Amphenol® Amphe-EX™ Connectors for Hazardous Environment Ex Zones 1/2

12-056-3

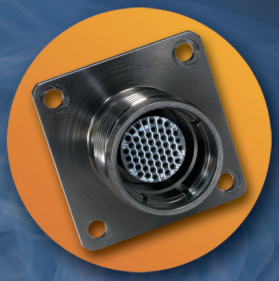
High Performance Connectors Designed for use in:

- High temperatures
- Harsh chemicals
- Potentially explosive environments

CE Ex

IECEx

EAC



Fiber Optics Multimode Contacts

Signal Contacts Size 20 and 22D

Power Coax Contacts

RJ45 Insert

Smaller interface than most heavy duty hazardous rated connectors.

Contact options that include signal, power, RF, fiber optics and Ethernet.

Amphenol

Amphe-EX Series Mated Pair

Amphenol technology provides innovation interconnect solutions for the demanding environmental requirements for equipment used in power generation, geophysical and oil and gas exploration. Sophisticated in-house testing facilities provide the qualification and specialization required for many of our connector products. Capabilities for testing include vibration and shock testing, humidity, engagement/separation force evaluation, durability testing, as well as salt spray/ fog, optical and many other performance requirements.

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Please visit our Website at www.amphenol-industrial.com

Amphe-EX™ Series

Hazardous Rated Connectors EX Zone 1 & 2 smaller size and more contact options

INTRODUCTION

With the ever growing need for more power and sig- nal in a smaller interface in ATEX rated areas, Amphenol is pleased to introduce the Amphe-EX circular connector series.

Designed for Hazardous Environments

AMPHE-EX Connector Series is designed for use in ATEX and IECex rated areas. AMPHE-EX connectors are equipped to handle signal, power, RF or fiber optic requirements in the most harsh environments. AMPHE-EX connectors offer a complete array of insert patterns, ranging from 2 # 20 contacts, right up through 79 # 22D contacts, and everything in between.

In addition, AMPHE-EX is able to provide RJ45 connections and fiber optic termini into an ATEX and IECex approved interconnect solution.

Chemical Manufacturing, Pharmaceutical Manufacturing, Petrochemical Refineries, Land and Offshore Drilling Platforms are just a few of the areas that the new AMPHE-EX Series will provide increased performance.

AMPHE-EX connectors are made from machined aluminum components, and plated in a hard anodic coating designed to withstand the most extreme environments. Double-lead acme threads allow for a self cleaning mating action that does not clog under adverse conditions of ice, snow, mud or sand. The specific materials and design features of the AMPHE-EX series were originally selected to satisfy the stringent requirements of the Military and Aerospace industries. These connectors combine electrical and mechanical capabilities that equal or exceed many of the parameters established by the Military specification MIL-5015.

Amphenol Industrial, one of the leading interconnect suppliers to Industrial markets around the world, welcomes this new product to it's current offering of harsh environment interconnect solutions.

Amphe-EX Shell Styles

EXM-A00. . . . Flangeless Panel Mount Receptacle (Resin)

EXM-A01 . . . .Fix Inline Receptacle

EXM-A02 . . . .Panel Mount Receptacle (Resin)

EXM-A03. . . . Flangeless Inline Receptacle

EXM-A06 . . . .Plug with EX Cable Gland

Amphe-EX™ Series
Specifications

Amphe-EX connectors are Certified for EX Zone 1 and 2 (T6, T5 & T4)

Gases, Vapours and Mists - Ex de IIC Gb Tamb between -40°c to +55°c
Fiber Optic OP PR - Ex op pr IIC Gb Tamb between -40°c to +55°c *
Fiber Optic OP IS - Ex op is IIC Gb Tamb between -40°c to +55°c *
Combustible Dusts - Ex tb IIIC Db (T80°c & T95°c) IP6X Tamb between -40°c to +55°c

ATEX Certified Zone 1 & 2- Cert. # SIRA 07ATEX1229X
IECEx Certified Zone 1 & 2- Cert # SIR 08.0029X
EAC Ex Zone 1 & 2- Cert #
Cenelec IP68

HIGH TENSILE STRENGTH ALUMINUM: Bar Stock components precision machined, with points of impact designed for extra strength.

