



SOURIAU

Ethernet & High Speed Networks
MIL-DTL-38999, ARINC 600, EN2997, EN3646



Presentation

Today's technology for Aeronautic and Military equipment is more and more complex, requiring the management of an increasing flow of information at greater speeds.

In response to this need, **SOURIAU** offers a wide range of electrical and fiber optic solutions for high speed networks in harsh environments. These solutions can handle data speeds from several Mbit/s up to several Gbit/s using a wide array of communication protocols (Ethernet, ATM...).

Quadrax is the best electrical solution for: High speed electrical network applications, excellent network performances, crosstalk, return loss, high density of links, harsh environment use...

Typical network applications are 100Mbit/s Ethernet, Gigabit Ethernet, IEEE 1394, Fibre Channel, ...

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QUADRAX CONTACT

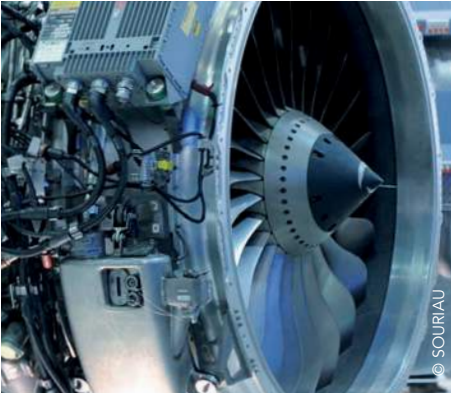
Quadrax Contact up to Cat6

Overview

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Typical applications



Engines



Aircraft Cabin / Cockpit



IFE / Lightning



Landing Gear



Radio / Network Systems

Features & Benefits

HIGH SPEED

An Optimized Electrical Contact

Size 8 contact with 4 strategically spaced size 24 inner contacts.
One Quadrax contact = Two twinax contacts.
One contact provides a full duplex 100 Mbps ethernet link.

COMPA- TIBILITY

A Versatile Technology

Fit the major harsh environment MilAero connectors:
MIL-DTL-38999 - EN3645, ARINC 600, EN2997, EN3646.

QUALIFIED

A Standardized Technology

2 designs for 2 standards:
- Protruding alignment key: ABS qualified / ARINC 664 compliant.
- In-line alignment key: EN3155 qualified.

SMART DESIGN

Superior Signal Integrity Performance

Innovative insert design to enable radial insertion of contacts to improve cross talk performance.

Description

- Front and rear removable versions available
- Crimp and PC tail versions available
- Standard #8 cavity insertion and removal tools
- Ground connection of the cable braid to the shell possible through the external shell of the #8 contact
- Compatible with star quad cable
- Characteristic impedance of 100 Ohms



Technical features

Mechanical

- **Operating temperature:**
-65°C up to 200°C
Stainless steel (class K, E, Y and YE)
- **Inner contact:**
Copper alloy
- **Contact body:**
Copper alloy
- **Insulator:**
Thermoplastic resin
- **Contact plating:**
Gold over nickel

Electrical

- **ISO/IEC 11801 category 6 compliant:**
Next (cross talk): >46 db at 250 MHz
Return loss: >16 db at 250 MHz
Shield effectiveness: >36 db at 80 MHz
- **Contact to shell continuity:**
<10 mΩ (ARINC 600)
- **Contact resistance (low level):**
Initial: 15 mΩ
After tests: 30 mΩ
- **Dielectric withstanding voltage:**

Altitude	Service I
Sea level	500 Vrms
21 000 m	125 Vrms
- **Insulation resistance:**
At ambient temperature: >5000 mΩ
At high temperature: >1000 mΩ
- **#24 contact cable size acceptance:**
AWG 22 to AWG 26

2 designs for 2 Standards

- **Protuding alignment key:**
for ARINC 600, EN2997, EN3646



- **In-line alignment key:**
for MIL-DTL-38999



An optimized high speed electrical contact

Size 8 outer contact with 4 strategically spaced size 24 inner contacts forming two **100Ω** or **150Ω** matched impedance pairs with excellent 360° shielding.

Equivalent to **two twinax contacts** with:

- better performance (reduced cross talk)
- shorter cabling time
- compact profile
- lighter weight



One contact provides a **full duplex 100 Mbps ethernet** link, and fulfills the ISO/IEC 11801 **category 6** requirements.

A versatile technology

Fit the major harsh environment **MilAero connectors**:



Ground connection of the cable braid to the connector shell on:

- All ARINC 600 layouts
- MIL-DTL-38999 Series I & III - EN3645
- EN2997
- EN3646

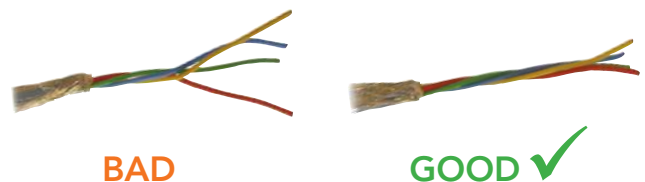
Superior signal integrity performance

Innovative insert design enabling radial insertion of inner crimped contacts.



Radial insertion of contacts in insert enabling minimum untwisting of the cable for wiring operation.

Minimum untwisting of the cable
= **improved cross talk performance.**



QUADRAX CONTACT

Quadrax Contact up to Cat6

Product Series

■ Quadrax contact: ordering information, tooling & accessories	12
■ MIL-DTL-38999 Series I / 8LT Series	13
■ MIL-DTL-38999 Series III / EN3645 / 8D Series	14
■ EN2997 / 853 Series	19
■ EN3646 / 8525 Series	22
■ ARINC 600 Series	23

38999 Series I & III contacts - In-line alignment key

All crimp contacts are sealed thru a sealing boot. Crimp contacts ordered separately are delivered with sealing boot.

