

# Amphenol SOCAPEX



## Powersafe

Qualified VG96944

Derived from MIL-DTL-38999 Series III/EN3645



# ABOUT AMPHENOL SOCAPEX



## Proven excellence in interconnect solutions

Since **1947**, Amphenol Socapex has prescribed, designed and manufactured reliable and innovative interconnection solutions for **harsh environments**, specializing in standard and customized electrical and fiber optic connectors, contacts, accessories and cabling solutions. Located in the **Mont Blanc** region of France and Pune in India, Amphenol Socapex has a presence in over 100 countries around the world. Amphenol Socapex is part of the international **Amphenol Corporation**.



**1000+** employees



Net Sales 2019: **86,6 M€**  
69% Export - 31% France



Two facilities :  
**Thyez** (France), **Pune** (India)

OUR HISTORY

### 1947



- Socapex creation in Suresnes, France
- 1<sup>st</sup> radio connector

### 1956-57



- Manufacturing unit in Cluses (74), France
- Thomson-CSF becomes primary shareholder

### Early 1960's



- 1st board level connectors: HE8
- 1st "licence Bendix" manufactured connectors
- SL Series launch

### 1973



- New factory 13 000 m<sup>2</sup> in Thyez (74) France with 250 people

### 1975



- Production of 38999 connectors

### 2014-2017



Quadrax Contacts



Cable Assembly

- New Cable Assembly workshop
- New Contact Manufacturing workshop

### Today and tomorrow | New technologies



Miniaturization High-speed signals  
 Miniaturization ROHS solutions Power  
 Advanced Materials (composite) Power  
 Fiber optics Rugged Ethernet  
 Power Rugged Ethernet  
 Fiber optics ROHS solutions  
 Miniaturization ROHS solutions

# INTERNATIONAL EXPERTISE



## Our expertise has no boundaries

### Integrated Production in France & India

- **24 000 m<sup>2</sup>** manufacturing capacity on 2 sites
- Design centers in **France** and **India**
- State-of-the-art manufacturing technology



## Our markets



### Military

Communication Systems - Radios - C4ISR /  
Ground vehicles - Vetronics / Marine / Missiles



### Aviation

Commercial & military / Avionics /  
Engines / Landing gear / Actuators

1986

**Amphenol**  
Socapex

- Amphenol becomes primary shareholder

1995-96



- Expanded Beam connector CTOS launch
- Headquarters transferred to Thyez

2004



- RJ Field launch, "Award Electronica"

2005



- Opening of manufacturing site in Pune, India

2010's



- LuxBeam™ and HDAS launch

## Today and tomorrow | Sustainable development



Respect for nature and the environment  
Optimization of natural resources  
Recycling  
Waste Management  
Goodwill  
Optimization of natural resources  
Respect for nature and the environment  
Recycling  
Waste Management  
Goodwill

# PRODUCING FASTER, SMALLER, STRONGER CONNECTORS...



## Technologies & innovation

### Technological Center



**Engineering Laboratory for product testing and qualification, product expertise and metrology**

- Mechanical and electrical skills
- RF and fiber optics expertise

### High-Speed Expertise



**Strong expertise in high-speed signals**

- 3D EM simulation software & EM models
- Time Domain and frequency domain (VNA 20GHz, TDR and eye diagram)

### Materials Expertise



**Focus on materials expertise and manufacturing techniques to produce faster, smaller and stronger products**

- 3D CAD mechanical software, simulation & analysis
- Disruptive metal alloys, additive manufacturing

### Eco-responsibility



**Sustainable environment approach, with pro-active management of regulations (REACH / RoHS / Conflict minerals...)**

- New materials development, plating, and suitable processes
- Recycling and rational resources consumption

## Our workshops

Our workshops located in France & India provide consistent quality adapted to your volume requirements.

**Tooling** : Tools for our different activities : molding, machining, assembly

**Molding** : Solid expertise in thermoplastic elastomer and thermoset molding

**Machining** : Manufacturing of cylindrical shells from 10 to 90 mm in diameter and rectangular shells

**Screw Machining** : Cylindrical production parts up to 10 mm in diameter

**Plating** : Plating with cadmium, nickel, electroless nickel, silver, black zinc nickel, gold

**Assembly** : Connector and harness assembly (electrical & optical)

## Our certifications

Certified Management System    Certified Management System    Certified Management System    Certified Management System

Product certifications : MIL-DTL38999, EN3645, EN3155, VG

## Our memberships

Member of CMG (Connecting Manufacturing Group) Consortium

# DELIVERING GREAT CUSTOMER EXPERIENCE



► We have a strong reputation for helping customers solve their toughest challenges. This approach of serving your needs is ingrained in our company – from our sales team to our product development engineers.

## A partner you can trust

Customer Proximity	Design Expertise	Quality Commitment	On Time Delivery Performance	Compliance manager

## Buy our solutions

You can access our solutions through our global network of sales offices or through our distributors.

