

M40 Circular

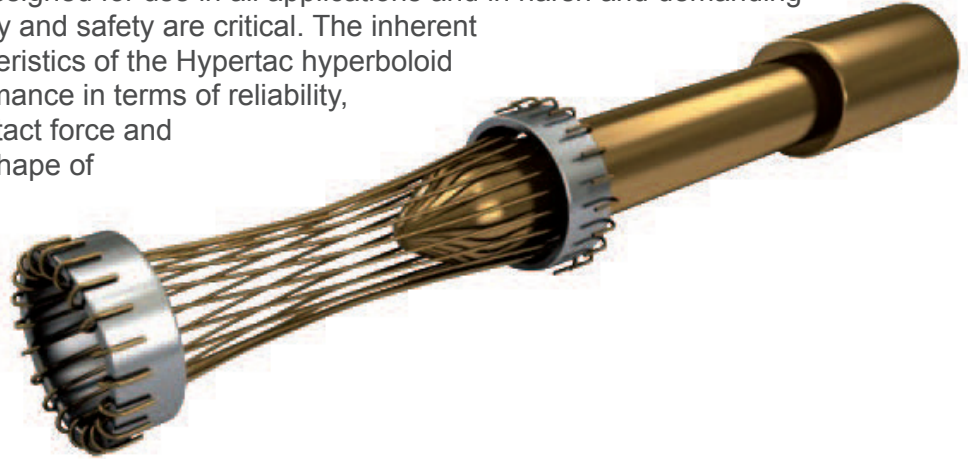
P Series

Robust Circular Power Connectors Size 1.5



Hypertac® Hyperboloid Technology

Smiths Interconnect 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.



Features	Benefits
<p>Low insertion/extraction forces</p> <p>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.</p>	<p>High density interconnect systems</p> <p>Significant reductions in size and weight of sub-system designs. No additional hardware is required to overcome mating and un-mating forces.</p>
<p>Long contact life</p> <p>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.</p>	<p>Low cost of ownership</p> <p>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.</p>
<p>Lower contact resistance</p> <p>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.</p>	<p>Low power consumption</p> <p>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.</p>
<p>Higher current ratings</p> <p>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.</p>	<p>Maximum contact performance</p> <p>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.</p>
<p>Immunity to shock & vibration</p> <p>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.</p>	<p>Reliability under harsh environments</p> <p>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.</p>

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M40 Power Connectors Size 1.5



The Smiths Interconnect M40 power connectors, series P, size 1.5, are qualified for heavy drive applications in mechanical engineering, tooling machines, robotics, mechatronics, heavy printing and packaging machines, conveyors and marine.

The adoption of crimp contacts allows for a consistent high quality connection and reduces the total installation time of the connector by minimizing the number of operations. Machined contacts feature a closed barrel design ideally suited for manual hand tools and support a wide range of wire termination cross sections.

The series P uses Hypertac® hyperboloid contacts. Hypertac® is a superior performing hyperboloid contact technology designed for use 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. These performance characteristics provide a real commercial benefit in terms of the total installed cost of ownership.

In addition the series P features outstanding protection against electromagnetic interference through a full 360° screen shielding.

Designed for Heavy Drive Applications

Features & Benefits

Reliable Contact Technology

- Hypertac® contact technology ensures immunity to shock and vibration and minimal contact resistance
- Long life and low rate of wear through excellent shock and vibration resistance

Heavy Drive Applications

- Outstanding protection against electromagnetic interference through a full 360° screen shielding
- Corrosion resistant
- Variable cable clamp can accept cable diameter from 9mm to 25mm

