smiths connectors

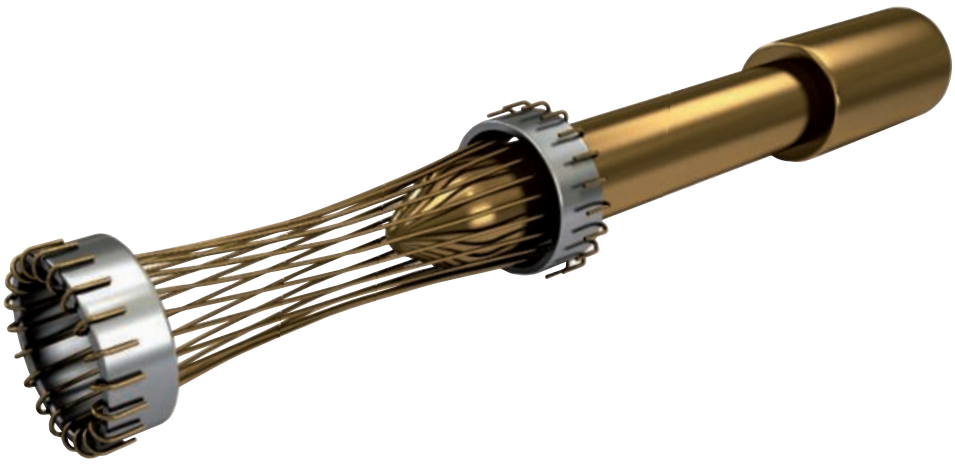
F
CONNECTOR SERIES

Heavy Duty Rectangular Modular Connectors

HYPERTAC IDI INTERCONNECT DEVICES SABRITEC

HYPERBOLOID TECHNOLOGY

Smiths Connectors offers an extensive range of superior contact technologies suitable for standard and custom solutions. Hypertac® (HYPERboloid conTACT) is the original superior performing hyperboloid contact technology designed for use in all applications and in harsh and demanding environments where high reliability and safety are critical. The inherent electrical and mechanical characteristics of the Hypertac hyperboloid contact ensures unrivalled performance in terms of reliability, number of mating cycles, low contact force and minimal contact resistance. The shape of the contact sleeve is formed by hyperbolically arranged contact wires, which align themselves elastically as contact lines around the pin, providing a number of linear contact paths.



FEATURE	BENEFIT
LOW INSERTION/EXTRACTION FORCES The angle of the socket wires allows tight control of the pin insertion and extraction forces. The spring wires are smoothly deflected to make line contact with the pin.	**HIGH DENSITY INTERCONNECT SYSTEMS** Significant reductions in size and weight of sub-system designs. No additional hardware is required to overcome mating and un-mating forces.
LONG CONTACT LIFE The smooth and light wiping action minimizes wear on the contact surfaces. Contacts perform up to 100,000 insertion/ extraction cycles with minimal degradation in performance.	**LOW COST OF OWNERSHIP** The Hypertac contact technology will surpass most product requirements, thus eliminating the burden and cost of having to replace the connector or the entire subsystem.
LOWER CONTACT RESISTANCE The design provides a far greater contact area and the wiping action of the wires insures a clean and polished contact surface. Our contact technology has about half the resistance of conventional contact designs.	**LOW POWER CONSUMPTION** The lower contact resistance of our technology results in a lower voltage drop across the connector reducing the power consumption and heat generation within the system.
HIGHER CURRENT RATINGS The design parameters of the contact (e.g., the number, diameter and angle of the wires) may be modified for any requirement. The number of wires can be increased so the contact area is distributed over a larger surface. Thus, the high current carried by each wire because of its intimate line contact, can be multiplied many times.	**MAXIMUM CONTACT PERFORMANCE** The lower contact resistance of the Hypertac contact reduces heat build-up; therefore Hypertac contacts are able to handle far greater current in smaller contact assemblies without the detrimental effects of high temperature.
IMMUNITY TO SHOCK & VIBRATION The low mass and resultant low inertia of the wires enable them to follow the most abrupt or extreme excursions of the pin without loss of contact. The contact area extends 360° around the pin and is uniform over its entire length. The 3 dimensional symmetry of the Hypertac contact design guarantees electrical continuity in all circumstances.	**RELIABILITY UNDER HARSH ENVIRONMENTS** Harsh environmental conditions require connectors that will sustain their electrical integrity even under the most demanding conditions such as shock and vibration. The Hypertac contact provides unmatched stability in demanding environments when failure is not an option.

TABLE OF CONTENTS

TECHNICAL CHARACTERISTICS

	FG	FH
	ELECTRICAL	
Number of contact	Up to 120	Up to 420
Contact Ø	Ø1 to Ø7 mm	
Current rating	5 to 260 A	
Contact resistance	0.3 to 7.0 mΩ	
Rated voltage	63 to 650 V depending on module	
Insulation resistance	$1x10^3$ MΩ or $5x10^3$ MΩ depending on module	
	MECHANICAL	
Mating cycles	> 500	
Balancing cycles	> 1 000 000	
Locking system	By 2 screws	By 4 screws
Housing material	Aluminium Alloy	
Cable clamp	Stainless steel	
Contact material	Brass, copper	
Contact plating	Gold over Nickel	
Insulator	Polyamide UL94VO; according to NF F 16-101 and NF F 16-102	
	ENVIRONMENTAL	
Temperature range	-40° C to +100° C	
Protection level	IP66 - IP67	IP66 - IP68
Dry heat	96h	
Salt spray	Housing open: 96h Housing close: 720h	
Damp heat	21 days (40° C 90-95% HR)	
Conformity	NF F 61-030, EN50124, EN50467, NF F 16-101/16-102	