### Field Sales Team :

- 12 in France
- 15 in Europe
- 100+ in North America and rest of the world.
- 5 Business Development Managers supporting local sales force Europe, North America and the rest of the world

- Technical Support & Multilingual Customer Service :**  
15 people

### Worldwide Distribution Network :

Including qualified distributors (QPL approved) for assembling : MIL-DTL-38999, PT/451/VG95328 & Fiber Optics connectors



# POWERSAFE

**PowerSafe** MIL-DTL-38999 Series III was developed to transfer high power (500V voltage) in harsh environment, with a full safety for the user.

## Main Features

- **Qualified VG96944**
- Focus both on **USER SAFETY** and on the **MIL-DTL-38999 Series III performances**
- **First mate/last break:** One protective contact linked to the shell
- **Last mate/first break:** One pilot contact with breaking capacity. It allows the current flow in the phase and neutral contacts through a relay
- **IP28 :**
  - finger test for socket contacts and socket inserts
  - pressure water tight (48h, under 2m water)

**USER  
SAFETY**



## Added Benefits

- In accordance with the new standard for power equipment
- Homogeneity with standard MIL-DTL-38999 III connectors when power is needed on the equipment (same panel drilling)
- Qualified according the most stringent standard VG96944
- Safety use design following DIN EN-61984 (VDE 0627)

## Markets & Applications

### Markets

- **Defense:** C4ISR/Battlefield/Ground Vehicles/Missile
- **Avionics**
- **Harsh industrial markets**

### Applications

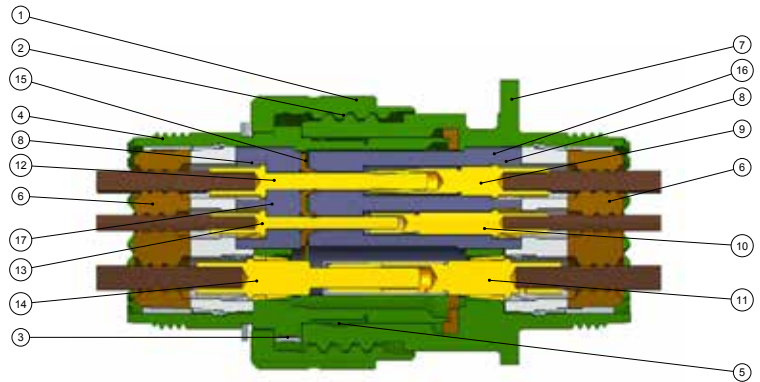
- I/O Power for boxes
- Power connectors spread on the field (drums)
- Electrical power generator



# POWERSAFE - MECHANICAL CHARACTERISTICS

- ① Coupling nut
- ② Quick coupling thread
- ③ Anti-decoupling device
- ④ Plug shell
- ⑤ Spring fingers (EMI)
- ⑥ Grommet
- ⑦ Receptacle shell
- ⑧ Contact retention clips
- ⑨ Phase and neutral socket contact

- ⑩ Pilot socket contact
- ⑪ Protective socket contact
- ⑫ Phase and neutral pin contact
- ⑬ Pilot pin contact
- ⑭ Protective pin contact
- ⑮ Interfacial seal
- ⑯ Socket insert
- ⑰ Pin insert



	MIL-DTL-38999 series III	VG96944
<b>Durability</b>	500 cycles	500 cycles
<b>Shell Size</b>	13/17/25 (3 arrangements)	13/17/25 (3 arrangements)
<b>Shock</b>	-	Half-sine, 500 m/s <sup>2</sup> , 11 ms
<b>Sine vibrations</b>	60g from -55 +175°C (ODC) + 200°C (nickel)	-
<b>Random vibrations per EIA364.28 vs VG95319-2</b>	-	Spectrum 5 Hz to 500 Hz
<b>Shell and Backshell plating</b>	Olive Drab Cadmium, Black Zinc Nickel, Electroless nickel, Bronze, Inox	Olive Drab Cadmium
<b>Insert material</b>	Thermoplastic insert Silicone rubber grommet and interfacial seal	Thermoplastic insert with Comparative Tracking Index < 400 V Silicone rubber grommet and interfacial seal
<b>Contacts</b>	Crimp, removable contacts Gold plating for pilot contact and silver plating for protective, phase and neutral contacts	Crimp, removable contacts Gold plating for pilot contact and silver plating for protective, phase and neutral contacts
<b>Protective contact resistance</b>	≤100 mΩ	≤100 mΩ

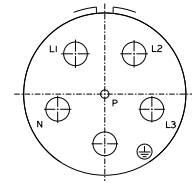
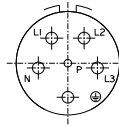
**Contact retention force:**