High Current Applications

- Crimp contacts for wire diameter from 1.5mm² to 16mm²
- Ground connection

UL certified

- UL/CSA approval file No. 178462

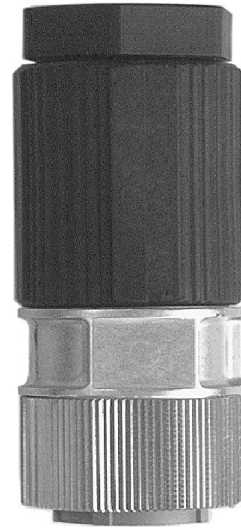
Type Overview



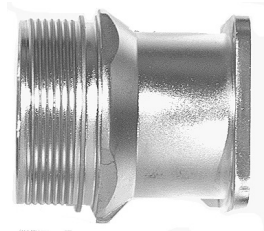
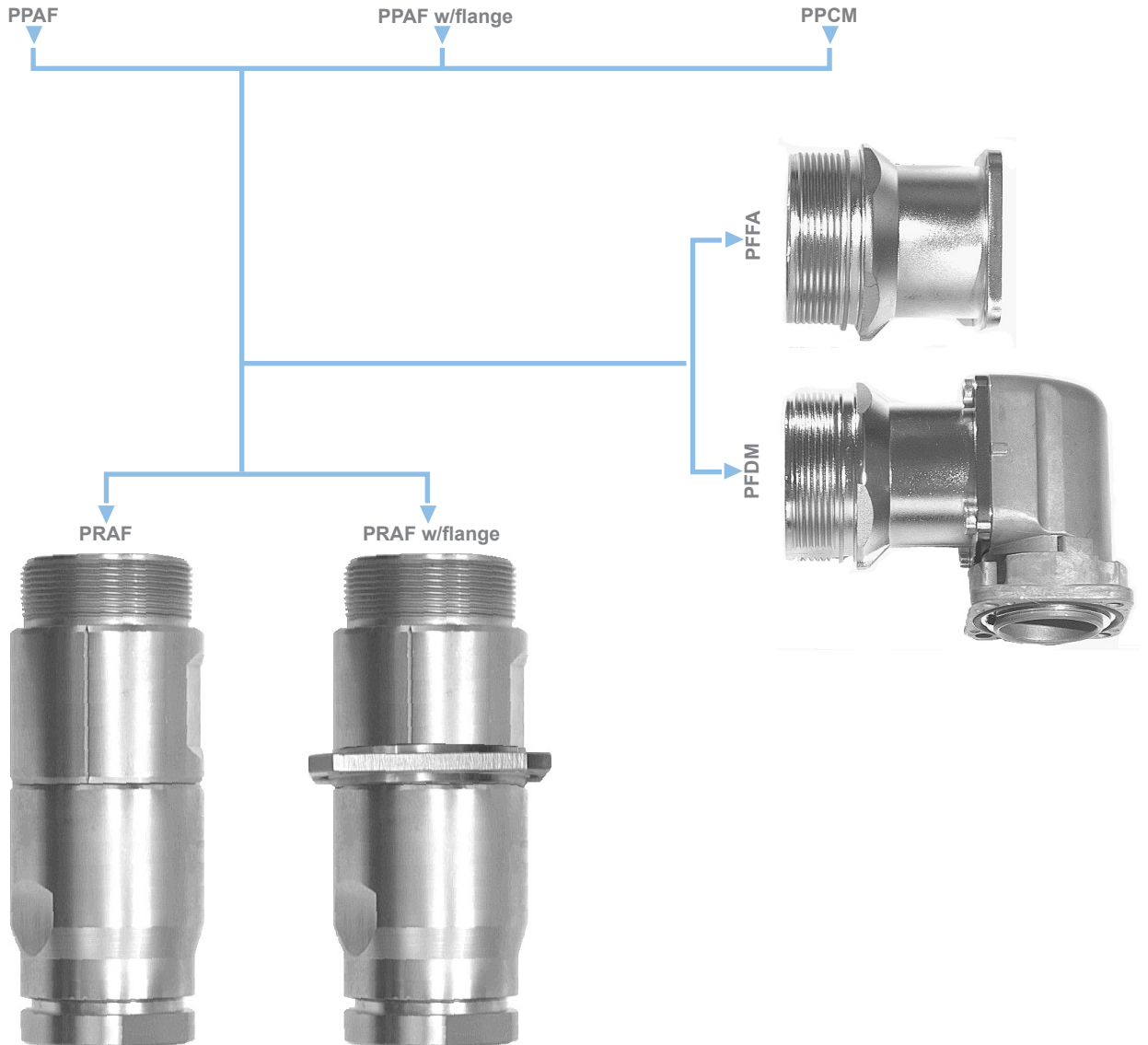
PPAF