HARD ANODIC PLATING: All machined aluminum parts are finished with a hard, scratch resistant coating per Mil-A-8625, Type III. (300 days salt spray performance)

EASILY ACCESSIBLE WIRE TERMINALS: Conductors are readily terminated to contacts. Cable housings are slipped over conductors after terminating. Cumbersome handling and seating of inserts with conductors attached is eliminated.

LARGE WIRE SPACING: Ample wire space is provided in cable housings and hardware.

CABLE OPTIONS: Cable Gland terminations available to allow variety of cable types including unarmored, armored and sheathed cable built to the IEEE-45, UL1309, IEC, BS, DIN and JIC standards. Flexible cables like SOOW-A, W, G-GC and DLO constructions can also be used with the AMPHE-EX series connectors. For Cable Gland information, ask for Amphenol Cable Glands and Cord Grips catalog # 12- 055.

INSERT VARIATIONS: A broad variety of inserts are offered ranging from 2 # 20 awg, up to 79 # 22D awg contacts. Numerous hybrid inserts available that offer combination copper and Coax/Twinax. In addition, Fiber Optic and RJ45 options available.

RoHS COMPLIANT PRODUCT

CONTACT RATING

Contact Size	Test Current	Maximum Millivolt Drop Crimp*	Crimp Well Data	
	Crimp		Crimp Barrel Diameter	Cable Range AWG / SQMM
22D	5	73	.0345” (.0876mm)	22-26 / 0.25-0.34
20	7.5	55	.047” (1.194mm)	20-24 / 0.5-0.75
16	13	49	.067” (1.701mm)	16-20 / 1.0-1.5
12	23	42	.100” (2.540mm)	12-14 / 2.5
10 (Power)	33	33	.137” (3.480mm)	10-12 / 4.0-6.0

Measurements in inches ± .0010 size 22D to size 16 and ± .002 for size 12 and 10
Measurements in mm ± .0025 size 22D to size 16 and ± .050 for size 12 and 10

