

# **SOURIAU**

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



## Quadrax Technology



#### **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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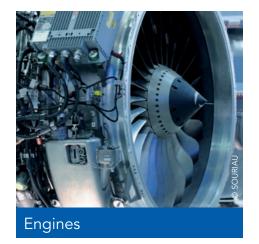
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## Quadrax Contact up to Cat6

# Overview

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## **Typical applications**











#### Features & Benefits



## 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.



## A Versatile Technology

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



## 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.



- 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:  $<10 \text{ m}\Omega$  (ARINC 600)
- Contact resistance (low level): Initial: 15 m $\Omega$  After tests: 30 m $\Omega$
- Dielectric withstanding voltage:

Altitude	Service I			
Sea level	500 Vrms			
21 000 m	125 Vrms			

- Insulation resistance: At ambient temperature: >5000 m $\Omega$  At high temperature: >1000 m $\Omega$
- #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  $100\Omega$  or  $150\Omega$  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 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
ď	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 t	type	SOURIAU part number	Cross norm	Impedance	Release	T° Max
	D:-	ETH1-1237A	-	100Ω	Rear	125°C
PC tail	Pin	ETH1-1501A	-	150Ω	Rear	125°C
L= 4 <sup>±0</sup> 1mm	Socket	ETH1-1238A	-	100Ω	Rear	125°C
		ETH1-1502A	-	150Ω	Rear	125°C
	Pin	ETH1-1345A	EN 3155-074	100Ω	Rear	150°C
Colores		ETH1-1503A	-	150Ω	Rear	150°C
Crimp		ETH1-1346A	EN 3155-075	100Ω	Rear	150°C
	Socket	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		ETH1-1110A	-	100Ω	Front	125°C	<b>✓</b>		
Tinned PC tail L= 6.35 mm	Pin	ETH1-1123A	-	100Ω	Front	125°C	<b>✓</b>		
PC tail L= 4.45 mm		ETH1-1137A	-	100Ω	Rear	200°C		✓	
	D:-	ETH1-1100A	ABS0973 M08A	100Ω	Rear	125°C	<b>✓</b>		✓
Cuitana	Pin	ETH1-1126A	-	100Ω	Rear	200°C		<b>√</b>	
Crimp	Crimp	ETH1-1101A	ABS0974 F08A	100Ω	Rear	125°C	<b>✓</b>		<b>√</b>
	Socket	ETH1-1127A	-	100Ω	Rear	200°C		✓	

## **Sealing boot**

Connector	T° Max	# Cable	SOURIAU part number	ABS part number
	200°C	8	8533-8236	ABS0992B01
EN2997	260°C	0	8533-8307	
	260 C	10/12	8533-8287	ABS0992B02
ARINC 600	200°C	Quadrax cable	8660-6053	

## Recommanded 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)

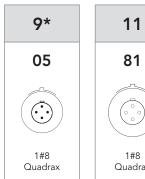


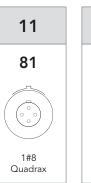


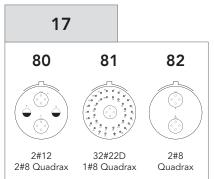


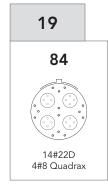
- High contact density
- MIL-DTL-38999 Series I: Bayonet coupling
- Numerous layouts
- 100% scoop proof
- RFI EMI shielding and shell to shell continuity
- Nickel or cadmium plated

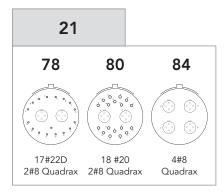
## **Contact layout**

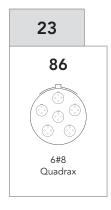


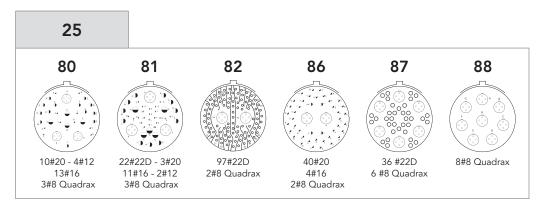












## **Ordering information & Dimensions**

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



- 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)