Contact type		SOURIAU part number	Cross norm	Impedance	Release	T° Max
PC tail L= 4 ^{±0.1} mm	Pin	ETH1-1237A	-	100Ω	Rear	125°C
		ETH1-1501A	-	150Ω	Rear	125°C
	Socket	ETH1-1238A	-	100Ω	Rear	125°C
		ETH1-1502A	-	150Ω	Rear	125°C
Crimp	Pin	ETH1-1345A	EN 3155-074	100Ω	Rear	150°C
		ETH1-1503A	-	150Ω	Rear	150°C
	Socket	ETH1-1346A	EN 3155-075	100Ω	Rear	150°C
		ETH1-1504A	-	150Ω	Rear	150°C

ARINC 600, EN2997, EN3646 contacts - Protruding alignment key

All crimp contacts are unsealed. Sealing boots are available. All contacts delivered without boot.

Contact type		SOURIAU part number	ABS part number	Impedance	Release	T° Max	ARINC 600	EN2997	EN3646
PC tail L= 6.35 mm	Pin	ETH1-1110A	-	100Ω	Front	125°C	✓		
Tinned PC tail L= 6.35 mm		ETH1-1123A	-	100Ω	Front	125°C	✓		
PC tail L= 4.45 mm		ETH1-1137A	-	100Ω	Rear	200°C		✓	
Crimp	Pin	ETH1-1100A	ABS0973 M08A	100Ω	Rear	125°C	✓		✓
		ETH1-1126A	-	100Ω	Rear	200°C		✓	
	Socket	ETH1-1101A	ABS0974 F08A	100Ω	Rear	125°C	✓		✓
		ETH1-1127A	-	100Ω	Rear	200°C		✓	

Sealing boot

Connector	T° Max	# Cable	SOURIAU part number	ABS part number
EN2997	200°C	8	8533-8236	ABS0992B01
	260°C		8533-8307	
		10/12	8533-8287	ABS0992B02
ARINC 600	200°C	Quadrax cable	8660-6053	

Recommended cable

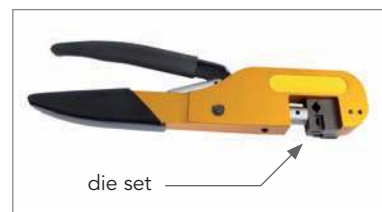
Impedance	Reference	Cable type	Number of pairs
100Ω	ABS 1503 KD24	Star quad	2

Quadrax tools

- Inner contacts: M22520/2-01 crimping tool and K709 locator



- Outer body: M22520/5-01 crimping tool and M22520/5-45 die set



- Insertion/extraction tool, standard size 8 cavity tools: 8660-197 (metallic) or M81969/14-06 (plastic)

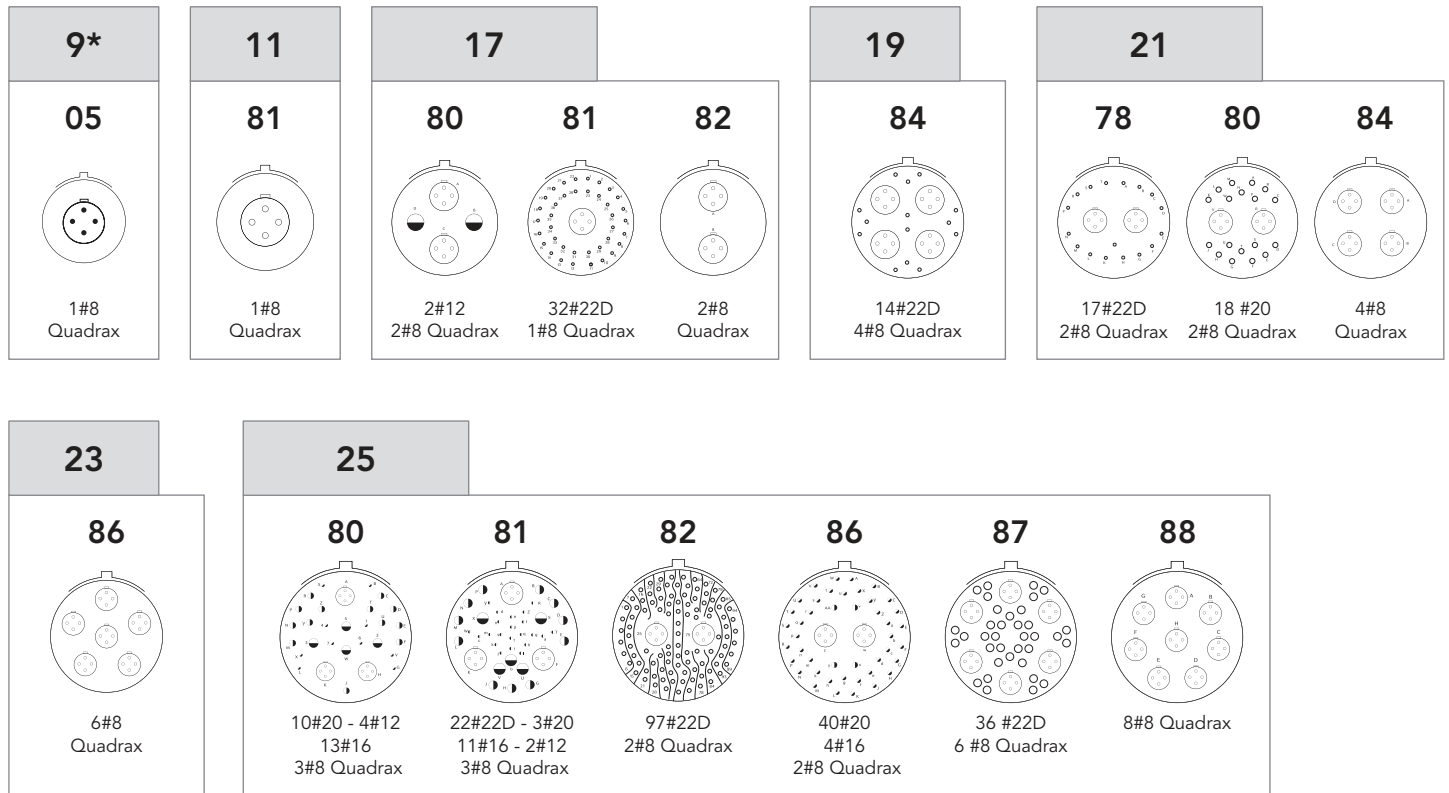


Description

- High contact density
- MIL-DTL-38999 Series I: Bayonet coupling
- Numerous layouts
- 100% scoop proof
- RFI - EMI shielding and shell to shell continuity
- Nickel or cadmium plated



Contact layout



Ordering information & Dimensions

Please consult "8LT Series - MIL-DTL-38999 Series I" catalog.