PPAF w/flange



PPCM



PFFA



PFDM



PRAF



PRAF w/flange

How to Order



1 CONNECTOR FAMILY

P M40 CIRCULAR POWER CONNECTORS, SIZE 1.5
SERIES P (UL VERSION = SERIES D)

2 CONNECTOR LAYOUT

F	F	A	STRAIGHT RECEPTACLE, ZINC-DIECAST, CONNECTING EARTH PIN TO THE SHELL
F	D	M	ANGLED RECEPTACLE, ROTATABLE, WITH CAP
R	A	F	EXTENSION WITH VARIABLE SHIELD CONNECTION AND VARIABLE CABLE CLAMP

P	A	F	PLUG WITH VARIABLE SHIELD CONNECTION AND VARIABLE CABLE CLAMP
P	C	M	PLUG WITH INTEGRATED CABLE CLAMP AND SHIELDING CONNECTED TO THE CHASSIS GROUND, SHELL AND ATTACHMENT SCREW OF PLASTICS, COUPLING RING AND SLEEVE METALLIC

3 INSERTS

0	6	C	6WAY, PINS 2 x Ø 2 mm, 4 x Ø 3.6 mm FOR RECEPTACLE PFFA
0	8	C	8WAY, PINS 4 x Ø 2 mm, 4 x Ø 3.6 mm FOR RECEPTACLE PFFA
0	6	A	6WAY, PINS 2 x Ø 2 mm, 4 x Ø 3.6 mm FOR EXTENSION PRAF
0	8	A	8WAY, PINS 4 x Ø 2 mm, 4 x Ø 3.6 mm FOR EXTENSION PRAF

0	6	B	6WAY, PINS 2 x Ø 2 mm, 4 x Ø 3.6 mm FOR PLUG PPAF
0	8	B	8WAY, PINS 4 x Ø 2 mm, 4 x Ø 3.6 mm FOR PLUG PPAF
0	6	D	6WAY, PINS 2 x Ø 2 mm, 4 x Ø 3.6 mm FOR PLUG PPCM
0	8	D	8WAY, PINS 4 x Ø 2 mm, 4 x Ø 3.6 mm FOR PLUG PPCM

4 TERMINATION STYLE - CRIMP CONTACTS

N	N	N	N	WITHOUT CONTACTS, CONTACTS TO BE ORDERED SEPARATELY
M	R	H	K	PINS, Ø 2 mm AWG 18-14, Ø 3.6 mm AWG 14-12 FOR RECEPTACLES
M	R	H	G	PINS, Ø 2 mm AWG 18-14, Ø 3.6 mm AWG 12-8 FOR RECEPTACLES

M	R	D	E	PINS, Ø 2 mm AWG 18-14, Ø 3.6 mm AWG 18-12 FOR EXTENSIONS
M	R	D	F	PINS, Ø 2 mm AWG 18-14, Ø 3.6 mm AWG 10-6 FOR EXTENSIONS
F	R	A	E	HYPERTAC SOCKETS, Ø 2 mm AWG 18-14, Ø 3.6 mm AWG 16-12 FOR PLUGS
F	R	A	F	HYPERTAC SOCKETS, Ø 2 mm AWG 18-14, Ø 3.6 mm AWG 10-6 FOR PLUGS

5 CABLE CLAMPS

0	0	0	WITHOUT CABLE CLAMP FOR RECEPTACLES - PFFA AND PFDM
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9	1	5	VARIABLE CABLE CLAMP FROM 9 - 25 mm FOR EXTENSION AND PLUG - PPAF AND PRAF
9	2	0	VARIABLE CABLE CLAMP FROM 9 - 25 mm FOR PLUG - PPCM

6 VERSION NUMBER

0	2	FOR EXTENSION WITH SQUARE FLANGE (shown on page 9)
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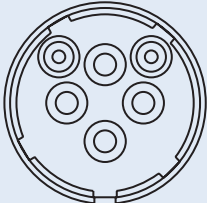
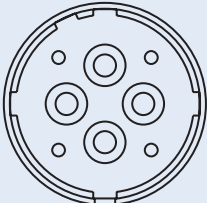
0	3	FOR PLUG WITH SQUARE FLANGE (shown on page 10)
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Technical Characteristics

