K2 Qualified Connectors for EPR Reactor

Class 1E connector with quick connect 1/4 turn bayonet coupling and shielding continuity designed to operate during normal & seismic conditions.

K2 Qualified / RCC-E 2005	✓	Qualified for use on safety related equipments inside reactor building, under normal and seismic conditions
Compliant with EPR wiring specifications CST 74C030.02	✓	New back-shell design with integrated 360° shield termination mechanism
High shielding performances	✓	Reduced shell to shell resistance: ≤ 20 mΩ EMI/RFI protection over a wide frequency range
High sealing level	✓	Insulators with grommet seal Back-shell with seal gland
Easy installation and maintenance	✓	No need for shrinkable sheath Dismountable insulators

SOURIAU
Connection Technology

8N45S Series
K2 Qualified Connectors for EPR

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 to +60°C (-31 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

8N45S Series
K2 Qualified Connectors for EPR

Features & benefits

Class 1E Safety Connectors

Designed and manufactured according to RCC-E code
8N45S Series connectors meet the design and manufacturing rules of AFCEN's RCC-E code, which stands as one of the major worldwide references for safety electrical equipments of nuclear islands.

K2 Qualified for 40 years operation
8N45S Series connectors are K2 qualified according to RCC-E, which means they are suitable for use on safety related equipments inside reactor building, under normal and seismic conditions. The qualified lifetime of 8N45S Series connectors is 40 years.

Approved quality assurance program

SOURIAU quality assurance program meets International & Nuclear standards:

- ISO/EN 9001 :2000
- ISO 17025
- SGAQ DIN-DPN 2004-04
- Q/N/100, Q/N/200, Q/N/300
- KTA 3507
- NQA-1-1994 & NQA-1a-1995
- 10 CFR50 Appendix B
- 10 CFR21

Applications

SOURIAU 8N45S series connectors are designed to be used for various applications in the reactor containment building

- Instrumentation
- Control

Field proven

Used in main power plants
The 8N45S is designed on the base of the 8N45 which has been extensively used in more than 60 PWR plants (all types including 900, 1300, 1450 MW reactors).

40 years experience
With 40 years of successful usage without any failure experienced in the field, the 8N45 Series guarantees a safe and reliable connection in the reactor containment building.

Features & benefits

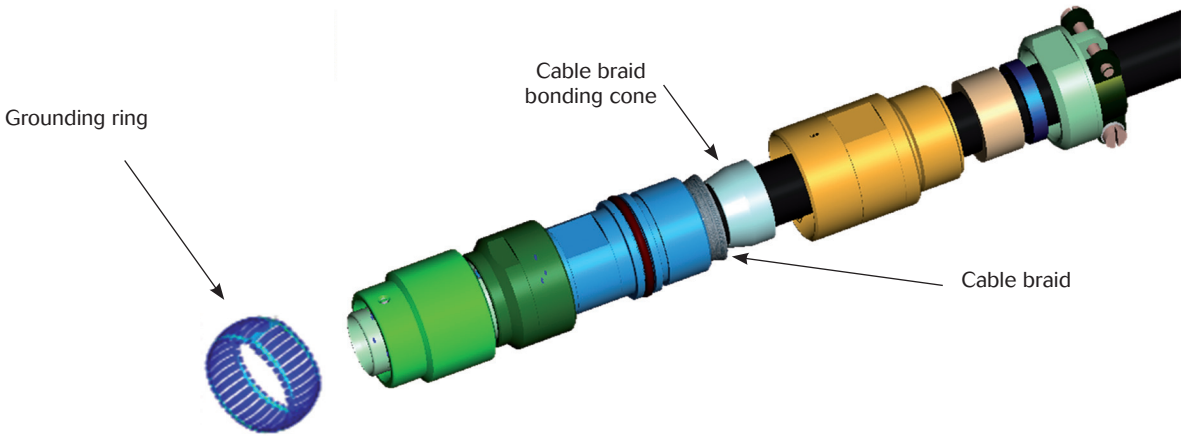
Compliant with EPR wiring specification CST 74C030.02

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 back-shell, 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°