<b>Contact Size</b>	20	16	12	6
<b>Maximum load (N)</b>	67	111	111	111

## Environmental Characteristics

	MIL-DTL-38999 series III	VG96944
<b>Temperature</b>	-65 +175°C (ODC, BZN platings) -65 + 200°C (Nickel plating, bronze, stainless steel)	-65 +150°C (ODC plating)
<b>Salt spray exposure</b>	48h for Nickel 500h for Olive Drab Cadmium, Black Zinc Nickel, Bronze and stainless steel	Test level 2 : 5% NaCl, 2h salt fog exposure, 22h storage in humid air, 5 cycles
<b>Sealing</b>	IP28 : - finger test for socket contacts and socket inserts - pressure water tight (48h, under 2m water)	IP28 : - finger test for socket contacts and socket inserts - pressure water tight (48h, under 2m water)

## Insert Arrangements



VG designation	13-V4	17-V6	25-V6
TV designation	13-E4	17-E6	25-E6
Pilot contact	1 Size 20	1 Size 16	1 Size 16
Phase & neutral	2 Size 16	4 Size 12	4 Size 6
Protective contact	1 Size 16	1 Size 12	1 Size 6

Other platforms in development. Please consult us.

## Electrical Characteristics

Arrangements	Pilot contact		Phase, neutral and protective contact		Test voltage AC
	Contact rating	Operating Voltage AC or DC	Contact rating	Operating Voltage AC or DC	
13-V4 / 13-E4	0,5 A	60 V	16 A	250 V	1500 V
17-V6 / 17-E6	0,5 A	60 V	25 A	500 V	2500 V
25-V6 / 25-E6	0,5 A	60 V	63 A	500 V	2500 V

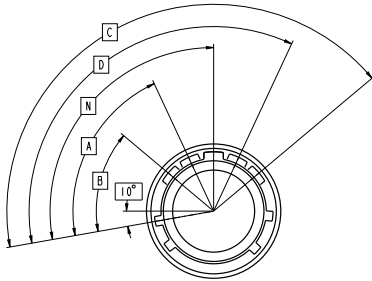
Note : test voltage in mated condition, unmated condition for pilot socket contact only

## Polarization

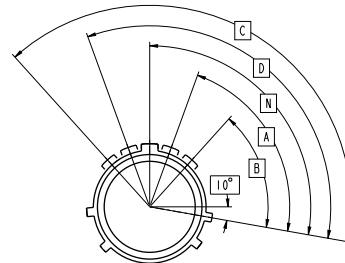
To avoid cross-plugging problems in applications requiring the use of more than one PowerSafe connector of the same size, alternate key-rotations are available as indicated in the chart aside. As shown in the accompanying diagram, the major key rotates clockwise from the secondary ones.

In the reference system, the polarization is shown by the letters N, A, B, C, D.

Shell size	Position of the major keyway				
	Polarizations				
	N	A	B	C	D
13	100	80	68	132	120
17	100	82	70	130	118
25	100	85	74	126	115



Receptacle - Front face shown

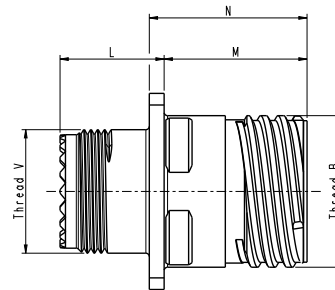
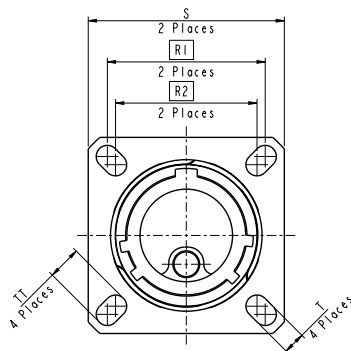


Plug - Front face shown

## Overall Dimensions

### Square flange receptacle

VG96944-04A  
 TVP00RW  
 TVP00ZN  
 TVPS00RF  
 TVPS00RB  
 TVPS00RK

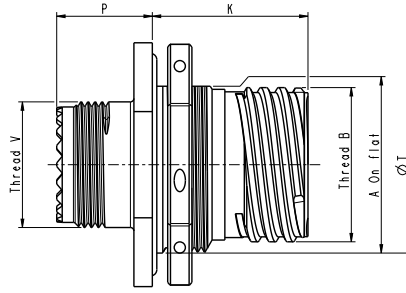
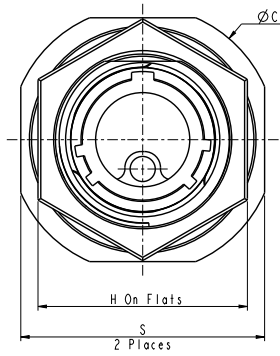