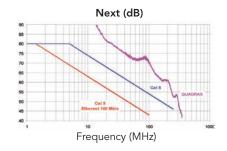
. Bronze shell: Without plating

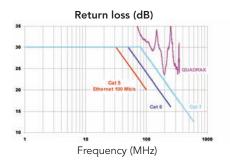
#### **Electrical**

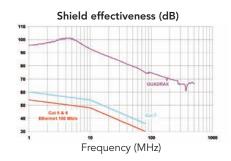
- ISO/IEC 11801 category 6 compliant:
- . Next (cross talk): > 46 db at 250 MHz
- . Return loss: > 16 db at 250 MHz
- . Shield effectiveness: > 36 db at 80 MHz
- Contact to shell continuity: < 10 mΩ
- Contact resistance (low level):
  - . Initial 15  $m\Omega$
  - . After tests 30 m $\Omega$
- Dielectric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

Altitude	Service I
sea level	500 Vrms
21 000 m	125 Vrms

- Insulation resistance:
- . At ambient temperature:  $> 5000~\text{M}\Omega$ . At high temperature: > 1000  $M\Omega$
- #24 contact cable size acceptance: AWG 22 to AWG 26







## Quadrax Technology | MIL-DTL-38999 Series III

## **Contact layouts**



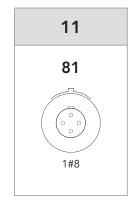


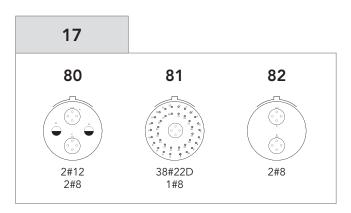


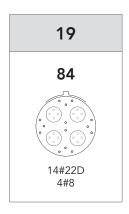


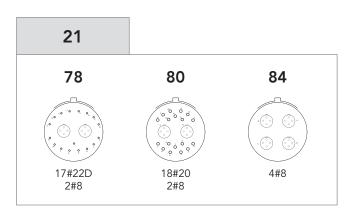


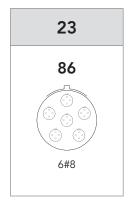


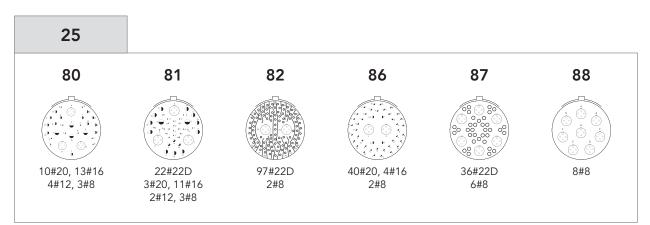










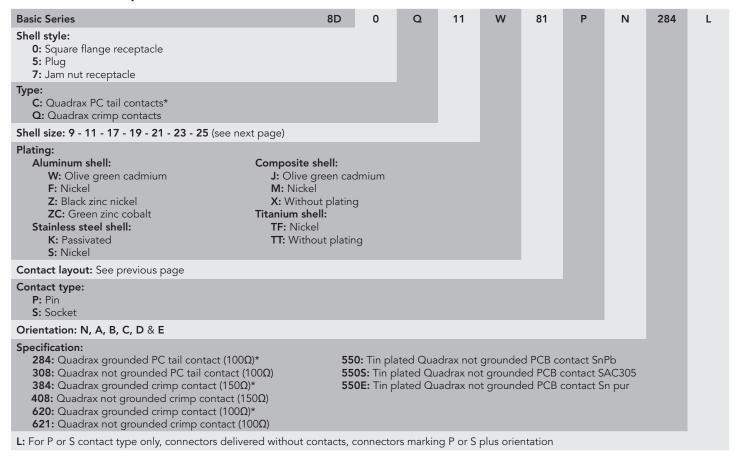


- \* 09-05 layout with twinax or quadrax contact:
- grounded version only
- plug with female contact & receptacle with male contact only

Note: Mixed layouts not grounded.