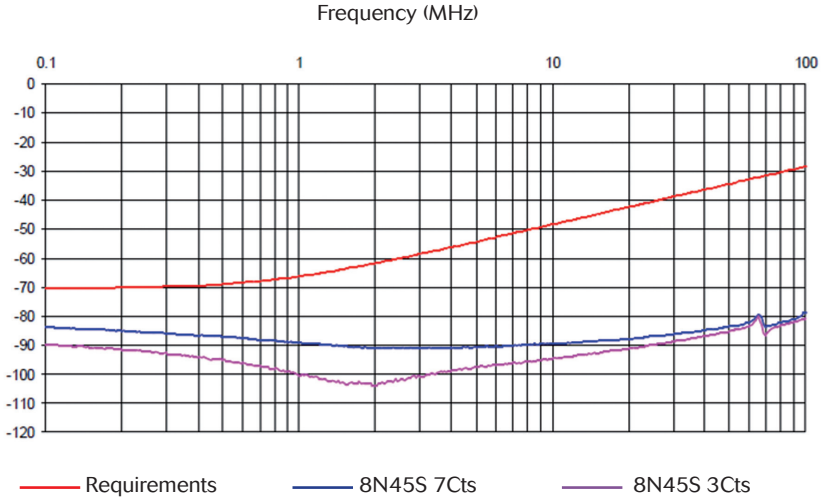
High performance shielding and ground continuity

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

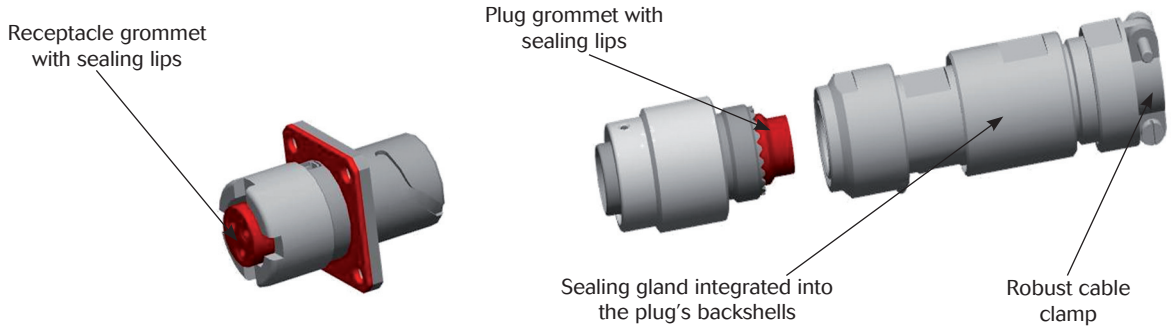
✓ **Nickel plating** on receptacles ensures that those performances are maintained over time.



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.



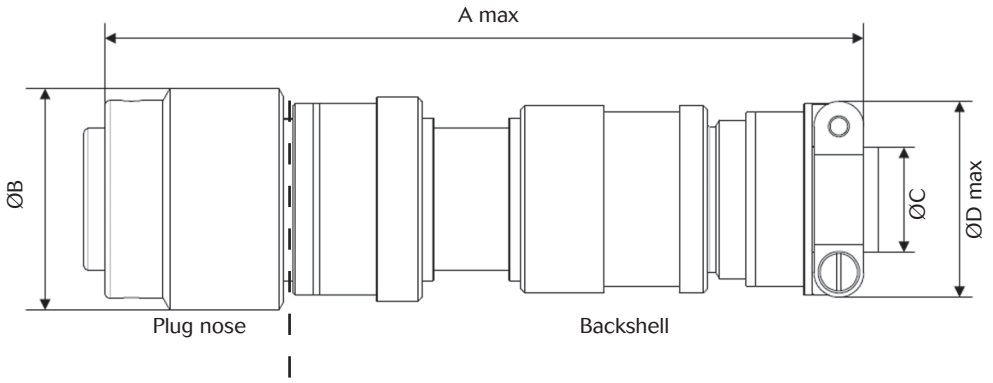
Easy wiring and installation

- ✓ **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 back-shell 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 back-shell that contains the cabling chamber with shielding continuity mechanism.
Several back-shell sizes are available to fit all cable sizes, as show in the table below:



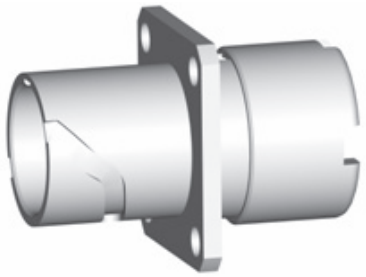
Shell Size	Backshell Type	Ø C		Max. Number of Wired Contacts	A max	Ø B	Ø D max
		min	max				
11	30	7.50	9.00	3	95	23.00	23.20
	31	9.00	10.40				
	301*	7.50	9.00				
		9.00	10.40				
	32	10.50	12.20				
21	30	7.50	9.00	4		27.00	
	31	9.00	10.40				
	301*	7.50	9.00				
		9.00	10.40				
	32	10.50	12.20	7			
	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				

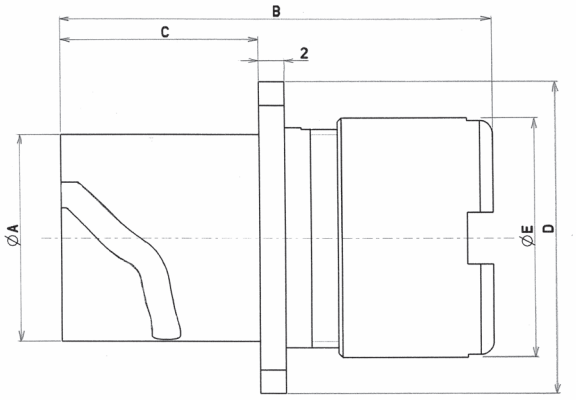
* P/N delivered with a set of two sealing glands and compression rings - ** New backshell sizes. Qualification pending.

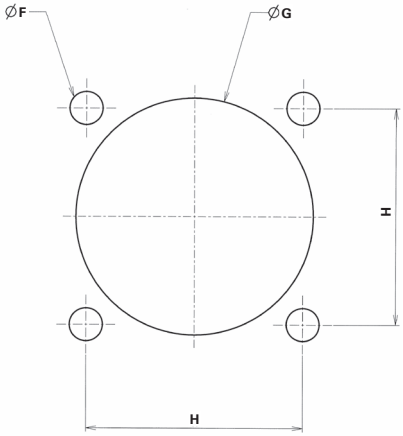
Receptacle characteristics

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. 6)



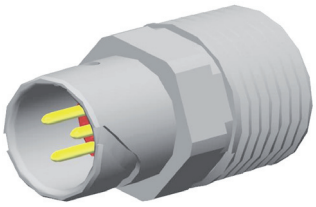


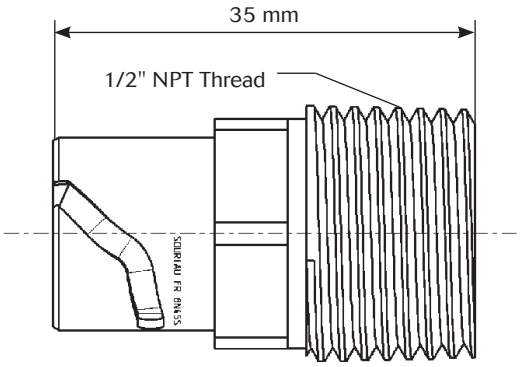


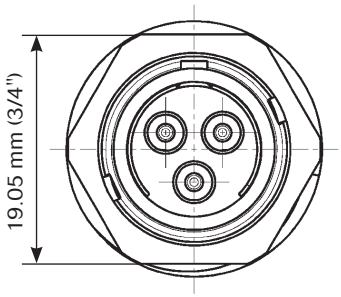
	Ø A	B	C	D	Ø E	Ø F	Ø G	H
11	16,00	33,50	15,40	24,00	18,60	3,2	19,00	18,00
21	20,00	33,50	15,40	27,00	22,60	3,2	23,00	21,00

Receptacle characteristics

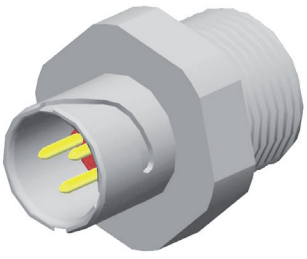
½"NPT receptacle (shell size 11 only)