Material & Finishes

Shell	CuZn, zinc diecast, aluminium, plastics (size 1.5i)
Shell plating	nickel plated, chemical nickel plated, chromium plated
Inserts	PA, PBT
Contacts	CuZn
Contact plating	gold plated
Sealing	FKM, NBR
Storage conditions	-40°C to +70°C / humidity 40%

Electrical

Size 1.5 Data based on DIN EN 61984				
	4 x 3.6	2 x 2	4 x 3.6	4 x 2
Number of ways x contact diameter [mm]	4 x 3.6	2 x 2	4 x 3.6	4 x 2
Crimp termination cross section [mm ²]	1.5 - 16	0,75 - 2.5	1.5 - 16	0.75 - 2.5
Nominal current [A] @ environmental temperature 50°C / 122°F @ environmental temperature 20°C / 68°F	48 57	20 30	48 57	20 30
Max. operating voltage [Vrms]	630	250	630	250
Contact resistance [mΩ]	< 1	< 3	<1	< 3
Insulation resistance [Ωcm]	10 ¹³	10 ¹³	10 ¹³	10 ¹³
Size 1.5i Nominal current [A] @ environmental temperature 50°C / 122°F @ environmental temperature 20°C / 68°F	55 65	20 30	55 65	20 30

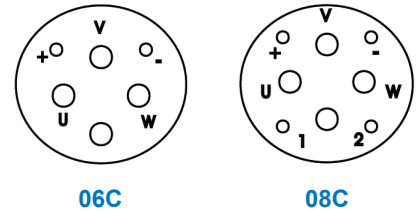
Physical & Environmental

Operating temperature range	-40°C to +125°C (UL version: -40°C to +75°C)
Environmental level	IP67 (mated)
Contamination level	3 (mated)
Installation altitude	up to 3000 m
Overvoltage category	III
Fire & Smoke	UL94-V0
RoHS	Compliant

Receptacles

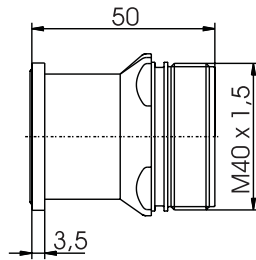
CONTACT ARRANGEMENTS
VIEW MATING FACE

LAYOUT
DESCRIPTION
PART NUMBER CONFIGURATOR



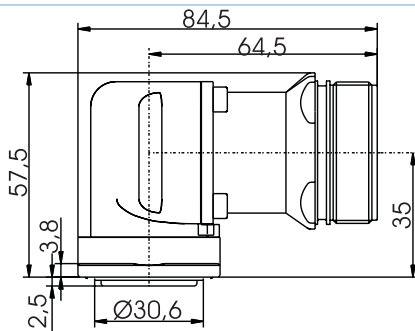
TERMINATION CROSS SECTION [mm²]

Straight receptacle,
connecting earth pin to the shell



part number incl. O-ring
against vibration on demand

Angled receptacle,
connecting earth pin
to the shell



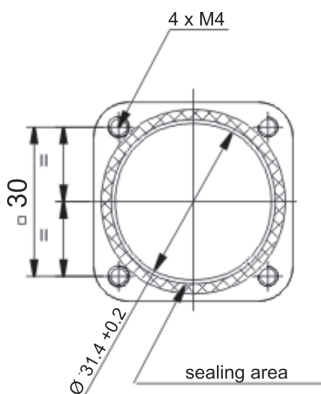
part number
incl. O-ring
against vibration
on demand

Dimensions are in mm

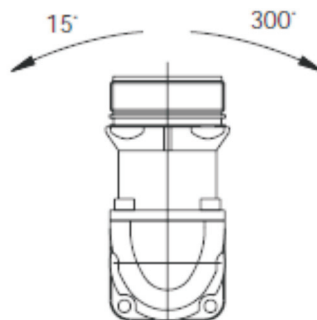
* UL Version

SHELL	INSERT	TERMINATION CROSS SECTION [mm ²]				CABLE CLAMP
		2 x 0.75 - 2.5 4 x 2.5 - 4	2 x 0.75 - 2.5 4 x 4 - 10	4 x 0.75 - 2.5 4 x 2.5 - 4	4 x 0.75 - 2.5 4 x 4 - 10	
PFFA DFFA*	06C	MRHK				000
	08C		MRHG			
PFDM DFDM*	06C		MRHG			000
	08C			MRHK		
					MRHG	