## Ordering information

#### Aluminum, Composite, Stainless steel & Titanium connector

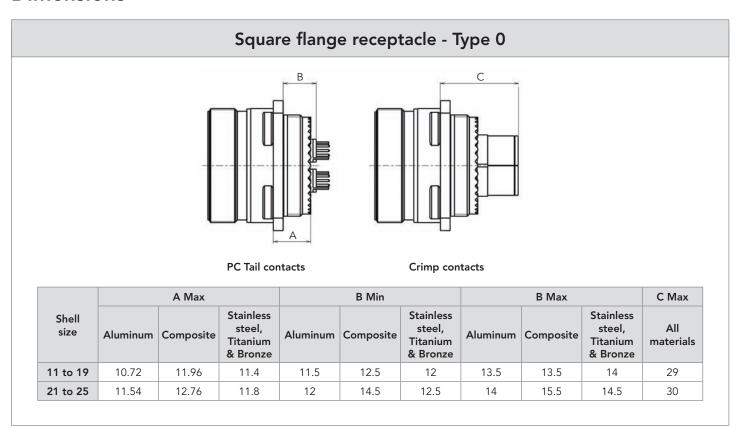


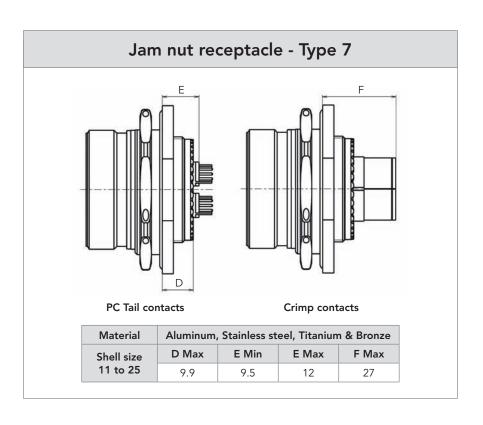
#### Bronze connector

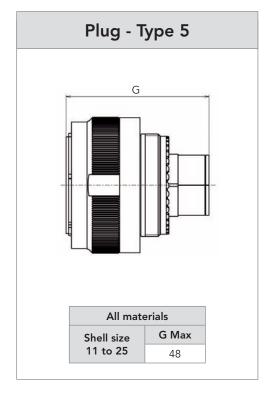
Basic Series	JVS	С	00A	09	35	Р	N	284	L
Type: C: Quadrax PC tail contacts* Q: Quadrax crimp contacts									
Shell style: 00A: Square flange receptacle 16A: Plug 07A: Jam nut receptacle									
Shell size: 9 - 11 - 17 - 19 - 21 - 23 - 25 (see next page)									
Contact layout: See previous page									
Contact type: P: Pin S: Socket									
Orientation: N, A, B, C, D & E									
Specification: 284: Quadrax grounded PC tail contact (100Ω)* 308: Quadrax not grounded PC tail contact (100Ω) 384: Quadrax grounded crimp contact (150Ω)* 408: Quadrax not grounded crimp contact (150Ω) 620: Quadrax grounded crimp contact (100Ω)* 621: Quadrax not grounded crimp contact (100Ω)	550: Tin plat 550S: Tin plat 550E: Tin pla	ated Qua	adrax not	grounde	ed PCB c	ontact SA	AC305		
L: For P or S contact type only, connectors delivered without contact	acts, connecto	rs markir	ng P or S	plus orie	ntation				

<sup>\*</sup> For PC tail contacts or grounded versions please consult us.