Shell size	B thread Class 2A .1P- .3L-TS (inches)	L Max (mm)	M Max (mm)	N +0.13 0 (mm)	R1 (mm)	R2 (mm)	S ±0.3 (mm)	T ±0.2 (mm)	TT ±0.2 (mm)	V thread (metric)
13	.875	15.5	20.9	22.99	23.01	20.62	28.6	3.25	4.93	M18x1-6g
17	1.1875	15.6	23.4	25.49	26.97	24.61	33.3	3.25	4.93	M25x1-6g
25	1.625	20.7	24.6	27.49	38.10	34.93	46.0	3.91	6.15	M37x1-6g



### Jam nut receptacle

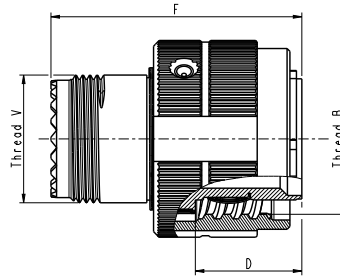
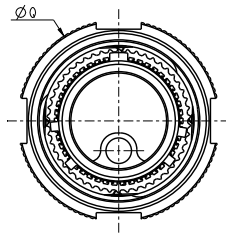
VG96944-04B  
TV07RW  
TV07ZN  
TVS07RF  
TVS07RB  
TVS07RK



Shell size	B thread Class 2A .1P-.3L-TS (inches)	A +0.1 -0.15 (mm)	C Max (mm)	K Max (mm)	P Max (mm)	H Hex 0 -0.1 (mm)	S +/-0.4 (mm)	T (mm)	V thread (metric)	Hex nut max torque (N.m)
13	.875	23.82	38.4	22.5	13.7	30	34.9	25.2 - 25.5	M18x1-6g	6.8
17	1.1875	30.15	44.8	25.0	14.1	36	41.3	31.8-31.95	M25x1-6g	9.6
25	1.625	42.85	59.0	27.0	18.5	50	55.6	44.2 - 44.5	M37x1-6g	14.7

### Straight plug

VG96944-04C  
TV06RW  
TV06ZN  
TVS06RF  
TVS06RB  
TVS06RK

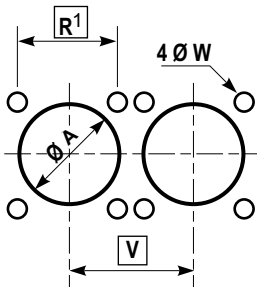


Shell size	B thread Class 2B .1P-.3L-TS (inches)	Q Max (mm)	F Max (mm)	D (mm)	V thread (metric)
13	.875	29.4	35.5	15.01	M18x1-6g
17	1.1875	35.7	38.0	17.51	M25x1-6g
25	1.625	48.0	46.0	19.51	M37x1-6g

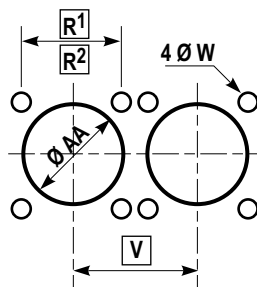
\* Conforms to CECC 75.201.002 (coupling nut for arctic gloves)

### Panel drilling for receptacles

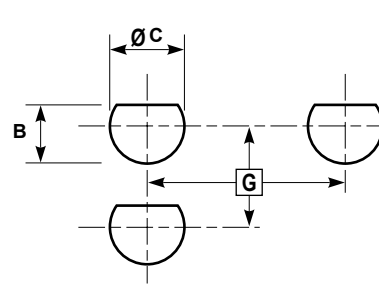
Square flange receptacle rear panel mounting



Square flange receptacle front panel mounting



Jam nut receptacle rear panel mounting



Shell size	R <sup>1</sup> (mm)	R <sup>2</sup> (mm)	V Mini (mm)	ØA Min (mm)	ØAA Min (mm)	ØW ±0.13 (mm)	G Mini (mm)	ØC +0.25 0 (mm)	B 0 -0.25 (mm)
13	23.01	20.62	30.20	23.42	19.05	3.25	36.00	25.65	24.26
17	26.97	24.61	36.50	30.96	25.81	3.25	43.30	32.01	30.73
25	38.10	34.93	48.80	42.47	37.69	3.81	59.70	44.70	43.43