Description

- Front and rear removable versions available
- Twinax: crimp version available
- Quadrax: crimp and PC tail versions available
- Standard #8 cavity insertion and removal tools
- Ground connection of the cable braid to the shell possible through the external shell of the #8 contact
- Compatible with star quad cable
- Characteristic impedance of 100 Ohms
- Mixed layouts not grounded



Technical features

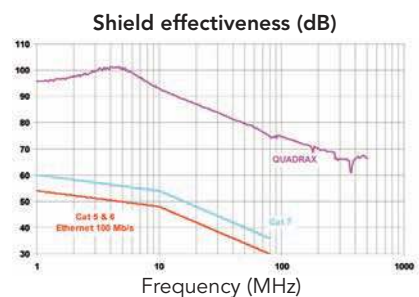
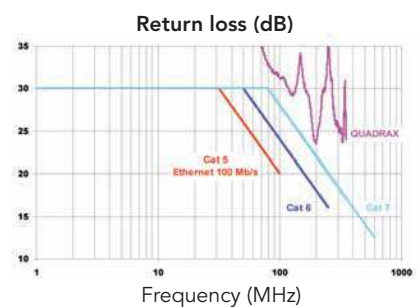
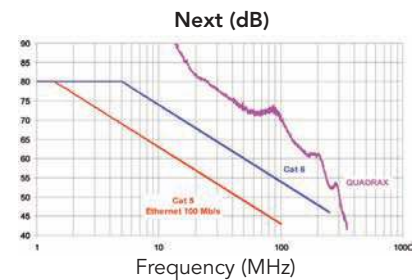
Mechanical

- **Operating temperature:**
-65°C up to 150°C
- **Inner contact:**
copper alloy
- **Contact body:**
copper alloy
- **Contact insulator:**
thermoplastic resin
- **Contact plating:**
gold over nickel
- **Shell plating:**
 - . Aluminum shell:
 - Cadmium olive drab (W)
 - Nickel (F)
 - Black zinc nickel (Z)
 - Green zinc cobalt (ZC)
 - . Composite shell:
 - Cadmium olive drab (J)
 - Nickel (M)
 - Without plating (X)
 - . Stainless steel shell:
 - Passivated (K)
 - Nickel (S)
 - . Titanium shell:
 - Without plating (TT)
 - Nickel (TF)
 - . Bronze shell:
 - Without plating





Electrical

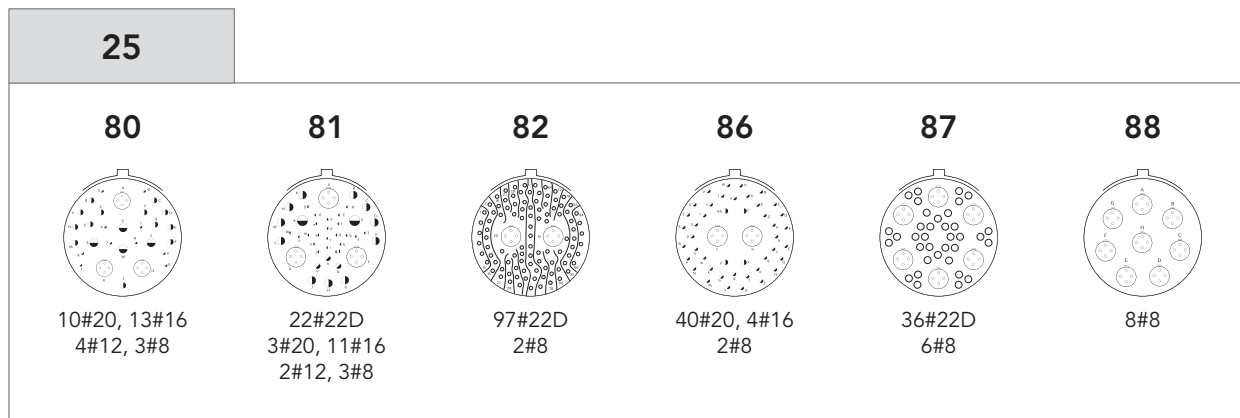
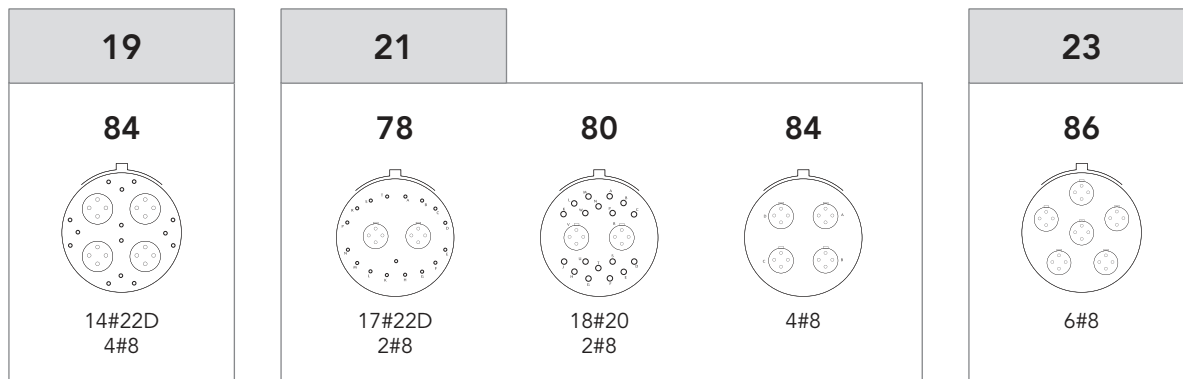
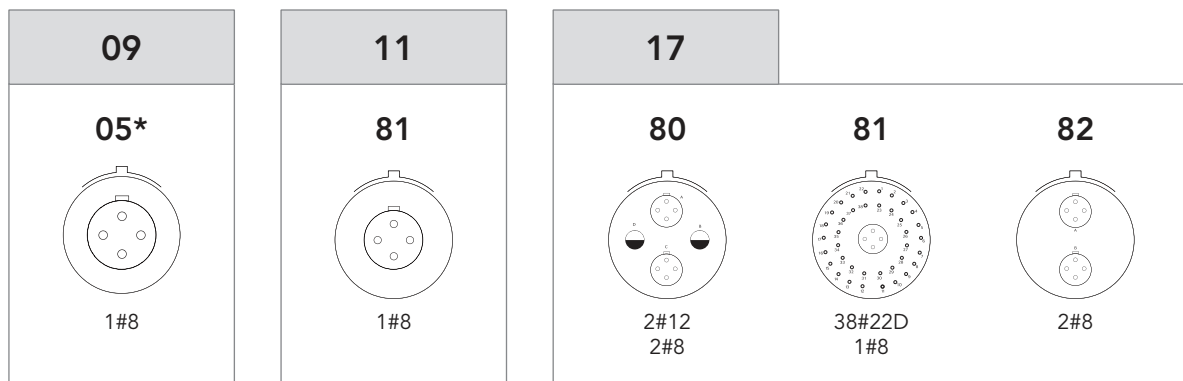
- **ISO/IEC 11801 category 6 compliant:**
 - . Next (cross talk): > 46 db at 250 MHz
 - . Return loss: > 16 db at 250 MHz
 - . Shield effectiveness: > 36 db at 80 MHz
- **Contact to shell continuity:**
< 10 mΩ
- **Contact resistance (low level):**
 - . Initial 15 mΩ
 - . After tests 30 mΩ
- **Dielectric withstanding voltage:**