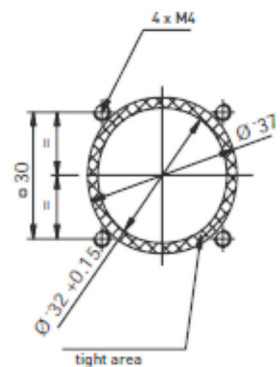
Drilling drawing PFFA



Variable position PFDM



Drilling drawing PFDM

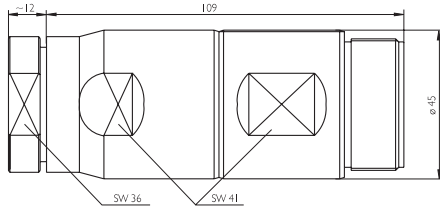


Extensions

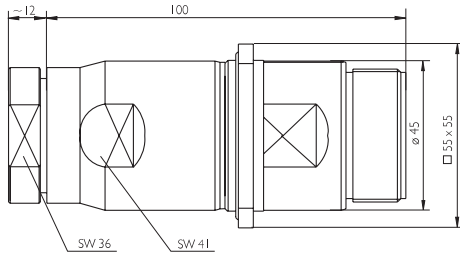
CONTACT ARRANGEMENTS
VIEW MATING FACE

LAYOUT
DESCRIPTION
PART NUMBER CONFIGURATOR

Extension with variable shield connection
and variable cable clamp



Extension with variable shield connection,
variable cable clamp and square flange

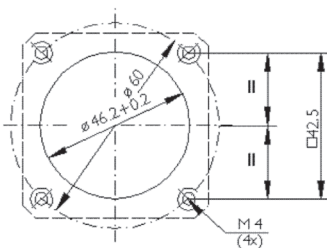


Dimensions are in mm

SHELL	INSERT	TERMINATION CROSS SECTION [mm ²]				CABLE CLAMP
		2 x 1 - 2.5 4 x 1 - 4	2 x 1 - 2.5 4 x 6 - 16	4 x 1 - 2.5 4 x 1 - 4	4 x 1 - 2.5 4 x 6 - 16	
PRAF DRAF*	06A	MRDE	MRDF			915
	08A			MRDE	MRDF	
PRAF DRAF*	06A	MRDE	MRDF			91502
	08A			MRDE	MRDF	

* UL Version

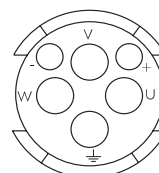
Drilling drawing PRAF



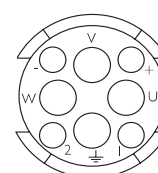
Plugs

CONTACT ARRANGEMENTS
VIEW MATING FACE

LAYOUT
DESCRIPTION
PART NUMBER CONFIGURATOR



06B/06D



08B/08D

TERMINATION CROSS SECTION [mm²]

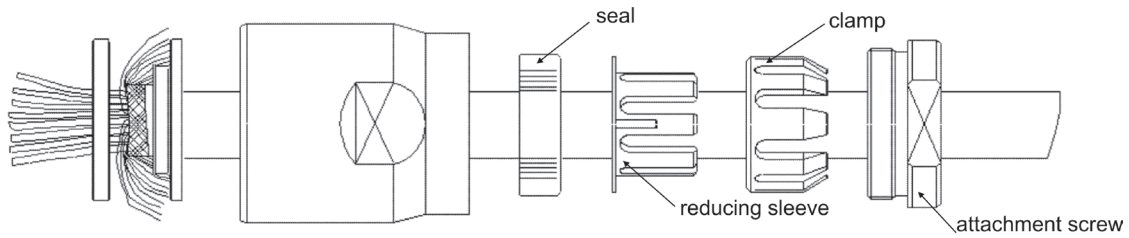
CONTACT ARRANGEMENTS VIEW MATING FACE	SHELL	INSERT	TERMINATION CROSS SECTION [mm ²]				CABLE CLAMP
			2 x 0.75 - 2.5 4 x 1.5 - 4	2 x 0.75 - 2.5 4 x 6 - 16	4 x 0.75 - 2.5 4 x 1.5 - 4	4 x 0.75 - 2.5 4 x 6 - 16	
Plug with variable shield connection and variable cable clamp 	PPAF DPAF*	06B	FRAE				915
		08B		FRAF		FRAE	
Plug with variable shield connection, variable cable clamp and square flange 	PPAF DPAF*	06B	FRAE				91503
		08B		FRAF		FRAE	
Plug, size 1.5i, with variable shield connection and variable cable clamp 	PPCM	06D	FRAE				920
		08D		FRAF		FRAE	