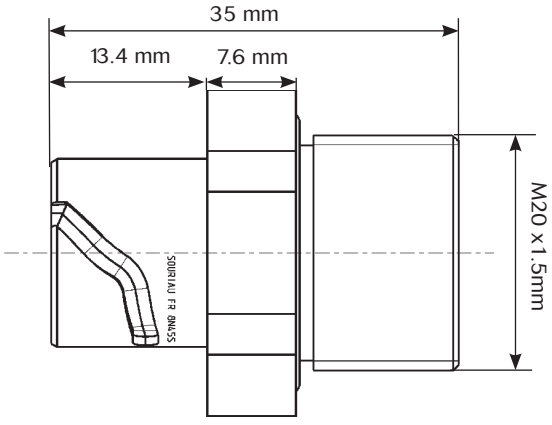


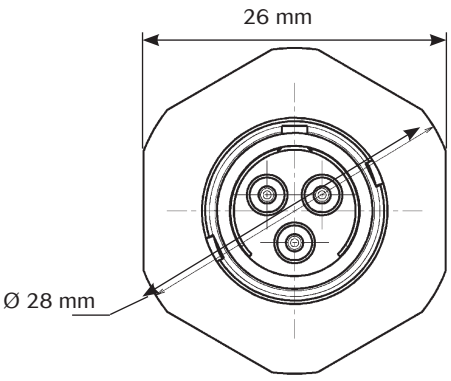




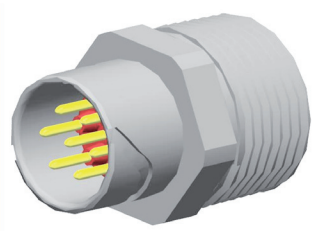
M20 receptacle (shell size 11 only)

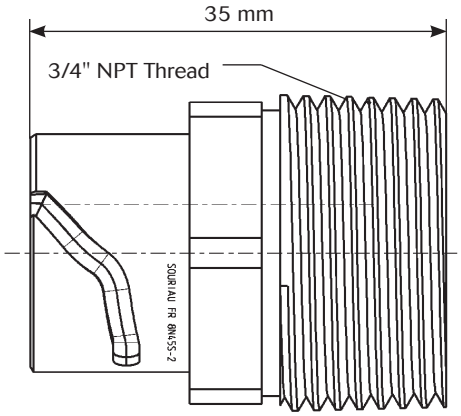


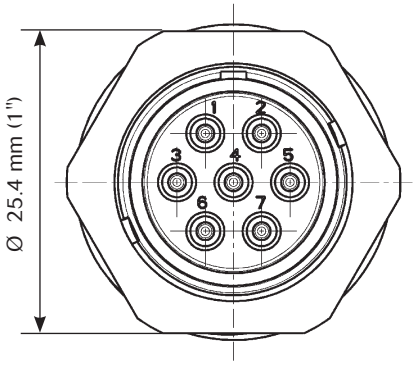




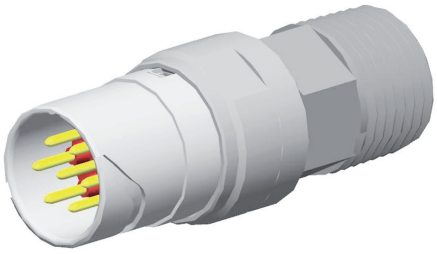
¾"NPT receptacle (shell size 21 only)

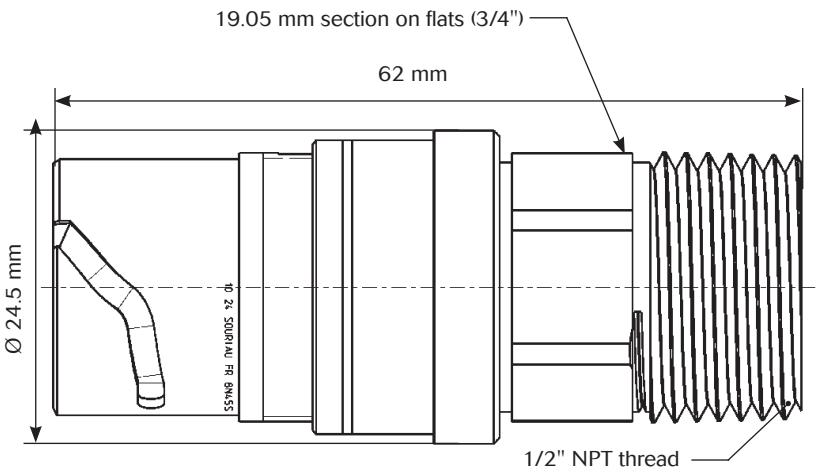


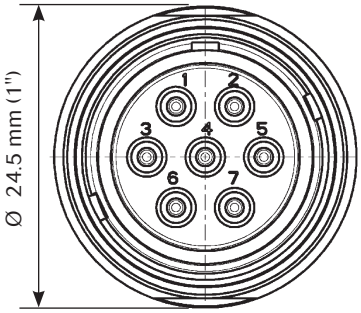




½" NPT adapter receptacle (shell size 21 only)