HOW TO ORDER

F G								
1	2	3	4	5	6	7	8	9

1 SERIES

2 CONNECTOR TYPE

P PLUG

E RECEPTACLE

3 CONTACTS

F FEMALE CONTACTS

M MALE CONTACTS

4 NUMBER OF FRAMES

0 2 2 MODULES

0 6 2X3 MODULES

5 SHIELDING DEGREE

N STANDARD WITHOUT SHIELDING

6 CONFIGURATION

ON REQUEST

7 POLARIZATION

0 0 NOT POLARIZED

0 1 POLARIZED

8 HOOD

0 0 WITHOUT HOOD

0 1 M12 VERTICAL OUTPUT

0 2 M16 VERTICAL OUTPUT

0 3 M20 VERTICAL OUTPUT

0 4 M25 VERTICAL OUTPUT

0 5 M32 VERTICAL OUTPUT

0 6 M40 VERTICAL OUTPUT

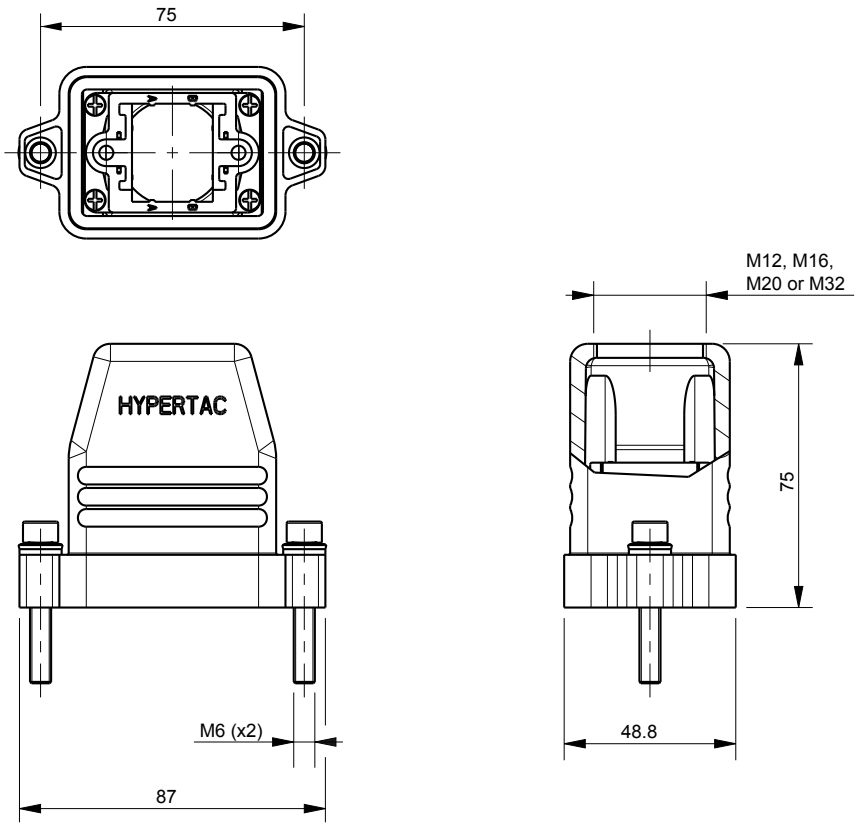
0 7 M50 VERTICAL OUTPUT

9 CABLE CLAMP

- WITHOUT CABLE CLAMP

CONNECTOR DIMENSIONS - 2 MODULES

PLUG



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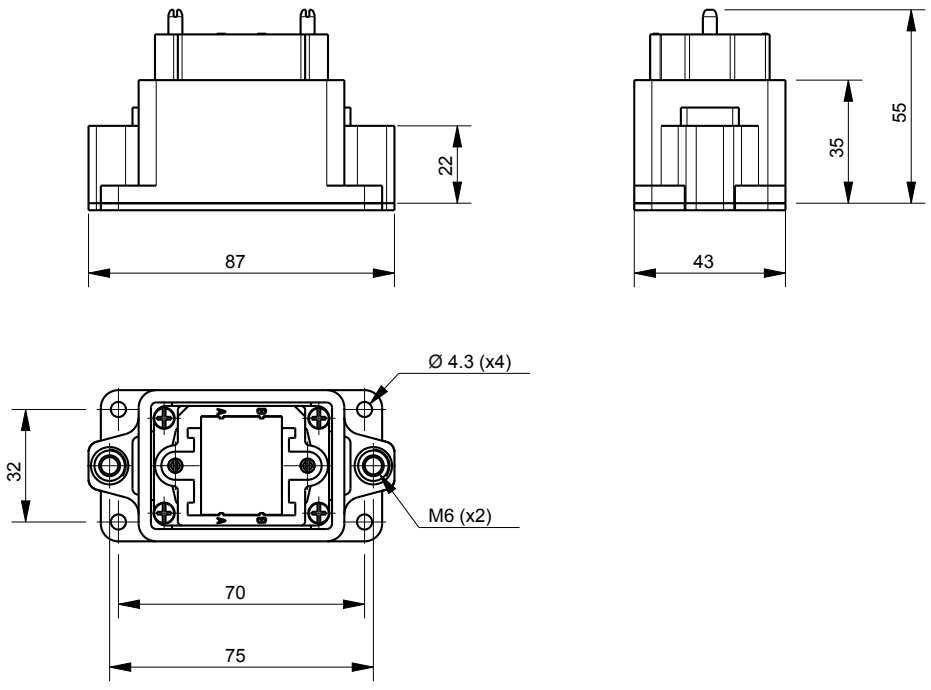
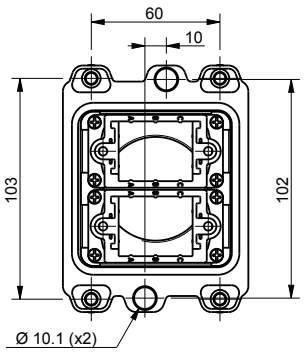
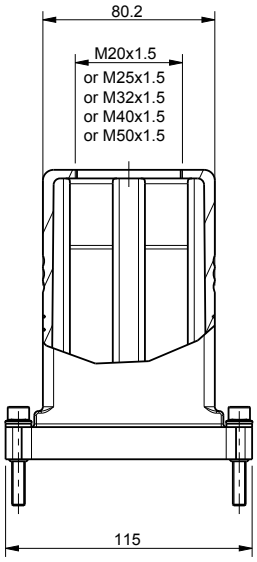


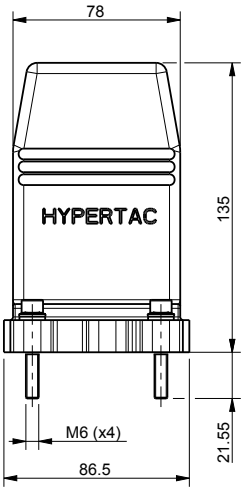
Dimension are in mm

CONNECTOR DIMENSIONS - 6 MODULES

PLUG







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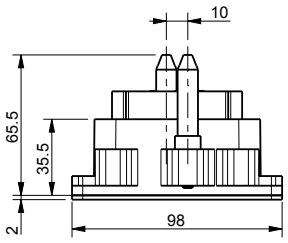

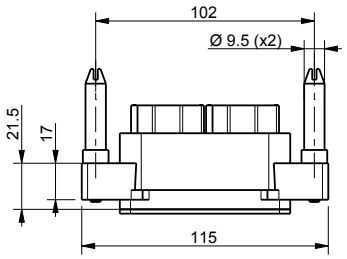

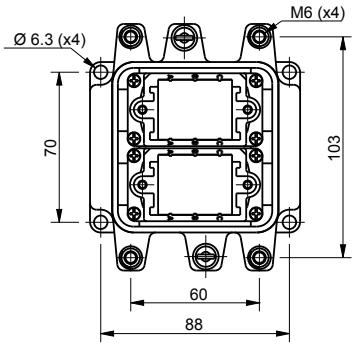

Dimension are in mm

HOW TO ORDER

1 SERIES

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P PLUG
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3 CONTACTS