Dimensions are in mm

* UL Version

Cable Clamps

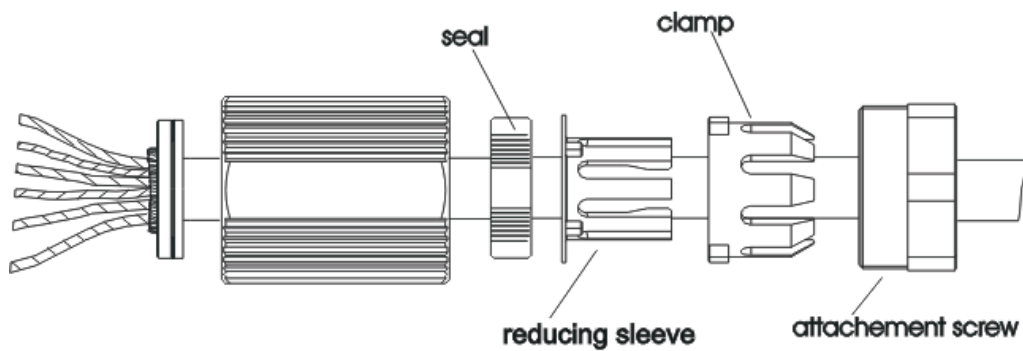
Cable clamp 915 for PPAF/PRAF



Clamp range:

with reducing sleeve from 9 to 17 mm
without reducing sleeve from 17 to 25 mm
can be used for shielded and non shielded cables







Cable clamp 920 for PPCM - Size 1.5i



Clamp range:

with reducing sleeve from 9 to 17 mm
without reducing sleeve from 17 to 25 mm
can be used for shielded and non shielded cables

Pins

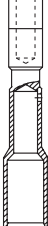

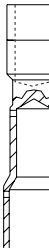
Type		D	H	E	F	G	K
Contact diameter [mm]		2	2	3.6	3.6	3.6	3.6
PART NUMBER AND LAYOUT		021.285.2000 	021.368.1020 	021.282.2000 	021.283.2000 	021.367.1020 	021.369.1020 
Termination cross section**	[AWG] [mm ²]	18 – 14 1 – 2.5	18 – 14 0.75 – 2.5	18 – 12 1 – 4	10 – 6 6 – 16	12 – 8 4 – 10	14 – 12 2.5 – 4
Min. conductor diameter [mm]		2,3	2,1	2,8	6,4	4,5	2,9
Max. insulation diameter [mm]		4.5	3.6	4.6	-	6.2	6.2
Crimping tool / part number		B152	B151	B152 B179*	B271	B271* B152	B152* B271
Positioner / part number		B166	B263	B167	B361	B263	B263
Insertion tool / part number		B117	-	B117	-	-	-
Extraction tool / part number		B107/A	-	B107/A	B107/A	-	-

Notes:

** Mentioned crimp ranges are recommendations and only valid with flexible wires H05(07)V-K[#mm²] acc. to DIN VDE 0281/0282 pp and with non compressed standard cables and wires acc. to DIN VDE 0295. It is possible that due to another structure of wires further cross sections and currents can be processed.