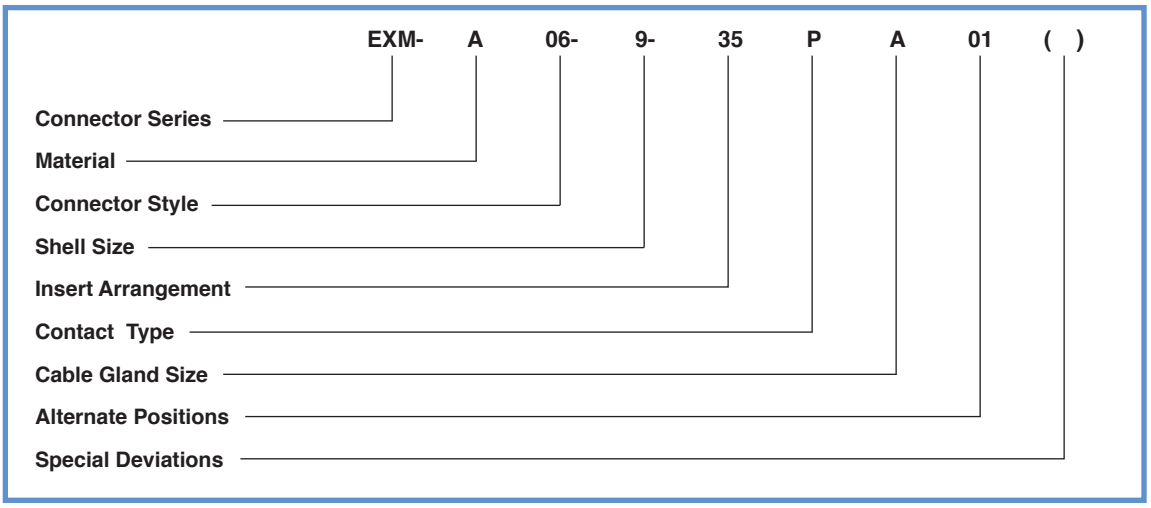
SERVICE RATING

Service Rating	Suggested Operating Voltage (Sea Level)		Test Voltage (Sea Level)
	AC (RMS)	DC	
M	400	550	1300 VRMS
N	300	450	1000 VRMS
I	600	850	1800 VRMS
II	900	1250	2300 VRMS

** Please note that the establishment of electrical factors is left entirely in the designers hands, since they are in the best position to know what voltage, switching surges, transients, etc. can be expected in a particular circuit.

Amphe-EX™ Series
how to order

Amphenol® Amphe-EX series Connectors can be ordered by coded part number.
Ordering procedure is illustrated by part number EXM-A06-9-35PA01 as shown below:



Caps and cable glands come standard on all assemblies

Connector Series
EXM . .designates Amphe-EX Series

Material
A. . . . .designates Aluminum Alloy Black Hardcoat
S. . . . .designates Stainless Steel 316L

Connector Style
00. . . . Flangeless Panel Mount Receptacle (Resin)
01 . . . .Fix Inline Receptacle with EX Cable Gland
02 . . . .Panel Mount Receptacle (Resin)
03. . . . Flangeless Inline Receptacle with EX cable Gland
06 . . . .Plug with EX Cable Gland

Shell Size
9 thru 21 available

Insert Arrangement
See insert arrangement chart, page 9 and illustrated on pages 10-11
Copper Contacts included - FO termini are optionals and can replace AWG16 contacts

Contact Type
P. . . . . Pin contacts (Standard 500 cycles)
S.. . . . Socket contacts (Standard 500 cycles)

Cable Back End
IF 01, 03 or 06 See chart page 14 for appropriate cable O.D.
IF 00 or 02 Connector comes with Resin (Epoxy / Potting Compound)

Alternate Positions
Rotation of minor keys on page 12. Omit for standard Keyway “N”

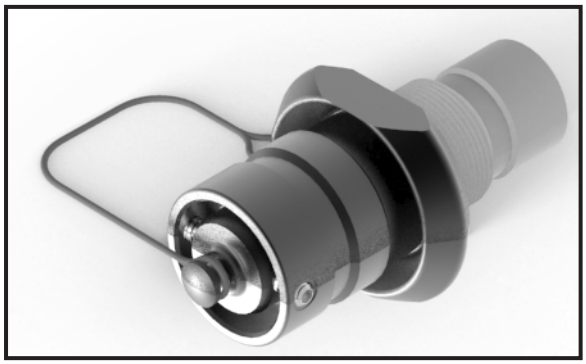
Specials Deviations
Omit for cable gland for Unarmored cable
BS. . . . EX cable gland for universal armored cable
BSR . . EX reduced cable gland for universal armored cable

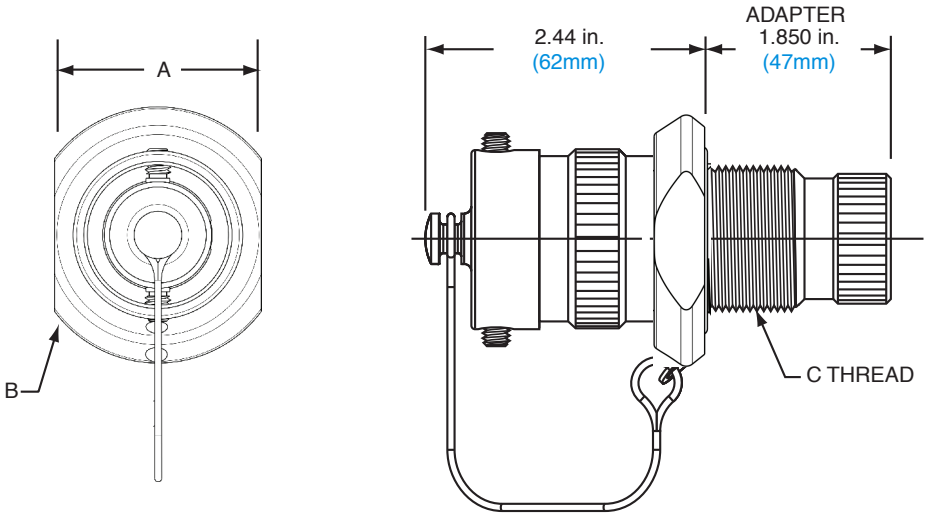
RoHS COMPLIANT
PRODUCT AVAILABLE -
Consult Amphenol Industrial Operations.