F FEMALE CONTACTS
M MALE CONTACTS

4 NUMBER OF FRAMES

2 2X7 MODULES
3 3X7 MODULES

5 SHIELDING DEGREE

N STANDARD

6 CONFIGURATION

ON REQUEST

7 POLARIZATION

0 0 NOT POLARIZED
0 1 POLARIZED

8 HOOD

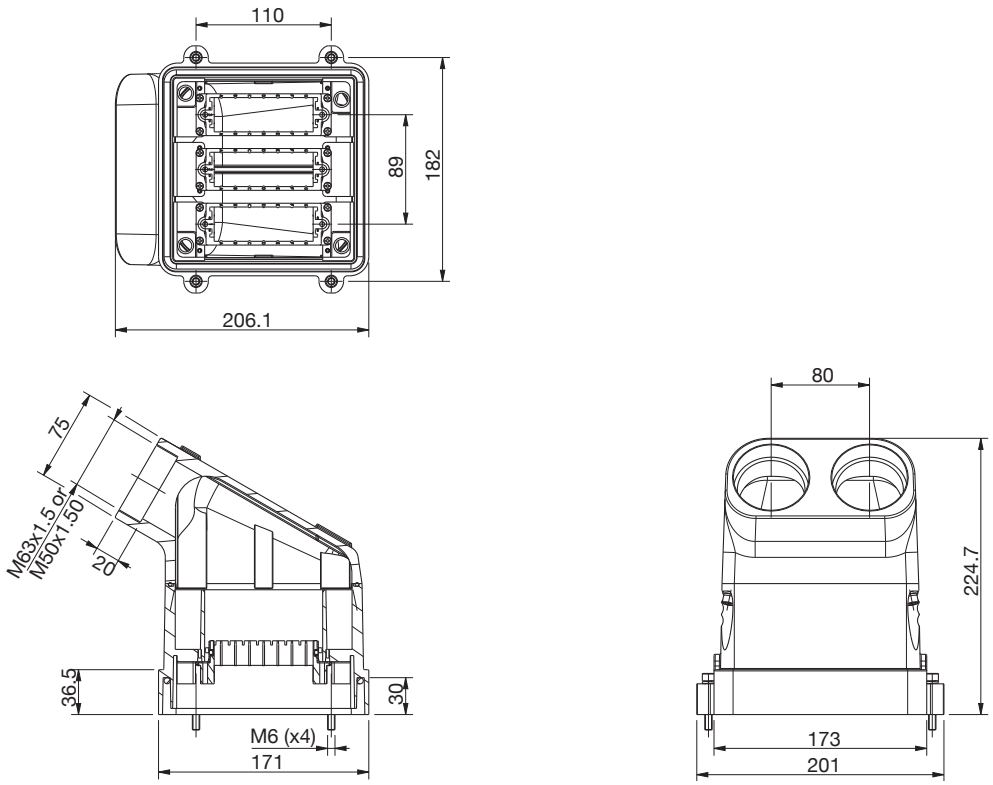
0 0 WITHOUT HOOD
0 1 M63 – 2 OUTPUTS
0 2 M50X1.50 – 2 OUTPUTS
0 4 M50X1.50 – 3 OUTPUTS

9 CABLE CLAMP

- WITHOUT CABLE CLAMP

CONNECTOR DIMENSIONS - 2 OUTPUT

PLUG



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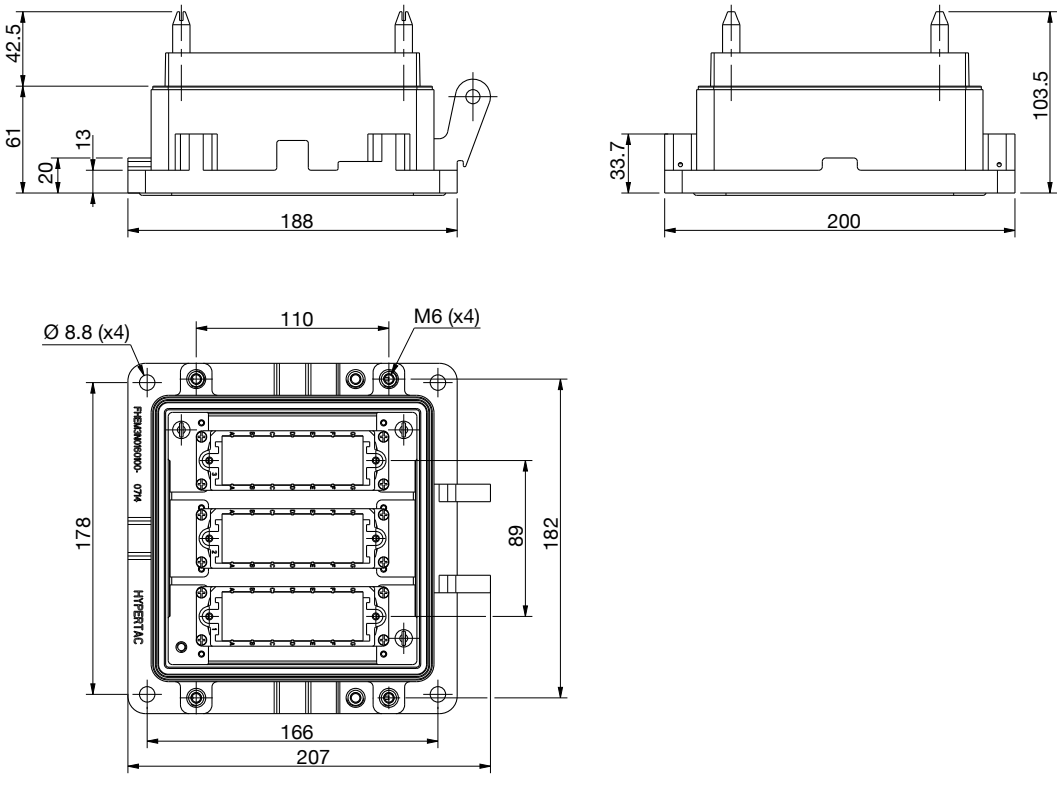
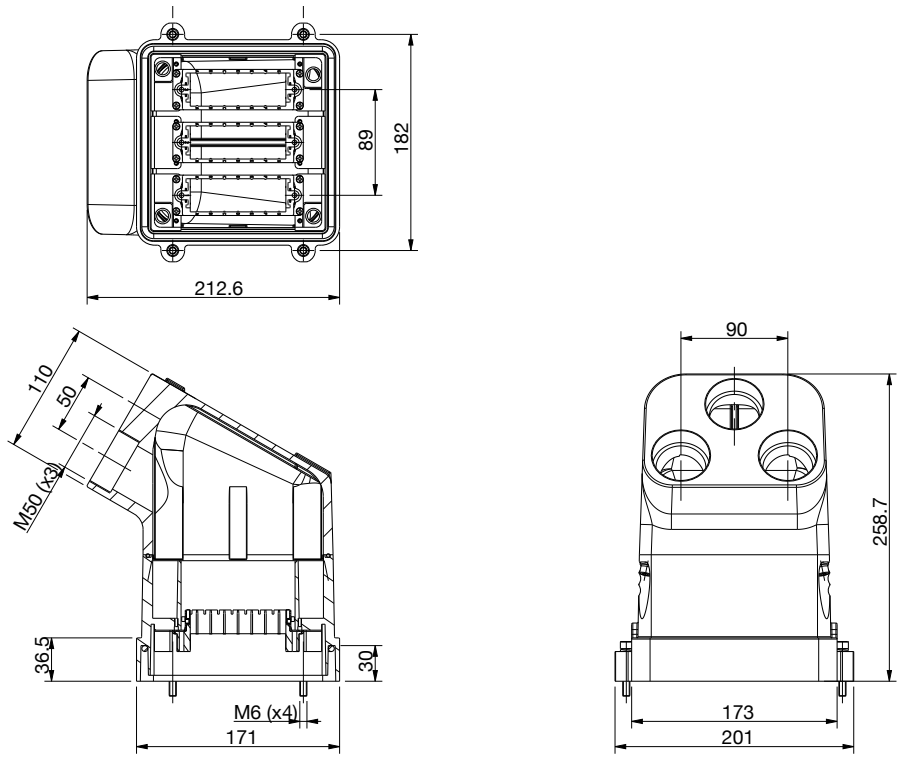