Altitude	Service I
sea level	500 Vrms
21 000 m	125 Vrms
- **Insulation resistance:**
 - . At ambient temperature: > 5000 MΩ
 - . At high temperature: > 1000 MΩ
- **#24 contact cable size acceptance:**
AWG 22 to AWG 26



Contact layouts

-  Contact #22D
-  Contact #12
-  Contact #20
-  Contact #8, Twinax or Quadrax
-  Contact #16



* 09-05 layout with twinax or quadrax contact:
 - grounded version only
 - plug with female contact & receptacle with male contact only

Note: Mixed layouts not grounded.

Ordering information

Aluminum, Composite, Stainless steel & Titanium connector

Basic Series	8D	0	Q	11	W	81	P	N	284	L
Shell style:										
0: Square flange receptacle										
5: Plug										
7: Jam nut receptacle										
Type:										
C: Quadrax PC tail contacts*										
Q: Quadrax crimp contacts										
Shell size: 9 - 11 - 17 - 19 - 21 - 23 - 25 (see next page)										
Plating:										
Aluminum shell:					Composite shell:					
W: Olive green cadmium					J: Olive green cadmium					
F: Nickel					M: Nickel					
Z: Black zinc nickel					X: Without plating					
ZC: Green zinc cobalt					Titanium shell:					
Stainless steel shell:					TF: Nickel					
K: Passivated					TT: Without plating					
S: Nickel										
Contact layout: See previous page										
Contact type:										
P: Pin										
S: Socket										
Orientation: N, A, B, C, D & E										
Specification:										
284: Quadrax grounded PC tail contact (100Ω)*					550: Tin plated Quadrax not grounded PCB contact SnPb					
308: Quadrax not grounded PC tail contact (100Ω)					550S: Tin plated Quadrax not grounded PCB contact SAC305					
384: Quadrax grounded crimp contact (150Ω)*					550E: Tin plated Quadrax not grounded PCB contact Sn pur					
408: Quadrax not grounded crimp contact (150Ω)										
620: Quadrax grounded crimp contact (100Ω)*										
621: Quadrax not grounded crimp contact (100Ω)										
L: For P or S contact type only, connectors delivered without contacts, connectors marking P or S plus orientation										

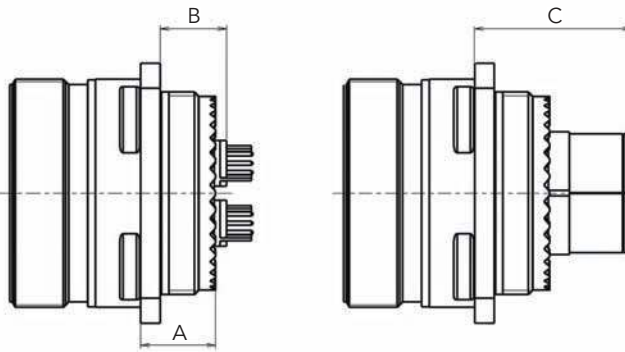
Bronze connector

Basic Series	JVS	C	00A	09	35	P	N	284	L
Type:									
C: Quadrax PC tail contacts*									
Q: Quadrax crimp contacts									
Shell style:									
00A: Square flange receptacle									
16A: Plug									
07A: Jam nut receptacle									
Shell size: 9 - 11 - 17 - 19 - 21 - 23 - 25 (see next page)									
Contact layout: See previous page									
Contact type:									
P: Pin									
S: Socket									
Orientation: N, A, B, C, D & E									
Specification:									
284: Quadrax grounded PC tail contact (100Ω)*					550: Tin plated Quadrax not grounded PCB contact SnPb				
308: Quadrax not grounded PC tail contact (100Ω)					550S: Tin plated Quadrax not grounded PCB contact SAC305				
384: Quadrax grounded crimp contact (150Ω)*					550E: Tin plated Quadrax not grounded PCB contact Sn pur				
408: Quadrax not grounded crimp contact (150Ω)									
620: Quadrax grounded crimp contact (100Ω)*									
621: Quadrax not grounded crimp contact (100Ω)									
L: For P or S contact type only, connectors delivered without contacts, connectors marking P or S plus orientation									

* For PC tail contacts or grounded versions please consult us.