# PROTECTIVE CAPS

## Description

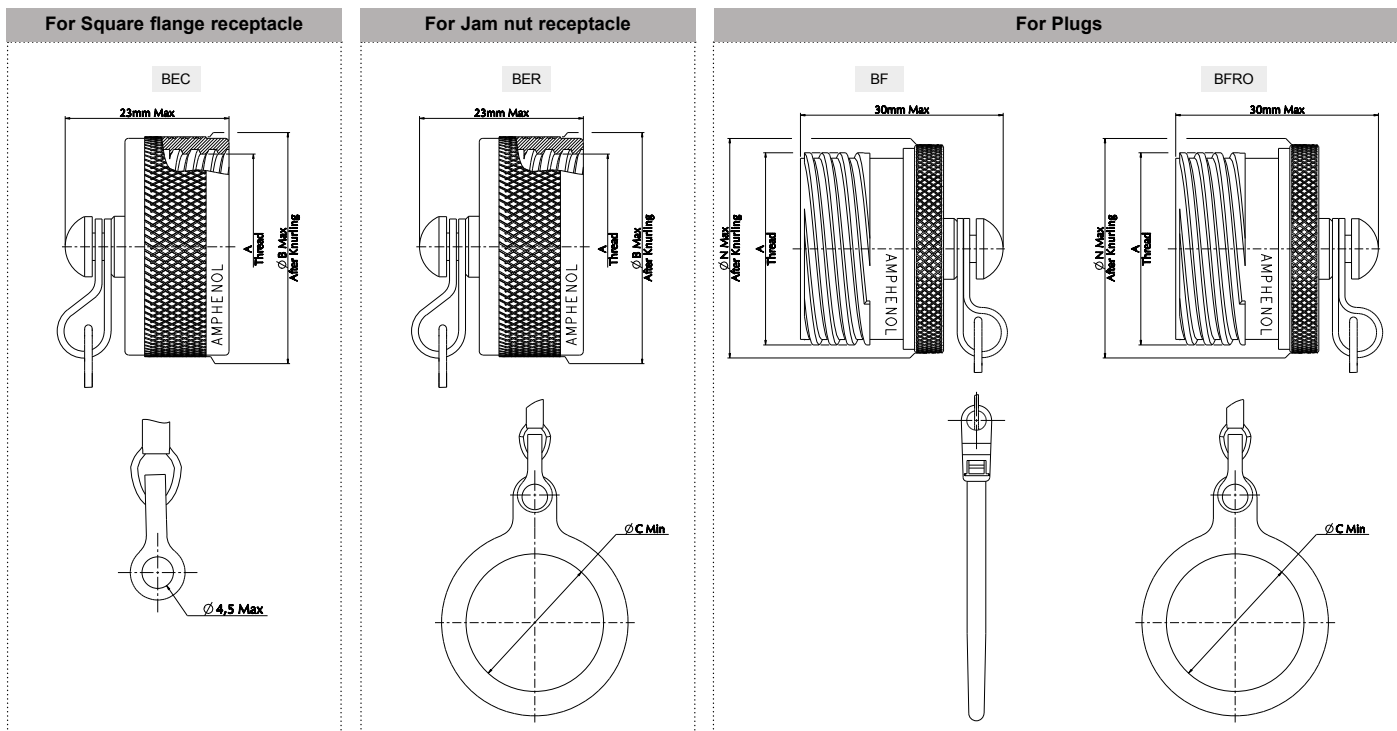
The largest range of protective caps with IP68 protection level.

## Main features

- Compatible with Plugs, Jam nut and Square receptacles
- IP 68 (permanent sealing)
- Protection against dust, water and moisture
- EMI function
- Nylon cord, stainless steel rope or metallic chain



## Overall dimensions



Lanyard (Attachment) Length

Cap type	Metallic chain length	Nylon cord length	Stainless steel rope length
BEC/BER for receptacle		127 (+13,-7)	
BF/BFRO for plug		160±5	

Shell size	A thread .1P-.3L-TS Class 2A (External) Class 2B (Internal) (inches)	ØB Max (After Knurling)	ØC Min	ØN Max
13	.8750	25,75	25,15	24,30
17	1.1875	33,80	32,00	30,60
25	1.6250	44,90	44,45	42,80

Standard Metallic Caps	B	EC	N	TV	W	13
<b>Protection cap type</b> EC: For square flange receptacle ER: For jam nut receptacle F: For plug						
<b>Wire type</b> Blank for metallic chain N: Nylon cord R: Jacketed stainless steel rope RO: Jacketed stainless steel rope with ring (only for plug)						
<b>Connector type</b>						
<b>Material and finish</b> W: Olive drab cadmium plated on aluminium (175°C) ZN: Black zinc nickel plated on aluminium (175°C) ✓ F: Electroless nickel plated on aluminium (200°C) ✓ B: Marine bronze (200°C) ✓						
<b>Corresponding connector shell size</b> 13/17/25						

For other platings, please consult us - Example : Olive Drab Cadmium Cap with Nylon Cord for Square Flange receptacle size 17 : BECNTW17

✓ : RoHS compliant

# BACKSHELLS



- Compatible with AS85049 suitable for MIL-DTL-38999 Series III connectors
- For VG96944 versions :

Shell size	Backshell from AALBGmbH or EMCA	Shrink boot	Adhesive	Micro Clamping Band	or	Standard Clamping Band	Tool for Micro Band	Tool for Standard Band
13	VG95319-1011G012A	VG95343T06B001A	VG95343T15A001	895693		072952	809985	809952
17	VG95319-1011G005A			895700				
25	VG95319-1011G010A	VG95343T06C001A						