Dimension are in mm

CONNECTOR DIMENSIONS - 3 OUTPUT

PLUG



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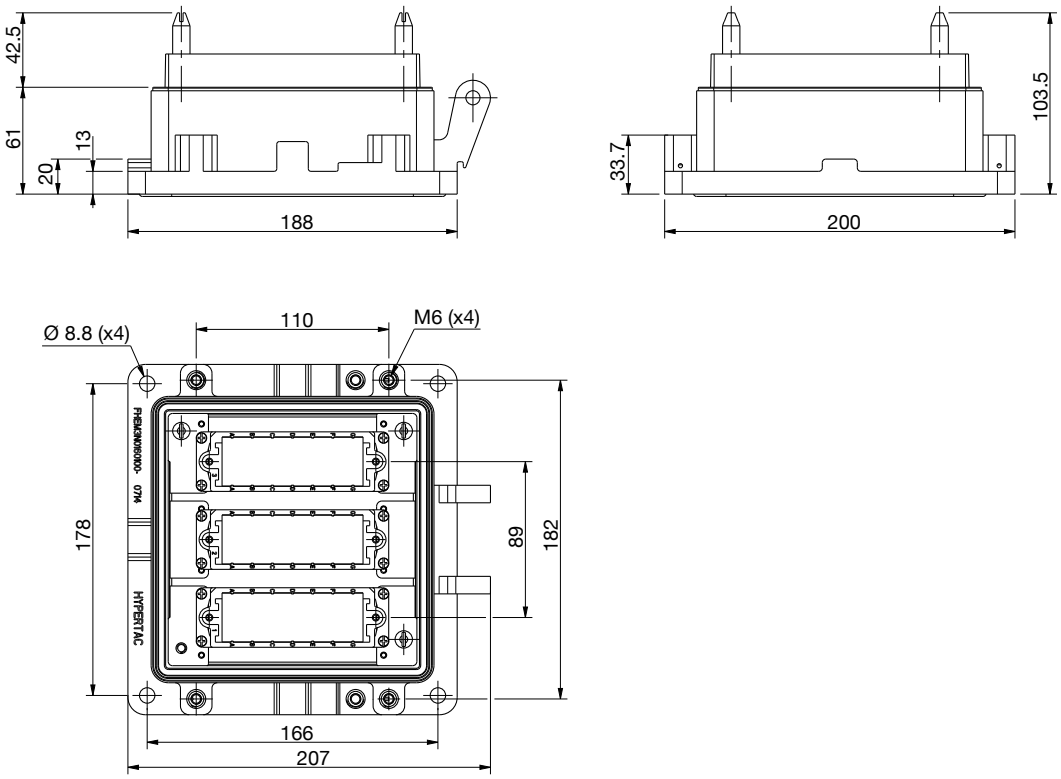
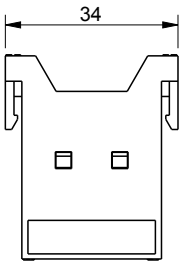


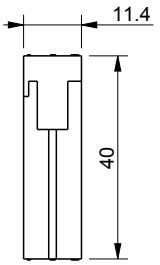
Dimension are in mm

MODULES (FG - FH)

20 X Ø1.00

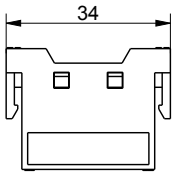
SOCKET

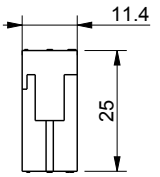




Insulator without contacts		Ref: **VOF** *(without contacts)*	
Conductor size AWG28-24	0.08-0.20 mm²	Ref: **VAF** *(AWG 28-24)*	P/N **20210**
Conductor size AWG24-20	0.20-0.62 mm²	Ref: **VEF** *(AWG 24-20)*	P/N **19999**

PIN





Insulator without contacts		Ref: **VOM** *(without contacts)*	
Conductor size AWG28-24	0.08-0.20 mm²	Ref: **VAM** *(AWG 28-24)*	P/N **20211**
Conductor size AWG24-20	0.20-0.62 mm²	Ref: **VEM** *(AWG 24-20)*	P/N **19997**

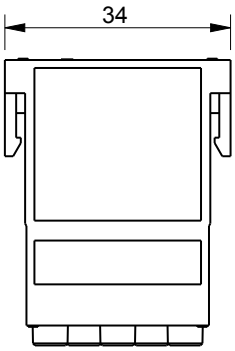
	DIN 0110	NF F 61-030
Rated voltage	63 V	30 V
Rated impulse withstanding voltage	1.5 kV	1.5 kV
Current rating (max wire ref. 25° C)	9 A	5 A
Creepage distance	1.8 mm	2.5 mm
Clearance distance	2.5 mm	2.5 mm