Dimensions

Square flange receptacle - Type 0

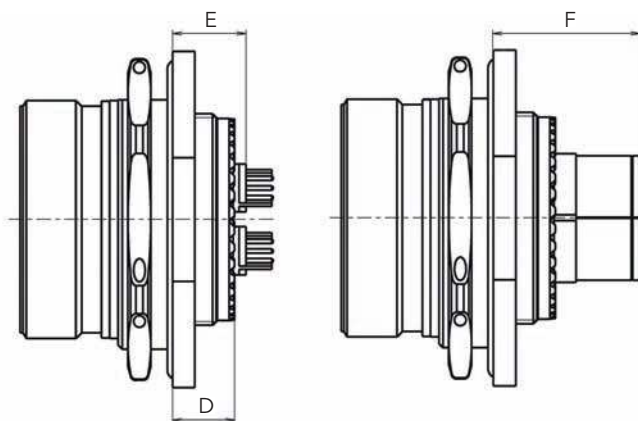


PC Tail contacts

Crimp contacts

Shell size	A Max			B Min			B Max			C Max
	Aluminum	Composite	Stainless steel, Titanium & Bronze	Aluminum	Composite	Stainless steel, Titanium & Bronze	Aluminum	Composite	Stainless steel, Titanium & Bronze	All materials
11 to 19	10.72	11.96	11.4	11.5	12.5	12	13.5	13.5	14	29
21 to 25	11.54	12.76	11.8	12	14.5	12.5	14	15.5	14.5	30

Jam nut receptacle - Type 7

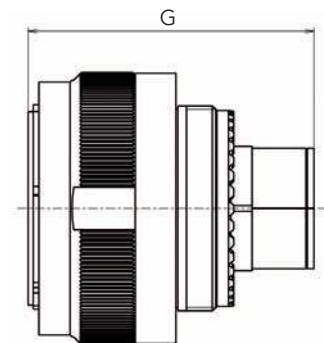


PC Tail contacts

Crimp contacts

Material	Aluminum, Stainless steel, Titanium & Bronze			
Shell size	D Max	E Min	E Max	F Max
11 to 25	9.9	9.5	12	27

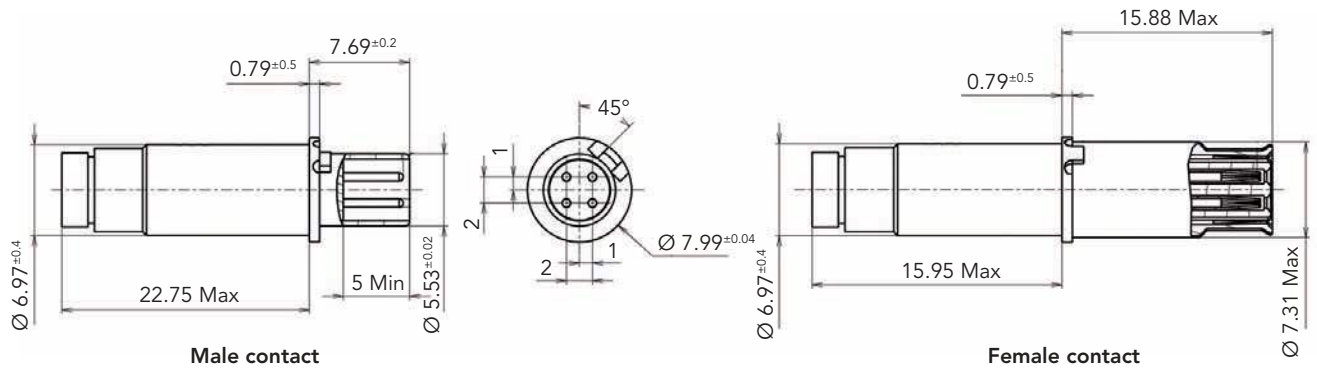
Plug - Type 5



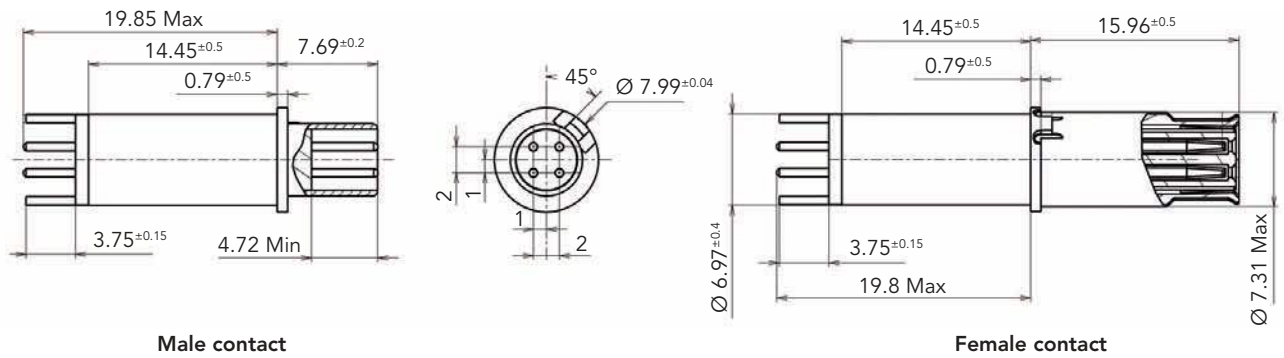
All materials	
Shell size	G Max
11 to 25	48

Note: All dimensions are in millimeters (mm)