Amphe-EX™ Series

EXM-A00 Flangeless Panel Mount Receptacle

EXM-A00*





* To complete PN see how to order in page 3.
Assembly includes contacts, resin, metal cap and lanyard.

Inches (Millimeters)

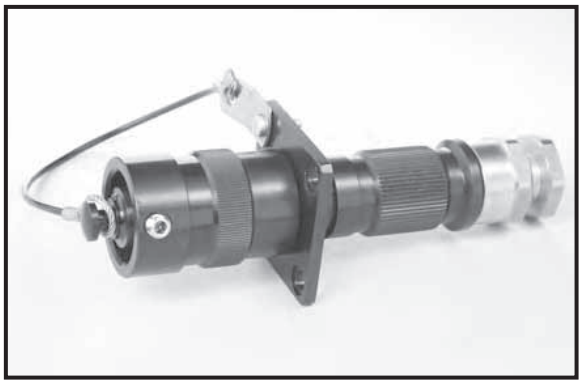
Shell Size	A Flange Dimension	B Mounting Dimension	C Thread Adapter
9	1.658 (42,11)	2.058 (52,27)	.750 NPT (M25)
11	1.786 (45,36)	2.180 (55,37)	.750 NPT (M25)
13	1.900 (48,26)	2.366 (60,09)	1.00 NPT (M32)
15	2.025 (51,43)	2.454 (62,33)	1.00 NPT (M32)
17	2.150 (54,61)	2.576 (65,43)	1.25 NPT (M40)
19	2.256 (57,30)	2.698 (68,52)	1.25 NPT (M40)
21	2.381 (60,47)	2.819 (71,60)	1.25 NPT (M40)

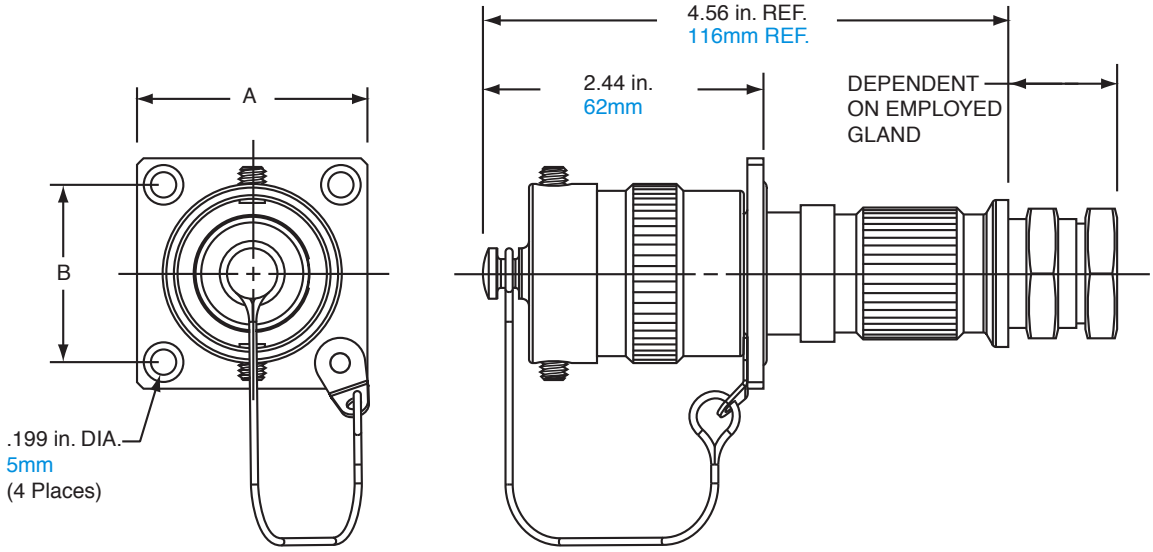
All dimensions for reference only.