#### **Dimensions**

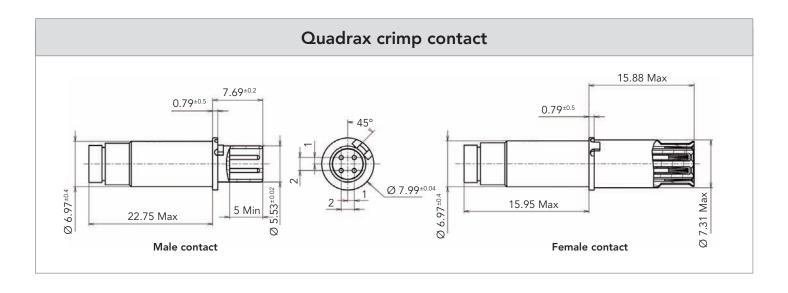


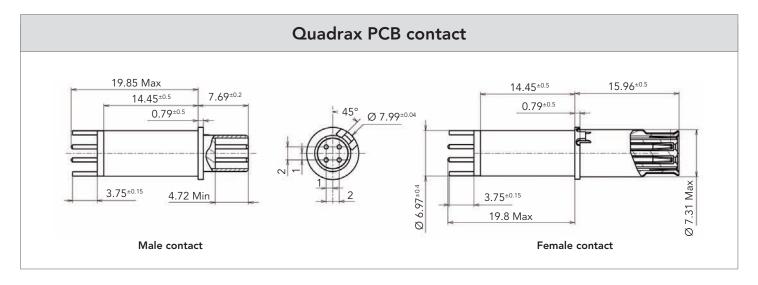


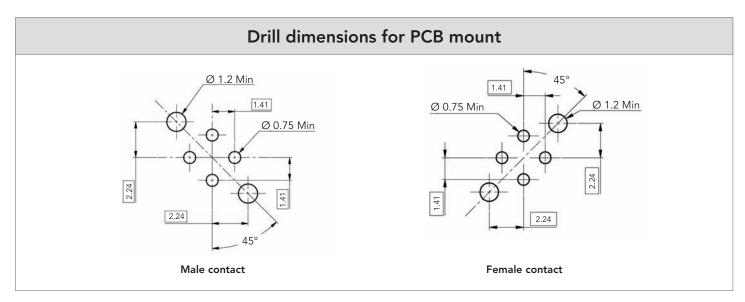


Note: All dimensions are in millimeters (mm)

## Quadrax Technology | MIL-DTL-38999 Series III







Note: All dimensions are in millimeters (mm)



- 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 MΩ under 500 Vdc.

#### • Max current rating per contact:

. size 24: 1A (4 size 24 inner contacts in a size 8 outter contact).

#### • Contact resistance:

. initial  $< 0.4 \text{ m}\Omega$ .

#### • Electrical continuity:

.  $5m\Omega$  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<sup>-6</sup> m<sup>3</sup>/h

#### • Salt spray:

- . 48 hours (R class),
- . 500 hours (K class).

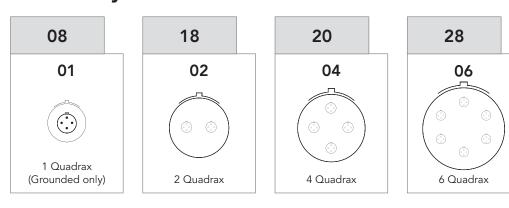
#### • Fire resistance:

. 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:

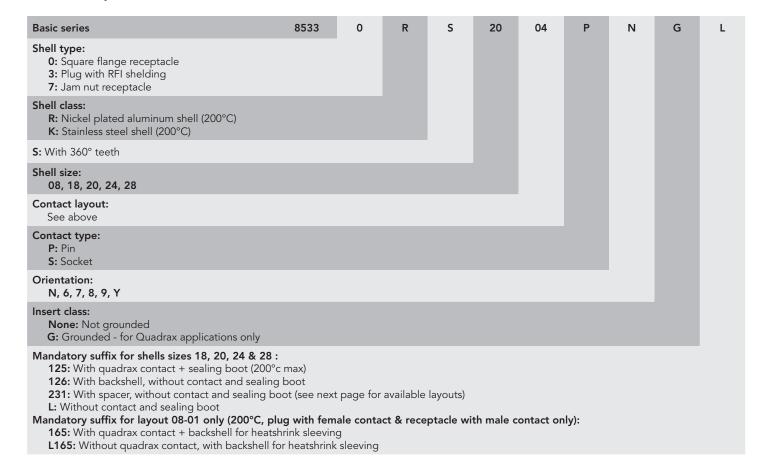
. MIL-H 5606 - SKYDROL 500 B4 - LD4 -JP5 - MIL-L 7870A - MIL-L 23699 -MIL- L 7808 - MIL-C 25769 - MIL-A 8243

## **Contact layout**



## Ordering information

#### **SOURIAU** part numbers

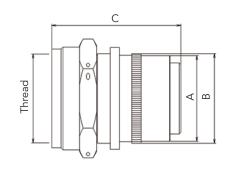


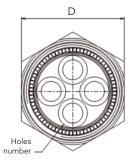
### **Dimensions**

Please consult "853 Series" catalog.