**IMPORTANT :** Use Shrink Boots 202K121-12 (size 13), 202K132-12 (size 17), 202K153-12 (size 25) and Adhesive S1255 for MIL applications

- Other backshells for shielding:

SHIELDING	
	<p><b>TV-35: BAND BACKSHELL FOR SHIELDING</b></p> <ul style="list-style-type: none"> <li>• Full 360° shield termination</li> <li>• Available with different cabling chambers</li> <li>• Easy maintenance or repairability</li> <li>• Sealing ensured by straight or right angled heat-shrink molded piece</li> <li>• Right angle version: TV SBC</li> </ul>
	<p><b>TV NSA: HIGH LEVEL OF EMI/RFI PROTECTION</b></p> <ul style="list-style-type: none"> <li>• Electrical continuity between cable and connector by clamping the braid with a screwing system</li> <li>• Free inner ring to avoid twisting of the braid when screwing</li> <li>• Sealing ensured by straight or right angle heat-shrink molded piece</li> </ul>

## How to Order

### How to order VG 96944 reference

<b>Series</b>	VG96944-04	A	13-V4	P	N	A
VG96944-04						
<b>Shell type</b>	A: Square Flange Receptacle B: Jam Nut Receptacle C: Straight plug					
<b>Shell size</b>	13-V4 / 17-V6 / 25-V6					
<b>Contact type</b>	P: Pin S: Socket					
<b>Polarization</b>	N for Neutral, A, B, C, D					
<b>Material and Plating</b>	A: Olive Drab Cadmium on Aluminium					

### How to order TV reference

<b>Series</b>	TV	P00	RW	13-E4	P	-
TV						
<b>Shell type</b>	P00: Square flange receptacle: 175°C (olive drab cadmium, black zinc nickel) PS00: Square flange receptacle: 200°C (nickel, stainless steel, bronze) 07: Jam nut receptacle: 175°C (olive drab cadmium, black zinc nickel) S07: Jam nut receptacle: 200°C (nickel, stainless steel, bronze) 06: Straight plug: 175°C (olive drab cadmium, black zinc nickel) S06: Straight plug: 200°C (nickel, stainless steel, bronze)					
<b>Material and Plating</b>	RW: olive drab cadmium on aluminium ZN: black zinc nickel on aluminium ✓ RF: electroless nickel on aluminium ✓ RK: passivated stainless steel ✓ RB: marine bronze ✓					
<b>Shell size</b>	13-E4 / 17-E6 / 25-E6					
<b>Contact type</b>	P: Pin S: Socket					
<b>Polarization</b>	Blank for neutral, A, B, C, D					

✓: RoHS compliant

# CONTACTS AND TOOLS

TOOLS FOR VG 96944 / POWERSAFE CONNECTORS																			
Arrangement	Contact type	Size	Contacts		Wires			Wire stripping length	Crimping tools			Insertion tools			Removal tools				
			Proprietary	Part Number	AWG	Section mm <sup>2</sup>	dia over insulator		Tools	Positioner	Selector position	Plastic color	Metallic		Plastic color	Metallic			
			Pin	Socket			Min						Max	Straight type		Angle type	Straight type	Angle type	
13-V4 13-E4	Pilot	20	600665	600892	20 22 24	0,61 0,38 0,24	1,02	2,11	6 (+0.5)	M22520/1-01	M22520/1-04	3 2 1	M81969/14-10 red / orange	809817	M81969/8-05	M81969/14-10 red / orange	809847	M81969/8-06	
	Phase Neutral	16	600666	600676	14 16 18 20	1,94 1,23 0,96 0,61	1,65	2,77				6 6 5 4	M81969/14-03 blue / white	809816	M81969/8-07	M81969/14-03 blue / white	809846	M81969/8-08	
	Protective		600667	600677									/		/				
17-V6 17-E6	Pilot	16	600660	600894	16 18 20	1,23 0,96 0,61	1,65	2,77	6 (+0.5)	M22520/1-01	M22520/1-04	6 5 4	M81969/14-03 blue / white	809816	M81969/8-07	M81969/14-03 blue / white	809846	M81969/8-08	
	Phase Neutral	12	600661	600671	12 14	2,98 1,94	2,46	3,61				8 7	M81969/14-04 yellow / white	809824	M81969/8-09	M81969/14-04 yellow / white	809850	M81969/8-10	
	Protective		600662	600672								/		/					
25-V6 25-E6	Pilot	16	600660	600894	16 18 20	1,23 0,96 0,61	1,65	2,77	6 (+0.5)	M22520/1-01	M22520/1-04	6 5 4	M81969/14-03 blue / white	/	/	M81969/14-03 blue / white	/	/	
	Phase Neutral	6	600663	600673	6	13,61	7,3	8,1				14 (+1.5)	809947 + 809908 (hex crimp) or	/	/	/	/	/	809696
	Protective		600664	600674								M22520/23-01 + M22520/23-03	809697 (pin) 809690 (socket)	/	/	/	/	/	/