Amphe-EX™ Series

EXM-A01 Fix Inline Receptacle

EXM-A01*





* To complete PN see how to order in page 3.
Assembly includes contacts, metal cap, lanyard and EX gland (page 14)

Inches (Millimeters)

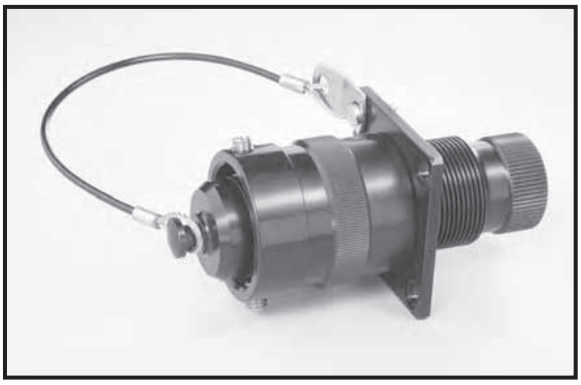
Shell Size	A Flange Dimension	B Mounting Dimension	F Metric Cable Gland Entry Thread
9	1.772 (45)	1.299 (33)	M16X1.5mm
11	1.772 (45)	1.299 (33)	M16X1.5mm
13	2.008 (51)	1.535 (39)	M20X1.5mm
15	2.008 (51)	1.535 (39)	M25X1.5mm
17	2.126 (54)	1.693 (43)	M25X1.5mm
19	2.126 (54)	1.693 (43)	M32X1.5mm
21	2.126 (54)	1.693 (43)	M32X1.5mm

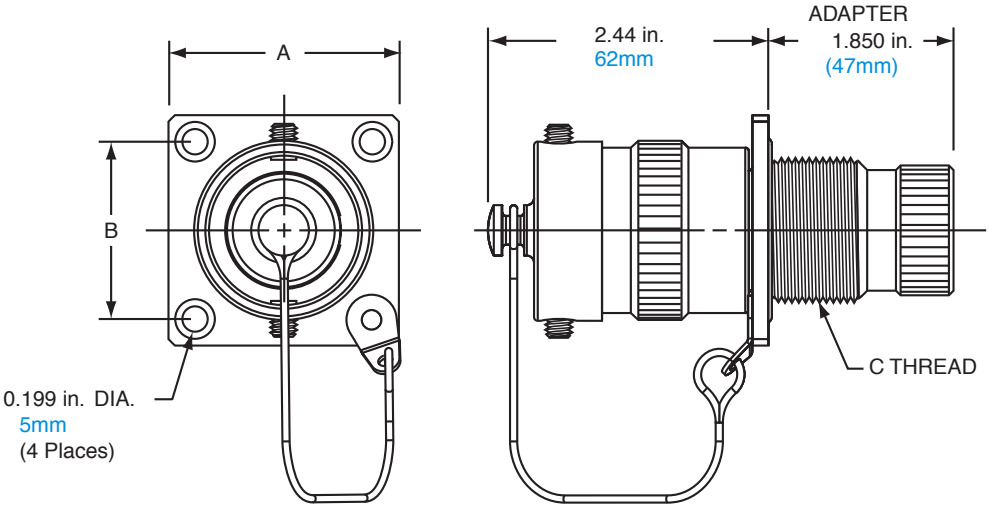
All dimensions for reference only.