## Quadrax Technology EN2997 Series

## Strain relief backshell







Layout	Material	Part number	Mass max (g)	A <sup>±0.1</sup>	B Max	C <sup>±0.12</sup>	D	Holes number	Thread Class 2B	Coupling torque N.m
18-02	Aluminum	85338342	40	24.90	29.45	41.78 <sup>±1.2</sup>	31.62	2	1.0625-18 UNEF	16
10-02	Stainless steel	85338343	75							
20-04	Aluminum	85338250	40	27.72	30.12	41.78 <sup>±1.2</sup>	33.21	4	1.1875-18 UNEF	20
20-04	Stainless steel	85338281	73							20
24-04	Aluminum	85338223	53	33.71	37.26	48.95 Max	45	4	1.4375-18 UNEF	26
24-04	Stainless steel	Consult us	-							
28-06	Aluminum	85338245	82	39.7	44.4	41.78	47.49	6	1.7500-18 UNS	29
20-00	Stainless steel	85338288	146							

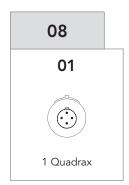
# Spacer 31.9<sup>±1</sup> Self locking ring spacer

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



- 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

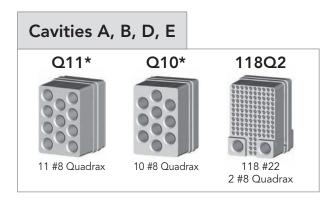
Shell type	Layout	SOURIAU part number	ABS part number
Dl	0801 (8B01)	8525 16R8B01SNH164L (1)	ABS 1054 A60801 BN + ABS 1057-08A01
Plug		8525 16R8B01SNH164 <sup>(2)</sup>	ABS 1054 A60801 FN + ABS 1057-08A01
Square flange	0801	8525 10R8B01PNH164L (1)	ABS 1054 A00801 AN + ABS 1057-08A01
receptacle	(8B01)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

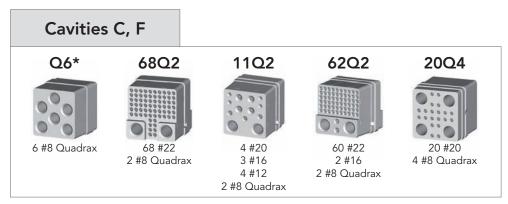
- (1) mono quadrax connector delivered with backshell and without contact.
- (2) mono quadrax connector delivered with backshell and with quadrax contact.



- 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





<sup>\*</sup> Grounded metal insert

## Ordering information & Dimensions

Please consult "ARINC 600 Series" catalog.

## **Quadrax Contact up to Cat6**

# Range Extension

	Fiber optic ELIO® contacts	26
	BMA coaxial contacts	26
ļ	Power contacts	27
ļ	High power contacts	27
ļ	Power contacts for PCB	28
4	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.



#### **BMA Coaxial Contacts**

A robust and powerfull 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.



#### 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:

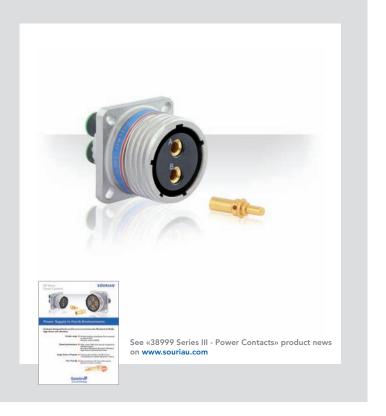
- . 20 contact points for a #4 contact vs 2 or 3 for a standard socket.
- . Allowing 20 % more current as compared to standard socket.
- . Excellent vibration withstanding.
- . Insure excellent crimping.

#### 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.



## **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 to185mm).

#### Safety



#### **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.



## Reliable People, Reliable Solutions



# **SOURIAU**

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