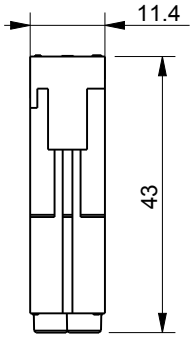
Dimension are in mm

MODULES (FG - FH)

10 X Ø1.50

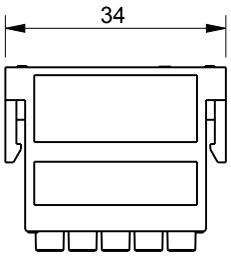
SOCKET

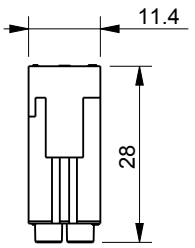




Insulator without contacts		Ref: **BOF** *(without contacts)*	
Conductor size AWG24-14	0.22-1.91 mm²	Ref: **BEF** *(AWG 24-14)*	P/N **015 090 2-20R G0**
Insulator without contacts		Ref: **DOF** *(without contacts)*	
Conductor size AWG24-20	0.20-0.62 mm²	Ref: **DAF** *(AWG24-20)*	P/N **20212**
Conductor size AWG20-16	0.62-1.30 mm²	Ref: **DEF** *(AWG-20-16)*	P/N **19996**

PIN





Insulator without contacts		Ref: **BOM** *(without contacts)*	
Conductor size AWG24-14	0.22-1.91 mm²	Ref: **BEM** *(AWG 24-14)*	P/N **015 160 1-20X OG**
Insulator without contacts		Ref: **DOM** *(without contacts)*	P/N **20213**
Conductor size AWG24-20	0.20-0.62 mm²	Ref: **DAM** *(AWG 24-20)*	P/N **19994**
Conductor size AWG20-16	0.62-1.30 mm²	Ref: **DEM** *(AWG 20-16)*	

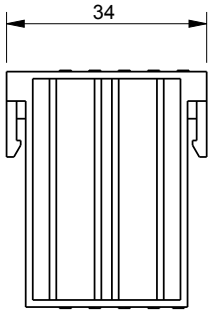
	BOF, BEF, BOM, BEM		DOF, DAF, DEF, DOM, DAM, DEM	
	DIN 0110	**NF F 61-030**	**DIN 0110**	**NF F 61-030**
Rated voltage	220 V	220 V	250 V	250 V
Rated impulse withstanding voltage	2.5 kV	2.5 kV	2.5 kV	2.5 kV
Current rating (max wire ref.)	8 A	8 A	20 A	20 A
Creepage distance	9.25 mm	9.25 mm	9.25 mm	9.25 mm
Clearance distance	3.60 mm	3.60 mm	3.60 mm	3.60 mm

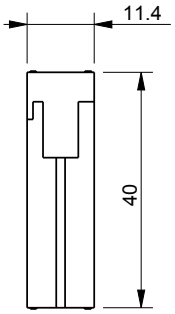
Dimension are in mm

MODULES (FG - FH)

5 X Ø2.50

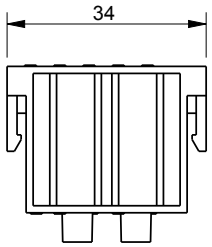
SOCKET

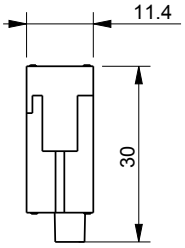




Insulator without contacts		Ref: **COF** *(without contacts)*	
Conductor size AWG20-16	0.50-1.22 mm²	Ref: **CAF** *(AWG 20-16)*	P/N **20214**
Conductor size AWG16-14	1.22-2.10 mm²	Ref: **CEF** *(AWG 16-14)*	P/N **20215**
Conductor size AWG14-10	2.10-5.40 mm²	Ref: **CIF** *(AWG 14-10)*	P/N **20035**

PIN





Insulator without contacts		Ref: **COM** *(without contacts)*	
Conductor size AWG20-16	0.50-1.22 mm²	Ref: **CAM** *(AWG 20-16)*	P/N **20216**
Conductor size AWG16-14	1.22-2.10 mm²	Ref: **CEM** *(AWG 16-14)*	P/N **025 041 1-20X OG**
Conductor size AWG14-10	2.10-5.40 mm²	Ref: **CIM** *(AWG 14-10)*	P/N **025 040 1-21X OG**

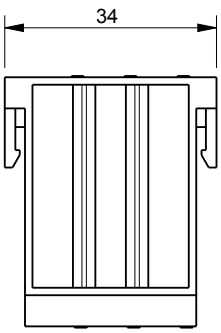
	DIN 0110	NF F 61-030
Rated voltage	400 V	30 V
Rated impulse withstanding voltage	4 kV	2.55 kV
Current rating (max wire ref.)	30 A	16 A
Creepage distance	4.5 mm	4.5 mm
Clearance distance	3.5 mm	3.5 mm

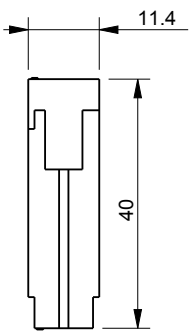
Dimension are in mm

MODULES (FG - FH)

3 X Ø3.50

SOCKET





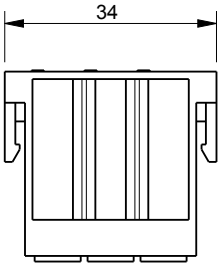
Insulator without contacts
Conductor size AWG12-10
Conductor size AWG8

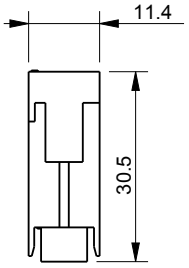
3.0-5.4 mm²
10 mm²

Ref. **TOF** *(without contacts)*
Ref. **TAF** *(AWG 12-10)*
Ref. **TEF** *(AWG 8)*

P/N **20412**
P/N **20409**

PIN





Insulator without contacts
Conductor size AWG12-10
Conductor size AWG8

3.0-5.4 mm²
10 mm²

Ref. **TOM** *(without contacts)*
Ref. **TAM** *(AWG 12-10)*
Ref. **TEM** *(AWG 8)*

P/N **20218**
P/N **19987**

	DIN 0110	NF F 61-030
Rated voltage	630 V	30 V
Rated impulse withstanding voltage	8 kV	2.55 kV
Current rating (max wire ref. 25° C)	60 A	25 A
Creepage distance	5 mm	5 mm
Clearance distance	5 mm	5 mm