* Preferred crimping tool

HYPERTAC® Sockets

Type		A	E	F
Contact diameter [mm]		2	3.6	3.6
PART NUMBER AND LAYOUT				
		020.123.1020	020.370.1020	020.371.1020
Termination cross section**	[AWG] [mm²]	8 - 14 0.75 - 2.5	16 - 12 1.5 - 4	10 - 6 6 - 16
Min. conductor diameter [mm]		2.3	2.8	6.4
Max. insulation diameter [mm]		4.5	4.6	6.4 (= only for 6 mm² up to 10 mm²)
Crimping tool / part number		B151 B179*	B152 B179*	B152* B271
Positioner / part number		B154	B281	B158

UL cross reference list



Standard	UL Version	USR		CNR		DIN EN 61984	
PFFA... PFDM... PRAF... PPAF...	DFFA... DFDM... DRAF... DPAF...						
contact diameter [mm]		2	3.6	2	3.6	2	3.6
max. current [A]		20	15	12	35	30	65
max. voltage [V]		125	600	125	600	125	630

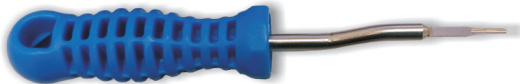
Note:


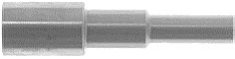
According to the certifacton all types of UL-versions of our connectors can only be used with our contacts. Therefore UL-versions can only be offered as a package with contacts included

Tools..

Crimping tools	Part number
 <p>DMC-USA CAGE 11851 RAISE TO ROTATE SEL. NO.</p>	B151 B179
 <p>DMC-USA CAGE 11851 RAISE TO ROTATE SEL. NO.</p>	B152 B271

Crimp accessories	Part number
 <p>CAGE 11851 BOMBYN USA CAGE</p>	MASTER GAUGE B190 (for B151) B189 (for B152), B290 (for B152) B230 (for B179) B289 (for B271)
	POSITIONER B154, B158, B166, B167, B263, B281, B361, B363

Insertion tools for contacts	Part number	Connector layout	Contact
	B117	PRAF	Ø 2 mm Ø 3.6 mm

Extraction tools for contacts	Part number	Connector layout	Contact
	B132		
	B107/A (B132 + B107/10)	PRAF	Ø 2 mm Ø 3.6 mm

Disclaimer 2018

All of the information included in this catalogue is believed to be accurate at the time of printing. It is recommended, however, that users should independently evaluate the suitability of each product for their intended application and be sure that each product is properly installed, used and maintained to achieve desired results.

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Global Support

UK Headquarters

- London, UK
+44 20 7004 1600
info.uk@smithsinterconnect.com

US Headquarters

- Stuart, FL
+1 772 286 9300
info.us@smithsinterconnect.com

Americas

- Costa Mesa, CA
+1 714 371 1100
info.us@smithsinterconnect.com
- Milpitas, CA
+1 408 957 9607 x 1125
info.us@smithsinterconnect.com
- Stuart, FL
+1 772 286 9300
info.us@smithsinterconnect.com
- Hudson, MA
+1 978 568 0451
info.us@smithsinterconnect.com
- Northampton, MA
+1 413 582 9620
info.northampton@smithsinterconnectinc.com
- Tampa, FL
+ 1 813 901 7200
info.tampa@smithsinterconnectinc.com
- Kansas City, KS
+1 913 342 5544
info.us@smithsinterconnect.com
- Salisbury, MD
+1 800 780 2169
info.us@smithsinterconnect.com
- Thousand Oaks, CA
+1 805 267 0100
info.thousandoaks@smithsinterconnectinc.com

Europe

- Deggendorf, Germany
+49 991 250 120
info.de@smithsinterconnect.com
- Genova, Italy
+39 0 10 60361
info.it@smithsinterconnect.com
- Dundee, UK
+44 1382 427 200
info.dundee@smithsinterconnect.com
- Rouen, France
+33 2 32 96 91 76
info.fr@smithsinterconnect.com
- Elstree, UK
+44 20 8236 2400
info.uk@smithsinterconnect.com

Asia

- Shanghai, China
+86 21 2283 8008
info.asia@smithsinterconnect.com
- Suzhou, China
+86 512 6273 1188
info.asia@smithsinterconnect.com
- Singapore
+65 6846 1655
info.asia@smithsinterconnect.com

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