## Crimping tools

MANUAL CRIMPING PLIERS  
M22520/1-01



HYDRAULIC PLIERS  
809947



PNEUMATIC PLIERS  
M22520/23-01



## QUALIFIED CABLES FOR VG96944

Size 13	PN	Raw material
WIRE AWG19 white	VG95218T020A003	TINNED copper, jacket PVF modified
WIRE AWG14 blue	M81044/12-14-6	TINNED copper, jacket PVDF
WIRE AWG14 white	M81044/12-14-9	TINNED copper, jacket PVDF
WIRE AWG14 green yellow	M81044/12-14-45	TINNED copper, jacket PVDF
Fillers	/	PTFE
Braid	TB13-T-63	TINNED copper
Heatshrink	DR25 3/8-0M (VG95343 Part 5 Type D)	ELASTOMER

Size 17	PN	Raw material
WIRE AWG19 white	VG95218T020A003	TINNED copper, jacket PVF modified
WIRE AWG12 white	VG95218T020A017	TINNED copper, jacket PVF modified
WIRE AWG12 blue	M81044/12-12-6	TINNED copper, jacket PVDF
WIRE AWG12 green yellow	M81044/12-12-45	TINNED copper, jacket PVDF
Fillers	/	PTFE
Braid	TB13-T-695	TINNED copper
Heatshrink	DR25 1/2-0M (VG95343 Part 5 Type D)	ELASTOMER

Size 25	PN	Raw material
WIRE AWG19 white	VG95218T020A003	TINNED copper, jacket PVF modified
WIRE AWG6 white	M22759/16 6-9	TINNED copper, jacket PVDF
WIRE AWG6 blue	M22759/16 6-6	TINNED copper, jacket PVDF
WIRE AWG6 green yellow	M22759/16 6-4/5	TINNED copper, jacket PVDF
Fillers	/	PTFE
Braid	TB13-T-200	TINNED copper
Heatshrink	DR25 1-0M (VG95343 Part 5 Type D)	ELASTOMER

## Qualified cables for MIL applications

Size 13	PN	Raw material
WIRE AWG20	M22759/34 20	TINNED copper, jacket ETFE
WIRE AWG14	M22759/34 14	TINNED copper, jacket ETFE
Fillers	/	PTFE
Braid	4D045558	Nickel copper
Heatshrink	RW200E-1/2-0 or HLR33001270	Fluroelastomeric or Viton

Size 17	PN	Raw material
WIRE AWG19	M22759/34 16	TINNED copper, jacket ETFE
WIRE AWG12	M22759/34 12	TINNED copper, jacket ETFE
Fillers	/	PTFE
Braid	4D047547	Nickel copper
Heatshrink	RW200E-3/4-0 or HLR33001900	Fluroelastomeric or Viton

Size 13	PN	Raw material
WIRE AWG19	M22759/34 16	TINNED copper, jacket ETFE
WIRE AWG6	M22759/34 6	TINNED copper, jacket ETFE
Fillers	/	PTFE
Braid	4D045591	Nickel copper
Heatshrink	RW200E-1 1/2-0 or HLR33003810	Fluroelastomeric or Viton



# NOTES

A series of horizontal dotted lines for taking notes, spanning the width of the page.

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Founded in 1932, **Amphenol** is one of the largest manufacturers of interconnect products in the world. The company designs, manufactures, and markets electrical, electronic, and fiber optic connectors, interconnect systems, and coaxial and specialty cables.

**Amphenol** has a diversified presence as a leader in high growth areas of the interconnect industry and provides solutions for customers in the automotive, broadband, industrial, information technology and data communications, military and aerospace, mobile devices, and mobile networks markets.

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### Europe

FRANCE	Amphenol AIR LB	2 rue Clément Ader, ZAC de Wé - 08110 Carignan	+33 3 24 22 78 49
FRANCE	Amphenol SEFEE	Z.I. des Cazes – BP243 - 12402 Saint-Affrique Cedex	+33 5 65 98 11 00
GERMANY	Amphenol AIR LB GMBH	Am Kleinbahnhof 4 - 66740 Saarlouis	+49 6831 981 00
ITALY	Amphenol EUROPEAN SALES OPERATIONS	Via Barbaiana n.5 - 20020 Lainate - Milano	+39 293 254 214
UNITED KINGDOM	Amphenol INVOTEC	Unit 1-3, Hedging Lane Industrial Estate, Dosthill - Tamworth, B77 5HH	+44 1827 263 000
UNITED KINGDOM	Amphenol IONIX SYSTEMS	Prospect House, Taylor Business Park, Risley, Warrington, WA3 6HP	+44 1 942 685 200
UNITED KINGDOM	Amphenol LTD	Thanet Way, Whitstable - KENT, CT53JF	+44 1227 773 200
UNITED KINGDOM	Amphenol MARTEC	St Augustines Business Park, Swalecliffe Whitstable - Kent CT5 2QJ	+44 1227 793 733