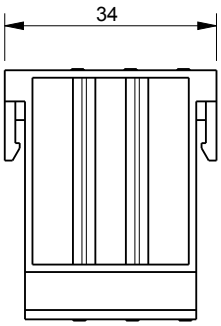
Dimension are in mm

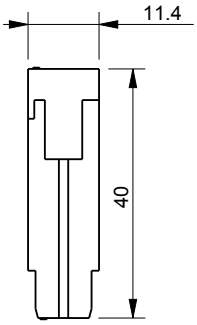
MODULES (FG - FH)

3 COAX CONTACTS

SOCKET

Insulator without contacts
Insulator with contacts



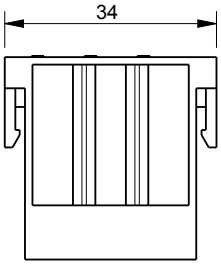


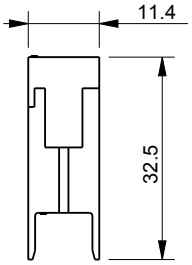
Ref. **TOX** *(without contacts)*
Ref. **TAX** *(with contacts)*

P/N **18024/1**

PIN

Insulator without contacts
Insulator with contacts





Ref. **TOY** *(without contacts)*
Ref. **TAY** *(with contacts)*

P/N **18024/2**

Characteristic impedence	50 Ω
Working frequency	
• **Optimum**	0-10 GHz
• **Maximum**	30 GHz

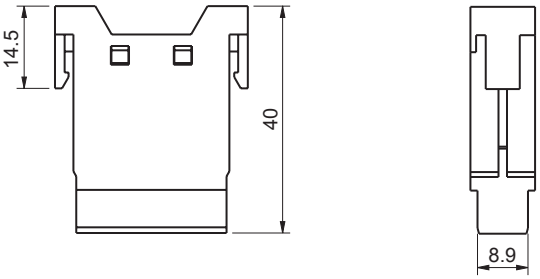
Dimension are in mm

MODULES (FG - FH)

2 FIBER OPTIC CONTACTS

SOCKET

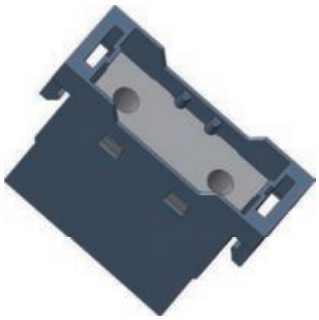
Insulator without contacts



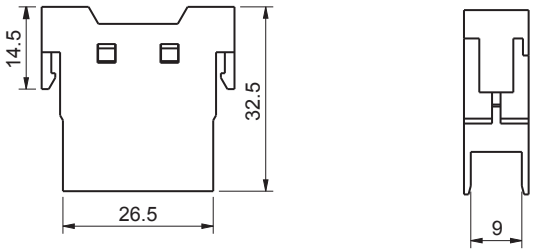
Ref: **FG_65336 - 00** *(without contacts)*

P/N **FG_65376-00**

PIN



Insulator without contacts



Ref: **FG_65335 - 00** *(without contacts)*

P/N **FG_65377-00**

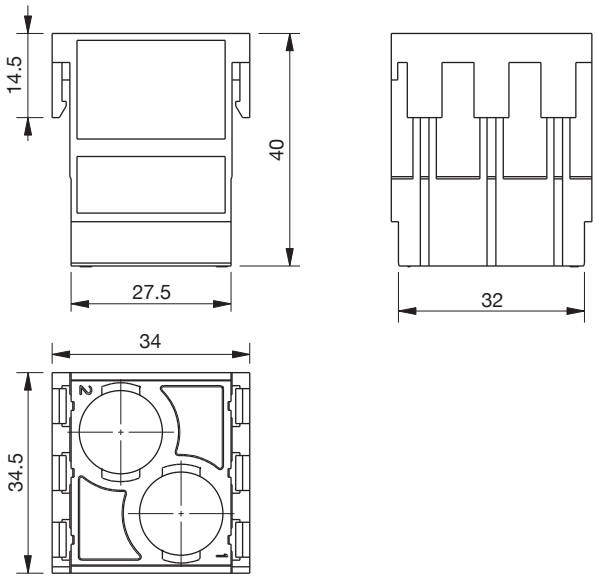
Type	Termini AWG 16 (MIL-T-29504/6)
Fiber	Multimode 50/125 or 62.5/125 µn
Cable	Simple fiber
Diameter max	Ø 2.2 mm
Conformity	MIL-C-83527 (MPX), ARINC 600 (NSX)

Dimension are in mm

MODULES (FG - FH)

HIGH SPEED QUADRAX CONTACTS

SOCKET

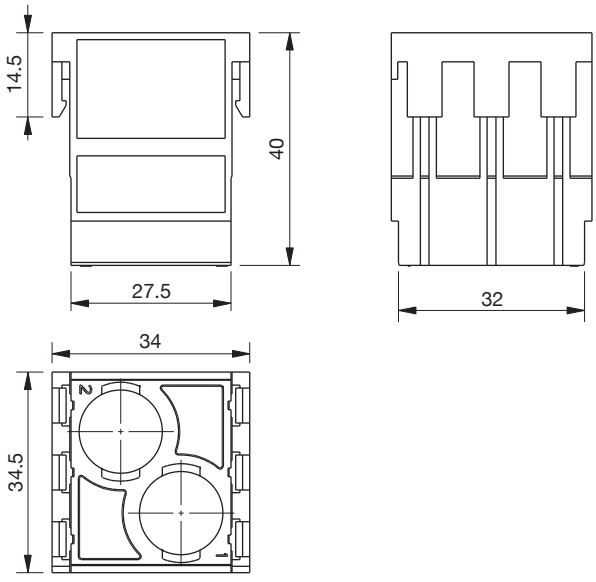


Insulator without contacts

Ref: **FG_65070 - 00** *(without contacts)*

P/N **123 009 2- QAR 01**
P/N **123 011 2- QAR 01**

PIN



Insulator without contacts

Ref: **FG_65069 - 00** *(without contacts)*

P/N **123 009 1- QAR 01**
P/N **123 011 1- QAR 01**

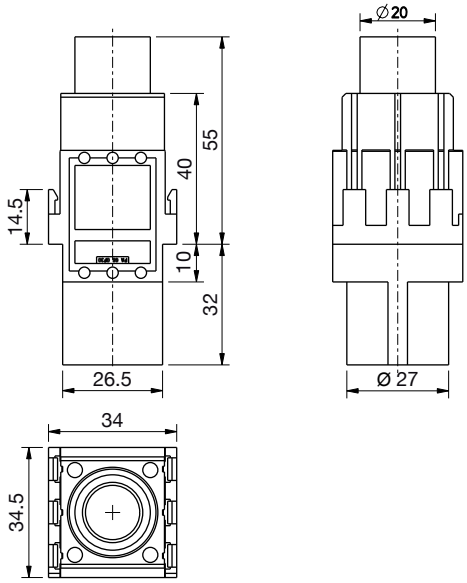
Rated voltage	30 V
Current rating	3 A
Creepage distance	1.169 mm
Clearance distance	1.169 mm