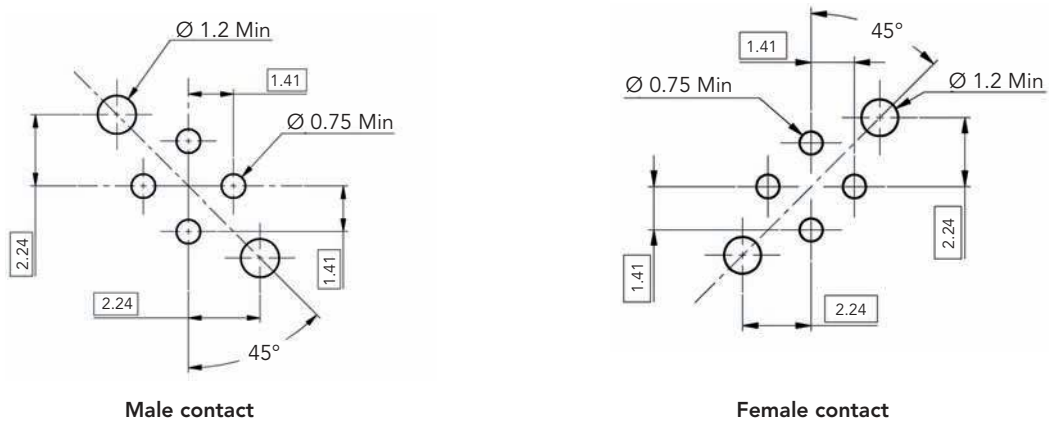
Quadrax crimp contact



Quadrax PCB contact



Drill dimensions for PCB mount



Note: All dimensions are in millimeters (mm)

Description

- Robust aluminum or stainless steel screw coupling connector.
- The utmost solution to combine high vibrations and high temperature.
- Quadrax contact size 8 to use in size 6 cavity.
- Standard strain relief backshell or spacer accessory to adapt any specific backshell.
- Airbus ABS 1340-1343, 1426-1427, 1452 qualified.
- Grounded insert option for perfect shielding.
- PC tail as well as crimp contacts available.



Technical features

Mechanical

- **Shell:**
 - . nickel plated aluminum (R class),
 - . passivated stainless steel (K class).
- **Grommet and seal:**
 - . silicone elastomer.
- **Insulator:**
 - . thermoplastic.
- **Contact body:**
 - . copper alloy.
- **Contact plating:**
 - . gold over nickel.
- **Contact retention:**
 - . size 8: 130N.
- **Endurance:**
 - . 500 mating cycles (K class),
 - . 250 mating cycles (R, W & A classes).
- **Vibration & shock:**
 - . according to EN2997.

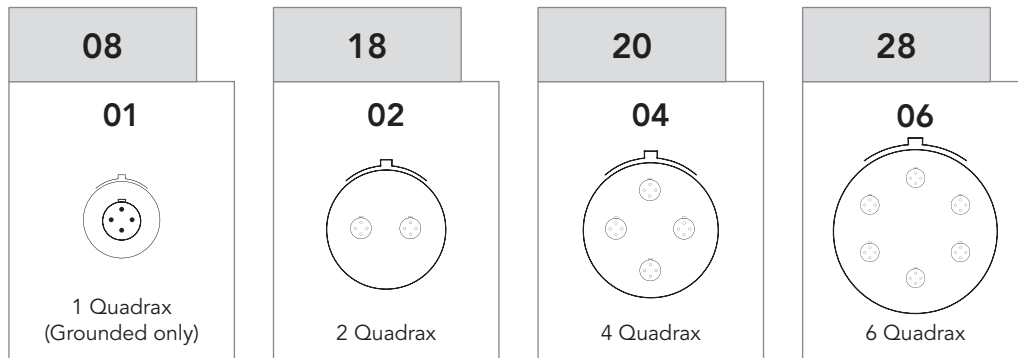
Electrical

- **Insulation resistance:**
 - . 5000 M Ω under 500 Vdc.
- **Max current rating per contact:**
 - . size 24: 1A
 - (4 size 24 inner contacts in a size 8 outer contact).
- **Contact resistance:**
 - . initial < 0.4 m Ω .
- **Electrical continuity:**
 - . 5m Ω with RFI shielding.
- **Shielding:**
 - . to 100 MHz at 1 GHz attenuation 65 dB.

Environmental

- **Temperature range:**
 - . -60°C +200°C R & K classes.
- **Leakage:**
 - . as per 2591-312:
 - Method B differential pressure: 100kPa
 - Maximum leakage flow: 16x10⁻⁶m³/h
- **Salt spray:**
 - . 48 hours (R class),
 - . 500 hours (K class).
- **Fire resistance:**
 - . as per EN 2591-318:
 - 6 min under a 1100°C flame without electrical perturbation, plus 14 min with no flame propagation (ES class).
- **Resistance to fluids:**
 - . MIL-H 5606 - SKYDROL 500 B4 - LD4 - JP5 - MIL-L 7870A - MIL-L 23699 - MIL- L 7808 - MIL-C 25769 - MIL-A 8243

Contact layout



Ordering information

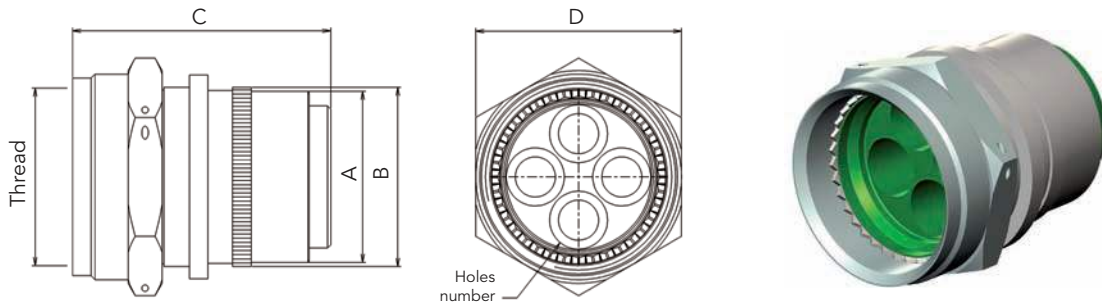
SOURIAU part numbers

Basic series	8533	0	R	S	20	04	P	N	G	L
Shell type:										
0: Square flange receptacle										
3: Plug with RFI shielding										
7: Jam nut receptacle										
Shell class:										
R: Nickel plated aluminum shell (200°C)										
K: Stainless steel shell (200°C)										
S: With 360° teeth										
Shell size:										
08, 18, 20, 24, 28										
Contact layout:										
See above										
Contact type:										
P: Pin										
S: Socket										
Orientation:										
N, 6, 7, 8, 9, Y										
Insert class:										
None: Not grounded										
G: Grounded - for Quadrax applications only										
Mandatory suffix for shells sizes 18, 20, 24 & 28 :										
125: With quadrax contact + sealing boot (200°C max)										
126: With backshell, without contact and sealing boot										
231: With spacer, without contact and sealing boot (see next page for available layouts)										
L: Without contact and sealing boot										
Mandatory suffix for layout 08-01 only (200°C, plug with female contact & receptacle with male contact only):										
165: With quadrax contact + backshell for heatshrink sleeving										
L165: Without quadrax contact, with backshell for heatshrink sleeving										