### North America

CANADA	Amphenol CANADA	605 Milner avenue - Toronto, Ontario	+1 416 291 0647
USA	Amphenol AEROSPACE OPERATIONS	40-60 Delaware street - Sidney, NY 13838	+1 800 678 0141
USA	Amphenol BORISH TECHNOLOGIES	4511 East Paris AVE - Grand Rapids, MI 49512	+1 616 554 9820
USA	Amphenol FSI	1300 Central Expwy N, Suite 100 - Allen, TX 75013	+1 214 547 2400
USA	Amphenol GRIFFITH ENTERPRISES	6000 East Coury Drive - Cottonwood, AZ 86326	+1 928 634 3685
USA	Amphenol NEXUS TECHNOLOGIES	50 Sunnyside Avenue - Stamford, CT 06902	+1 203 327 7300
USA	Amphenol PCD	72 Cherry Hill Drive - Beverly, MA. 01915	+1 978 624 3400
USA	Amphenol PRINTED CIRCUIT	Board Technology, 91 Northeastern Boulevard - Nashua, NH 03062	+1 603 324 4500
USA	Amphenol SV MICROWAVE	2400 Centrepark West Drive - West Palm Beach, FL	+1 561 840 1800
USA	Amphenol TIMES MICROWAVE	358 Hall Avenue - Wallingford, CT 06492	+1 800 867 2629

### Asia

CHINA	Amphenol PCD CO.	Building 21, 1 <sup>st</sup> Liao Keng Industrial Zone, Shi Yan Street - Bao An District - Shenzhen 518108	+86 755 8173 8000/8286
INDIA	Amphenol INTERCONNECT INDIA	105 Bhosari Industrial Area - Pune 411 026	+91 20 27120363
JAPAN	Amphenol JAPAN	471-1, Deba, Ritto-City - Shiga 520 3041	+81 77 553 8501
KOREA	Amphenol DAESHIN	558 SongNae-Dong SoSa-Gu, Bucheon-city, Kyunggi-Do - 420-130	+81 32 610 3830/3845
SINGAPORE	Amphenol EAST ASIA	26/F, Railway Plaza, 39 Chatham Road South, Tsim Sha Tsui, Kowloon, Hong Kong	+65 6294 2128

### Other Areas

AFRICA	Amphenol AFRICA	30 Impala Rd - Sandton 2146	+27 82 410 5179
ARGENTINA	Amphenol ARGENTINA	Av. Callao 930 2do piso Oficina B "Plaza" C1023 - AAP Buenos Aires	+54 11 4815 6886
AUSTRALIA	Amphenol AUSTRALIA PTY	2 Fiveways Blvd., Keilorborough - Melbourne - Victoria 3173	+61 3 8796 8888
BRAZIL	Amphenol DO BRAZIL	Rua Diogo Moreira, 132, 20 andar, rooms 2001-2-3	+55 11 3815 1003
ISRAEL	Amphenol BAR-TEC	3 Hagavish Street, K fir-Barkan Bldg. East Industrial Zone - Kfar-Sava, 44102	+972 9 764 4100
MEXICO	Amphenol OPTIMIZE	Carretera Internacional Km 6.5, Col. Parque Industrial, Nogales, Sonora, C.P. 84094	+52 631 311 160
NEW ZEALAND	Amphenol PHITEK	Level 4, 2 Kingdon Street, Newmarket, Auckland 1023	+64 9 524 2984
RUSSIA	Amphenol RUSSIA	Yaroslavskaja Street 8 - 129164 Moscow	+7 495 937 6341
TURKEY	Amphenol TURKEY	Sun Plaza 15 Kat: 15 Maslak Hah. Bilim Sok. No.5 - Sisli/Istanbul, 34398	+90 212 367 92 19

# Amphenol SOCAPEX



## Amphenol Socapex

948, promenade de l'Arve BP29  
74311 Thyez Cedex - France  
Phone: +33 (0)4 50 89 28 00  
[contact@amphenol-socapex.fr](mailto:contact@amphenol-socapex.fr)  
[www.amphenol-socapex.com](http://www.amphenol-socapex.com)



## For Technical Support

+33 (0)4 50 89 28 49  
[technicalsupport@amphenol-socapex.fr](mailto:technicalsupport@amphenol-socapex.fr)  
[www.amphenol-socapex.com/technical\\_support](http://www.amphenol-socapex.com/technical_support)



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