Dimension are in mm

MODULES (FG - FH)

POWER CONTACTS Ø7 MM

SOCKET

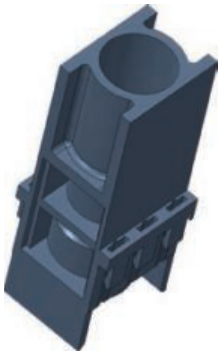


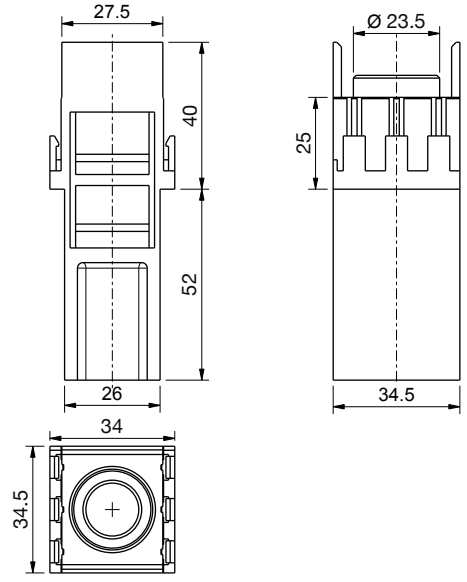
Insulator without contacts

Ref: **FH_64521 - 00** *(without contacts)*

P/N **070 041 2- 24R** (70 mm² - AWG00)
P/N **070 040 2- 23R** (50 mm² - AWG0)
P/N **070 039 2- 22R** (35 mm² - AWG2-1)

PIN





Insulator without contacts

Ref: **FH_64520 - 01** *(without contacts)*

P/N **070 039 1- 24R** (70 mm² - AWG00)
P/N **070 038 1- 23R** (50 mm² - AWG0)
P/N **070 037 1- 22R** (35 mm² - AWG2-1)

Current rating	260 A
Proof voltage	18 kV
Withstanding voltage	3000 V

Dimension are in mm

CONTACTS - HIGH SPEED QUADRAX, COAX AND POWER

	Contacts		Crimping tools			Tools	
	Part number	Type	Crimping tool	Tool turret	Position & Wire section	Insertion	Extraction
High Speed Quadrax contact	123 009 2- QAR 01	Socket	Astro-Tool TGV 101	TGV 210	2 (AWG 24) 3 (AWG 22) 4 (AWG 20) 5 (AWG 18)	S_069	S_056 S_069
	123 011 2- QAR 01		Daniels FT8	TP 945			
	123 009 1- QAR 01	Pin	Astro-Tool TGV 101	TGV 210	2 (AWG 24) 3 (AWG 22) 4 (AWG 20) 5 (AWG 18)	S_069	S_056 S_069
	123 011 1- QAR 01		Daniels FT8	TP 945			
Power contact	070 041 2- 24R	Socket	Mecatraction TR461 Jack TR462N SU210K	–	Die: TN70V20 Die hold number: S21	Mecatraction TR461 Jack TR462N SU210K	SD- 070 00 00 00 3
	070 040 2- 23R				Die: TN50V20 Die hold number: S21		
	070 039 2- 22R				Die: U13HCU50 Die hold number: U-21 / U13		
	070 039 1- 24R	Pin	Mecatraction TR461 Jack TR462N SU210K	–	Die: TN70V20 Die hold number: S21	Mecatraction TR461 Jack TR462N SU210K	SD- 070 00 00 00 3
	070 038 1- 23R				Die: TN50V20 Die hold number: S21		
	070 037 1- 22R				Die: U13HCU50 Die hold number: U-21 / U13		
Coax contact	18024/1	Socket	HXA M22502/5-01	Smiths Connectors M0577	Consult us	–	M0578
	18024/2	Pin	HXA M22502/5-01	Smiths Connectors M0577	Consult us	–	M0578

CONTACTS - FIBER OPTIC

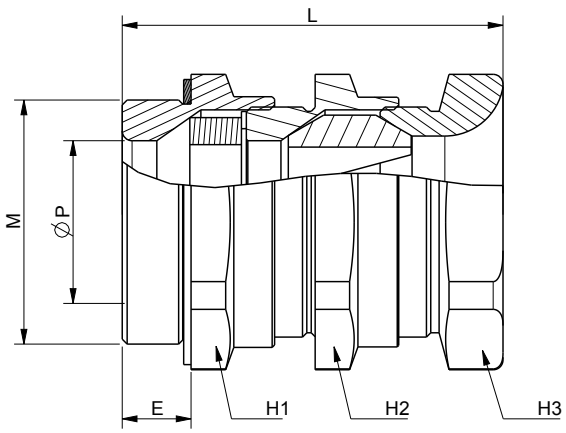
Contacts		Diameter	Extraction tools
Part number	Type		
FG_65377-00	Socket	Ø 2.2 mm max	M81969/1-03
FG_65376-00	Pin	Ø 2.2 mm max	M81969/1-03

CONTACTS - SIGNAL

Contacts			Crimping tools			Tools
Size	Type	Part number	Crimping tool	Tool turret	Position & Wire section	Extraction
Ø 1.00 mm	Socket	20210 19999	Daniels AFM8	M0572	4 - 0.08 mm² (28 AWG) 5 - 0.14 mm² (26 AWG) 6 - 0.20 mm² (24 AWG) 6 - 0.38 mm² (22 AWG) 7 - 0.62 mm² (20 AWG)	20264
	Pin	20211 19997	Daniels AFM8	M0572		20264
Ø 1.50 mm	Socket	015 090 2- 20R GO	Astro-tool TGV 101	TGV201 Red	2 - 0.22 mm² (24 AWG) 4 - 0,50 to 0.75 mm² (22-20 AWG) 5 - 1 mm² (18 AWG) 6 - 1.50 mm² (16 AWG) 7 - 2.50 mm² (14 AWG)	SD-0150000005
			Daniels FT8	SH 462 Red		
	Pin	015 160 1- 20X OG	Astro-tool TGV 101	TGV201 Red		SD-0150000008
			Daniels FT8	SH 462 Red		
	Socket	20212 19996	Daniels AF8	Smiths Connectors M0573	2 - 0.20 mm² (24 AWG) 3 - 0.50 mm² (22 AWG) 4 - 0.62 mm² (20 AWG) 5 - 0.75 mm² (20 AWG) 6 - 1 mm² (18 AWG) 6 - 1.30 mm² (16 AWG)	20265
	Pin	20213 19994	Daniels AF8	Smiths Connectors M0573		20265
Ø 2.50 mm	Socket	20214 20215 20035	Daniels M310	Smiths Connectors M0574	2 - 0.50 mm² (20 AWG) 3 - 1.00 mm² (18 AWG) 4 - 1.22 mm² (16 AWG) 5 - 2.10 mm² (14 AWG) 5 - 3.00 mm² (12 AWG) 6 - 5.40 mm² (10 AWG)	20266
	Pin	20216 025 041 1-20X OG 025 040 1-21X OG	Daniels M20218 1998710	Smiths Connectors M0574		20421
Ø 3.50 mm	Socket	20412	Daniels WA 23-2	Consult us	3 mm² - 5.40 mm² (12-10 AWG)	20267
		20409	Smiths Connectors 20490	Smiths Connectors M0601	10 mm² (7 AWG)	
	Pin	20218	Daniels WA 23-2	Daniels WA 23-9	3 mm² - 5.40 mm² (12-10 AWG)	20266
		19987	Smiths Connectors 20490	Smiths Connectors M0575	10 mm² (7 AWG)	