Dimensions

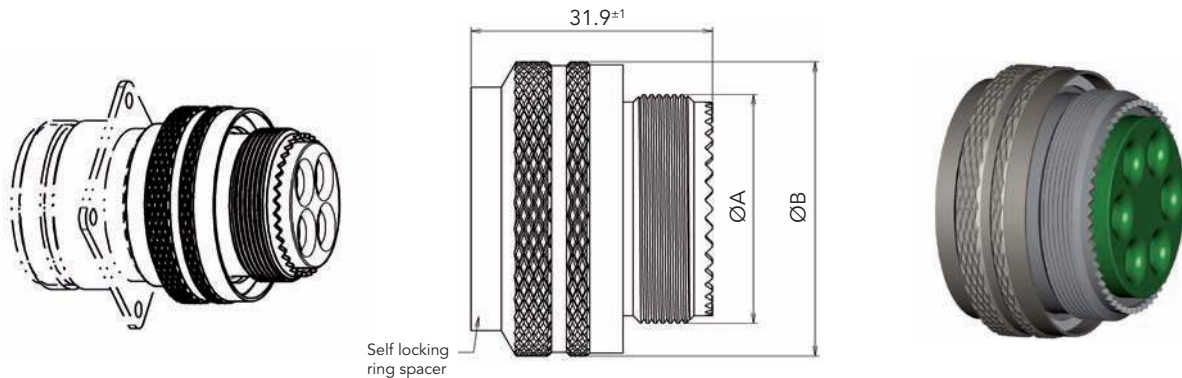
Please consult "853 Series" catalog.

Strain relief backshell



Layout	Material	Part number	Mass max (g)	A ± 0.1	B Max	C ± 0.12	D	Holes number	Thread Class 2B	Coupling torque N.m
18-02	Aluminum	85338342	40	24.90	29.45	41.78 ± 1.2	31.62	2	1.0625-18 UNEF	16
	Stainless steel	85338343	75							
20-04	Aluminum	85338250	40	27.72	30.12	41.78 ± 1.2	33.21	4	1.1875-18 UNEF	20
	Stainless steel	85338281	73							
24-04	Aluminum	85338223	53	33.71	37.26	48.95 Max	45	4	1.4375-18 UNEF	26
	Stainless steel	Consult us	-							
28-06	Aluminum	85338245	82	39.7	44.4	41.78	47.49	6	1.7500-18 UNS	29
	Stainless steel	85338288	146							

Spacer



Layout	Stainless steel		Aluminum		ØA	ØB Max
	Part number	Mass max (g)	Part number	Mass max (g)		
20-04	8533-8388	88	8533-8387	Consult us	1"3/16-18 UNEF 2A	40
24-04	8533-8390	115	8533-8389		1"7/16-18 UNEF 2A	45
28-06	8533-8392	140	8533-8391		1"3/4-18 UNS	53

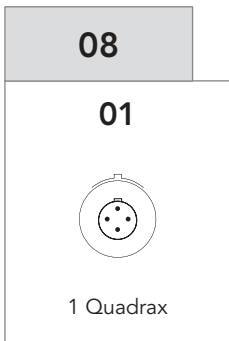
Note: All dimensions are in millimeters (mm)

Description

- Robust bayonet coupling system withstanding high vibrations
- ABS qualified design derived from EN3645/MIL 26482 Series 2
- Environmental stainless steel version or aluminum shell
- Smallest aeronautical quadrax on the market



Contact layout



Ordering information

Shell type	Layout	SOURIAU part number	ABS part number
Plug	0801 (8B01)	8525 16R8B01SNH164L ⁽¹⁾	ABS 1054 A60801 BN + ABS 1057-08A01
		8525 16R8B01SNH164 ⁽²⁾	ABS 1054 A60801 FN + ABS 1057-08A01
Square flange receptacle	0801 (8B01)	8525 10R8B01PNH164L ⁽¹⁾	ABS 1054 A00801 AN + ABS 1057-08A01
		8525 10R8B01PNH164 ⁽²⁾	ABS 1054 A00801 MN + ABS 1057-08A01

(1) mono quadrax connector delivered with backshell and without contact.

(2) mono quadrax connector delivered with backshell and with quadrax contact.

Description

- High density solution:
 - . Blind mate, clearance device for better rackability
 - . Low insertion force
- Rackable solution:
 - . Up to 56 #8 quadrax contacts
- Modular solution:
 - . Build your own connector matching your exact needs
- Repairable solution:
 - . EMI RFI shielding solution
 - . Nickel and alodine plating
 - . 100A power capability
 - . Fixing type
 - . Grounding
 - . Filtering

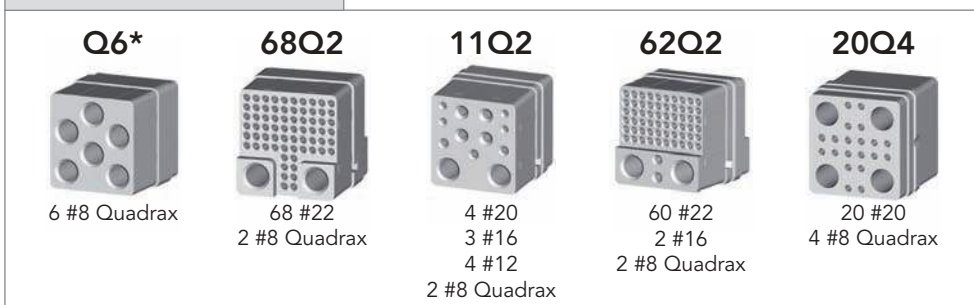


Contact layout - ARINC 600 sizes 2 and 3

Cavities A, B, D, E



Cavities C, F



* Grounded metal insert

Ordering information & Dimensions

Please consult "ARINC 600 Series" catalog.