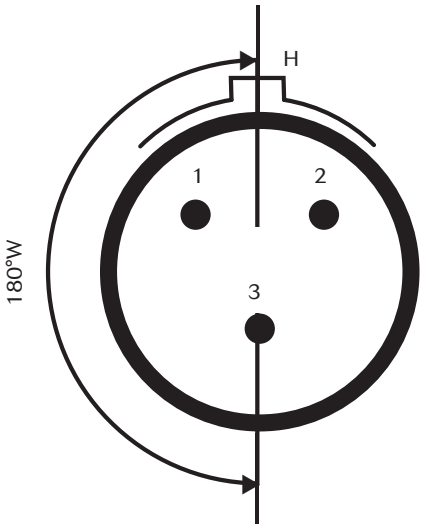




Contact characteristics

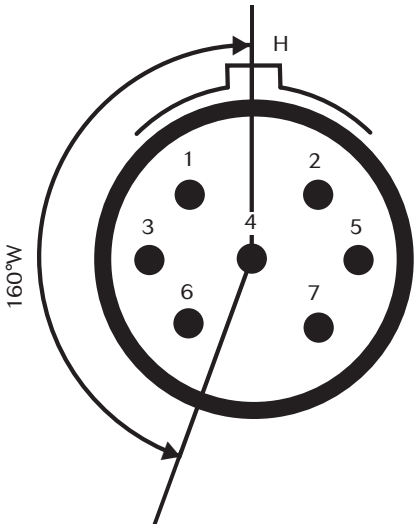
Shell sizes and contact layouts

Shell size 11



3 contacts Ø 1.5 mm

Shell size 21



7 contacts Ø 1.5 mm

Admissible wire sections and sleeving diameters

Shell Size	Contact type	Admissible wire section min/max (mm²)	Admissible sleeving diameters (mm)
11 & 21	Ø1.5 crimp	0.38 / 0.93	1.9 / 3.3
	Small barrel		
	Ø1.5 crimp	0.93 / 1.91	1.9 / 3.3
	Large barrel		

8N45S Series
K2 Qualified Connectors for EPR

Ordering informations

Product Series		8N45S	11	1	1	25	K2	20
Shell Size / Contact Layout	11 : Shell Size 1, 3 contacts Ø1.5 mm 21 : Shell Size 2, 7 contacts Ø1.5 mm							
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) 30* : Straight backshell (shell sizes 11 and 21) 31* : Straight backshell (shell sizes 11 and 21) 301* : Straight backshell (shell sizes 11 and 21) 32* : Straight backshell (shell size 11 only) 312* : Straight backshell (shell size 11 only) 70* : Straight backshell (shell size 21 only) 71* : Straight backshell (shell size 21 only) 701* : Straight backshell (shell size 21 only) 72* : Straight backshell (shell size 21 only) 712* : Straight backshell (shell size 21 only) 73* : Straight backshell (shell size 21 only) 74* : Straight backshell (shell size 21 only) M2 : M20 Interface (receptacle size 11 only) 05 : 1/2" NPT Interface (receptacle size 11 only) or 1/2" NPT adapter (receptacle size 21 only) 07 : 3/4" NPT Interface (receptacle size 21 only) 15 : Cable clamp Ø12 mm (receptacle size 21 only)							
Classification**	K2 : K2 qualified connectors according to RCC-E 2005 NC : Non-classified connectors							
Packaging	blank : standard packaging 20 : long duration packaging without chlorine							

* See definition table p.6 - ** 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
11 & 12	8365EL	8365-02EL	8400-1475EL	8400-448EL	8400-446EL

Spare parts

Panel Gaskets

Shell Size	Part numbers
11	8400-2222
12	8400-2223

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
11 & 21	Ø1.5 crimp Small barrel	8400-307 AKMEL	8400-9019-900EL
	Ø1.5 crimp Large barrel	8400-144 AKMEL	8400-9018-900EL