ACCESSORIES

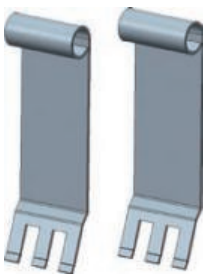
CABLE GLAND



Reference	Clamping	Color cone	M	Ø P	E	H1	H2	H3	L	Weight
FH_65388-03	23 - 26	Black	M50x1.50	33	14	55	55	55	73	599.00
FH_65850-00	25 - 31		M50x1.50	33	14	55	55	55	75	608.00
FH_65388-02	25.50 - 30	Red	M50x1.50	33	14	55	55	55	73	599.00
FH_65388-01	28.50 - 32	Yellow	M50x1.50	33	14	55	55	55	73	599.00
FH_65388-00	30 - 36	Green	M50x1.50	39.50	14	60	60	60	78	636.00
FH_65851-00	34 - 37		M63x1.50	39.50	16	70	60	60	94	1056.00

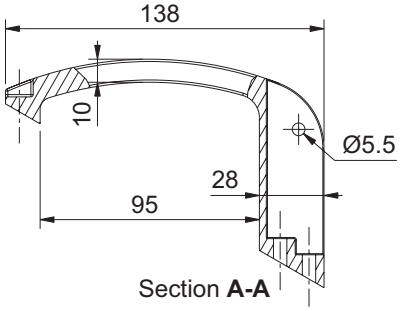
EXTRACTION TOOLS FOR MODULES

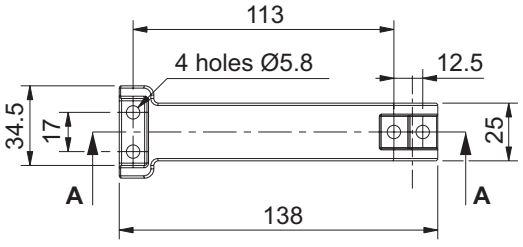
Extraction tool for 1x11.40 mm pitch
Ref: **20367**



Extraction tool for 3x11.40 mmm pitches
Ref: **S_140**

GRIP HANDLE





Ref: **FH_64486-00**

Dimension are in mm

Disclaimer 2016

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SMITHS CONNECTORS
PRODUCT LINES

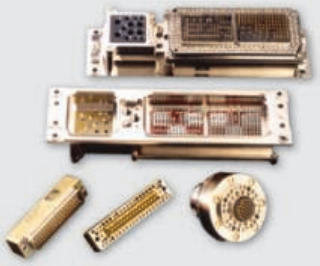
PCB

- Low, medium and high density board-to-board, cable to board and stacking
- Rugged standard
- Low profile
- Signal, power, coaxial & high speed configurations
- Self configurable board-to-board
- Spring probe connectors
- Mixed signal, power and coaxial contact connectors
- Different termination styles: solder cup, crimp, SMT and SMT flex, press fit, solder dip.

POWER

- Circular
- Configurable rectangular
- Ruggedized
- Single and Multi-Way Connectors
- Power contact up to 1,200 Amps
- Excellent performance in harsh environment conditions
- Cable assembling

EMI/EMP FILTER



- EMI/RFI filtering and transient protection
- RoHS compliant solderless filter connectors available
- Circular, ARINC, D-Subminiature Micro-D
- Filtered adapters for “bolt on” EMI /EMP solutions
- Filter hybrid capability

MODULAR/RECTANGULAR

- Configurable with modules for signal, power, coax, fiber optics and/or pneumatics
- Easy configuration in a single frame
- For rack & panel, and cable applications
- Guided hardware for blind
- D-sub connectors
- Micro-D style
- Signal connectors for hand held and docking stations

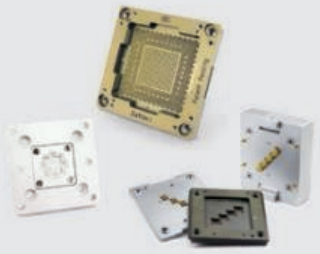
CIRCULAR

- Metal and Plastic
- Industrial M12, M23, M40, M58
- Crimp and solder terminations
- Various types of cable clamps
- Push Pull/ latch mechanism
- Color coding

HEAVY DUTY

- Ultra reliable hyperboloid contact
- Modular solution: signal, power, data contacts, and fiber optics
- High resistance in harsh environment
- EMC shielding
- Easy cable mounting
- High pressure up to 35K PSI, 250° C
- High temperature up to 440°C

SPRING PROBES

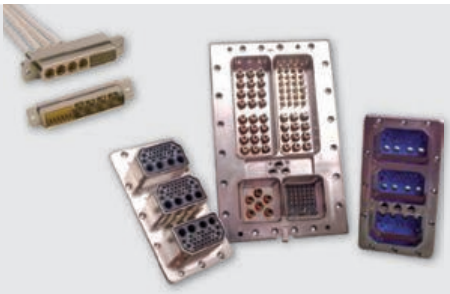


- Z-axis compliant
- Blind mate engagement
- Long cycle life
- High density
- Extreme miniaturization
- Printed circuit board test
- Bare board test
- Coaxial contacts

MIL/AERO STANDARD

- Standard military interface
- ARINC interface
- ARINC 801
- Custom inserts

HIGH SPEED COPPER/FIBER



- Quadrax and Twinax Connectors
- Rugged D-Sub Connectors
- ARINC and MIL-STD Contacts
- Micro Twinax/Quadrax
- Butt-Joint and Expanded Beam Contacts
- ARINC 801 Termini
- Floating Fiber Termini

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