QUADRAX CONTACT

Quadrax Contact up to Cat6

Range Extension

■ Fiber optic ELIO® contacts	26
■ BMA coaxial contacts	26
■ Power contacts	27
■ High power contacts	27
■ Power contacts for PCB	28
■ 230V connectors	28

SOURIAU contact offer

Fiber Optic ELIO® Contacts

ELIO® contact: ruggedized and user friendly fiber optic technology. Easy mounting optical link for severe applications.

Flight proven:

- . The only Airbus qualified fiber optic technology: ABS1379, ABS1213. ARINC 801 and EN4531 qualified.

Robust connection:

- . Withstanding the most severe vibrations with excellent optical performance (0.3 dB).

User friendly contact:

- . Easy cleaning: no part to remove.
- . No tool needed for insertion/extraction of the contacts.

A wide range available:

- . In all planforms with #8 cavities. Up to 24 ELIO® contacts in 38999 size 25.



See «ELIO® Fiber Optic Technology» catalog on www.souriau.com

BMA Coaxial Contacts

A robust and powerful coaxial High Frequency transmission (BMA) now available in any size 8 SOURIAU insert of D38999 Series III.

Spring HF contact:

- . Vibration and High Frequency.

Largest Flexibility:

- . 16 layouts available.

Qualified coaxial contact:

- . Interface according MIL-STD-348A/321.

Easy mounting:

- . Removable contact.



See «VGE1 ELIO® Rugged Fiber Optic Solutions» product news on www.souriau.com

SOURIAU contact offer

Power Contacts

Power supply in harsh environments. Designed to be used in severe environments, fluid resistance, high shock and vibration.

A unique contact design with a braid socket:

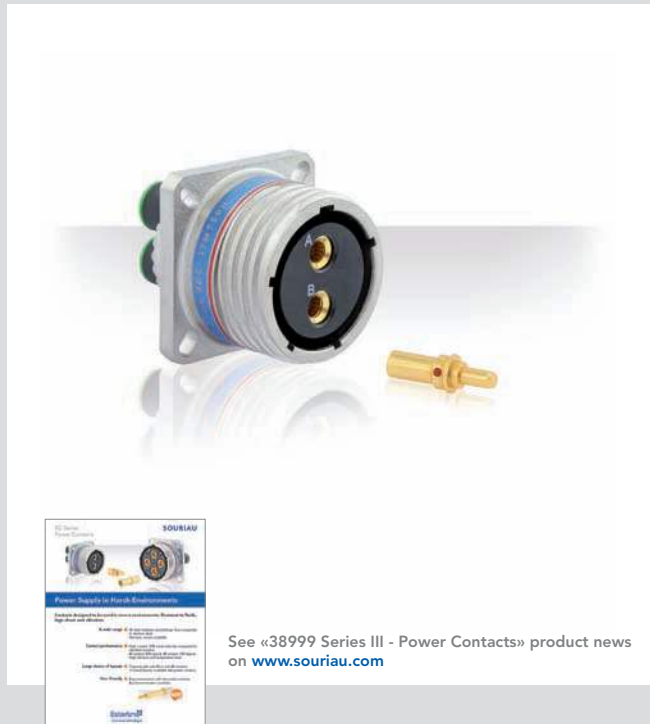
- . 20 contact points for a #4 contact vs 2 or 3 for a standard socket.
- . Allowing 20 % more current as compared to standard socket.
- . Excellent vibration withstanding.
- . Insure excellent crimping.

A versatile individual sealing on the cable:

- . Sealing on the cable done thanks to a sealing boot.
- . Same connector can accomodate a wild range of cable diameter.

A contact technology integrated in well proven standard MilAero connectors:

- . Up to 260°C service temperature.
- . Up to 60G vibration withstanding.
- . Shell available in, aluminium, composite, Stainless steel, Titanium & Bronze.



See «38999 Series III - Power Contacts» product news on www.souriau.com

High Power Contacts

38999 High Power (up to 850A). Designed to meet the harshest military requirement where high power and shielding are needed.

3 aluminum shell sizes available:

- . Size 19 (450A max); size 23 (650A max); size 25 (850A max).
- . Different finish: cadmium, zinc nickel, electroless nickel.
- . Threaded coupling.

Superior contact technology equipped with a silver plated braid:

- . High contact endurance.
- . Low contact resistance.
- . No microcut under vibration.

Modular design for easy installation:

- . Removable backshell: straight, right angle or bus bar.
- . Backshell termination: for thread or shrink boot.
- . Possible to crimp various cable (Ø from 50 to 185mm).

Safety



See «38999 Series III - High Power Contacts» product news on www.souriau.com

SOURIAU contact offer

Power Contacts for PCB

Firewall connector for power supply, adapted to PCB solutions.

Safe & Quick Avoid soldering of contacts:

- . No heat applied: no risk of damaging the connector.
- . Quicker fit in the equipment.

Robust:

- . True mechanical link between PCB and contacts: no additional double flange needed. Power contacts are attached directly to the board with screws for an optimized connection.
- . Available in size 6 contact (Ø4.6mm) & size 4 contact (Ø5.74mm).

Compact:

- . Tapped contacts for direct and small sized connections, especially compared to standard lugs.



230V Connectors

The use of higher voltage to reduce cable weight has lead to the development of double voltage in un-pressurized connectors.

Robust design and materials:

- . ensuring that in un-pressurized areas no partial discharge will weaken the connector.
- . each production batch is tested to ensure performance to this high level.

No possible mismatch:

- . specific T and V clocking to avoid mating with a non 230V qualified counterpart.

Flexible offering:

- . available in standard watertight as well as in hermetic connectors.
- . available in composite and stainless steel shells.



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