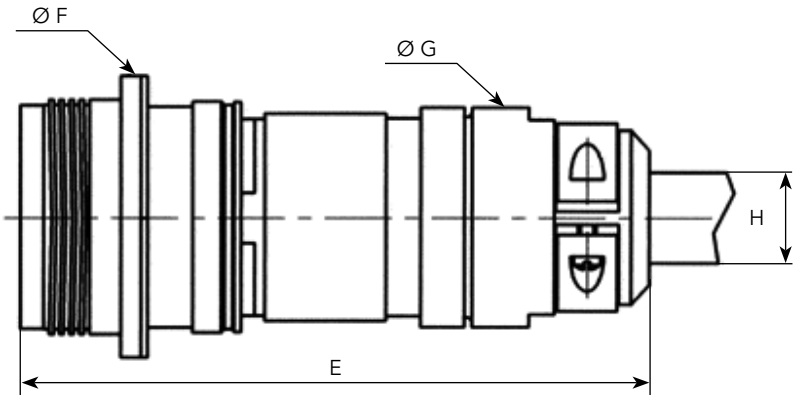
Plug & receptacle dimensions

MEN 2612 details

Plug details

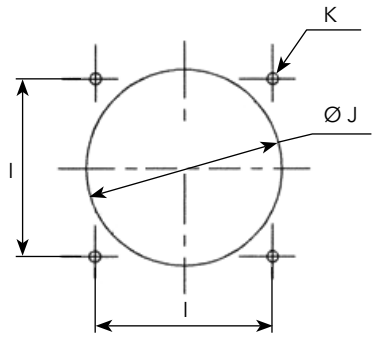


Receptacle details



	A	Ø B	Ø C	E	F	Ø G
Dimensions	$183^{+3/-3}$	65.5	84	$192^{+3/-3}$	84	65.5

Panel cut-out

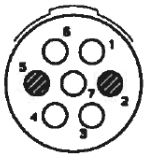


	I	Ø J	K
Dimensions	$61^{+0.2/-0.2}$	$73^{+0.2/-0.2}$	4 holes for M6 screws

Note: all dimensions are in mm

MEN 2612 plug & receptacle ordering information

Contact layouts

M6 or M7

7 contacts Ø 5mm

Wire section	M6 or M7
Plug (Pin contacts)	● 10mm² ○ 6mm²
Receptacle (Socket contacts)	● 16mm² ○ 10mm²

Max./min. cable diameters

Reference	Plug designation	D		Receptacle designation	H	
		max.	min.		max.	min.
2612 M6 2612 M7	FE2612M6 FE2612M7	22.8	20.5	RECSC2612M6 RECSC2612M7 RECSC261220	28	27
	FEM2612M7205	20.5	19	RECSCF2612M7235	23.5	21.2
	FEM2612M7212	21.2	18	RECSCF2612M7240	24	21.5
	FEDM2612M6245	24.5	22.5	RECSCF2612M6280	28	27

Note: all dimensions are in mm

Tools & spare parts

Crimping & extraction tools

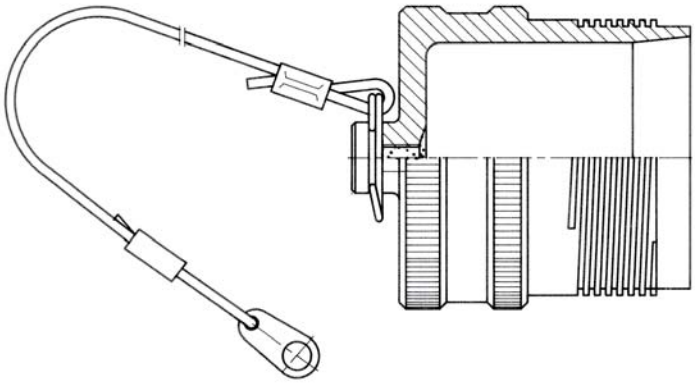
Contact Reference	Crimping tool	Locators	Extraction tools	Contact unlocking tool
BM26112020MT	8365EL	M22520MS EL	OUTDBM2000 EL	OUTM2000 EL OUTMBDB2000 EL
BM26112013MT				
BF20112020MT		836502EL	OUTDBK2000 EL	
BF20112022MT				
BM26115034ST90	M22520501EL	OUT2611B60 EL	-	-
BM26115046ST	SMELISOLECII EL	4E5010EL	-	-
BF26115056ST	SIMELISOLECII EL	4E7016 EL	-	-
BF26115046ST		4E5010 EL	-	-

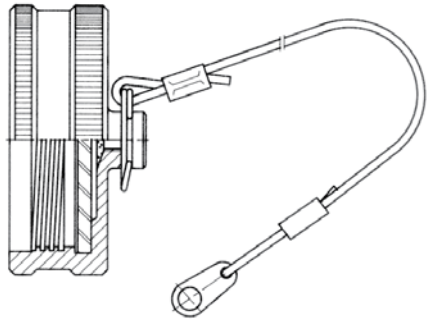
Contacts

Contact Layouts	Contact size	Pin contact	Barrel size	Socket contact	Barrel size	Comments
2012 M12	Ø2mm	BM26112020MT	Ø2mm	BF20112020MT	Ø2mm	
		BM26112013MT	Ø1.3mm			FEM2012M12173 only
2012 M15		BM26112020MT	Ø2mm	BF20112020MT	Ø2mm	13 contacts out of 15
				BF20112022MT	Ø2.2mm	2 contacts out of 15
2612 M6 **2612 M7**	Ø5mm	BM26115034ST90	Ø4.6mm	BF26115056ST	Ø5.6mm	●
		BM26115046ST	Ø3.4mm	BF26115046ST	Ø4.6mm	○

Accessories

Plug & receptacle caps





Connector size	Plug cap reference	Receptacle cap reference
2012	BEFC2012 EL	BERC2012 EL
2612	BEFC2612 EL	BERC2612 EL

NUCLEAR
POWER GENERATION

Other Products

Other Series

U Series

Connectors similar to M Series with 316L stainless steel shells and FPM seals.
See specific catalog.

High pressure withstand:
. Down to 300 meters depth

Robust:
. High corrosion resistant stainless steel shell (AISI 316L)
. Robust screw coupling mechanism
. High temperature resistance (up to +170°C with PTFE insulators)
. Nylatron, teflon or tefzel insulators
. Radiation withstanding (up to 100 MRads)

RoHS compliant RoHS

ULC Series

Push-pull connectors for glovebox application.
See specific catalog available online.

Quick connect:
. Push-pull coupling system

Radiation withstanding materials:
. Shell → Brass or titanium
. Insulation → PEEK
. Other non-metallic parts → Nylatron®

Large range:
. 4 shell sizes
. Multipin signal & power, coaxial, triaxial
. Large choice of receptacles

Sealing ability:
. IP68

Other Series

Remote ULC Series

The ULC remote connectors have been specially designed for remote-control operations and highly contaminated areas.

Quick connect:
. Push-pull coupling system

Remote operable:
. Flat surfaces for robot handling and guiding fork for an easy mating

High radiation and high temperature resistant:
. Titanium and stainless steel shells

No wrong mating:
. 8 different keying available, that also protects the contacts during the mating process

Contents

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Your local contact

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