Amphe-EX™ Series

EXM-A02 Panel Mount Receptacle

EXM-A02*





* To complete PN see how to order in page 3.
Assembly includes contacts, resin, metal cap and lanyard.

Inches (Millimeters)

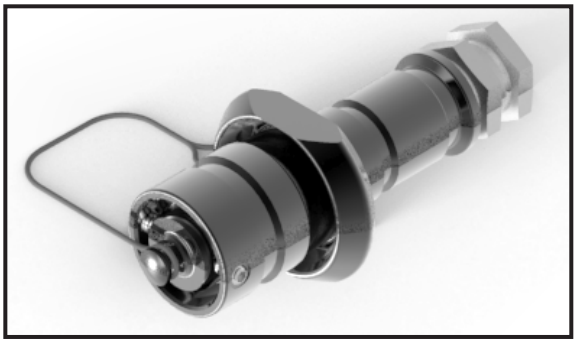
Shell Size	A Flange Dimension	B Mounting Dimension	C Thread Adapter
9	1.772 (45)	1.299 (33)	.750 NPT (M25)
11	1.772 (45)	1.299 (33)	.750 NPT (M25)
13	2.008 (51)	1.535 (39)	1.00 NPT (M32)
15	2.008 (51)	1.535 (39)	1.00 NPT (M32)
17	2.126 (54)	1.693 (43)	1.25 NPT (M40)
19	2.126 (54)	1.693 (43)	1.25 NPT (M40)
21	2.126 (54)	1.693 (43)	1.25 NPT (M40)

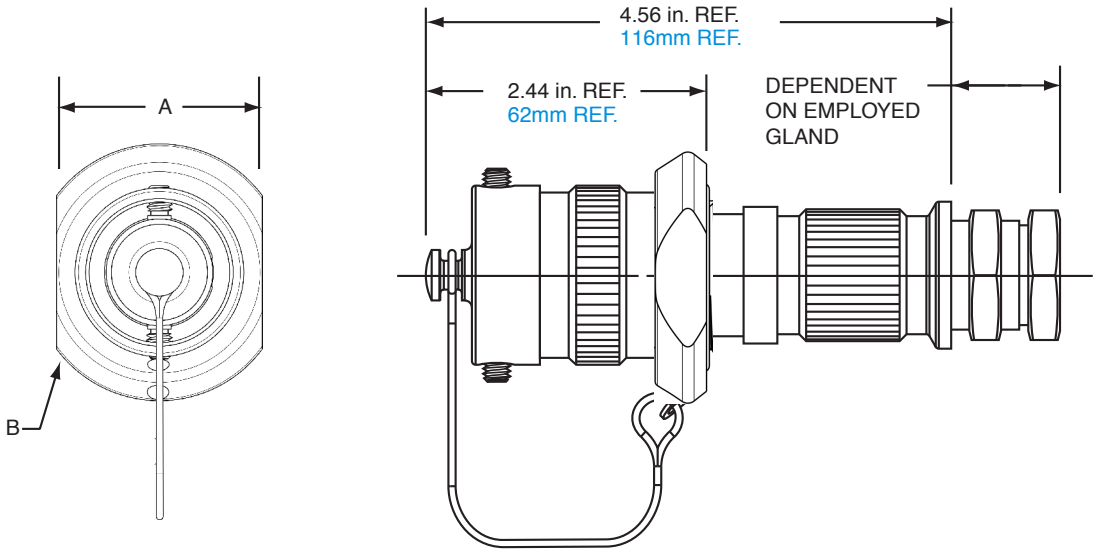
All dimensions for reference only.

Amphe-EX™ Series

EXM-A03 Flangeless Inline Receptacle

EXM-A03*





* To complete PN see how to order in page 3.
Assembly includes contacts, metal cap, lanyard and EX gland (page 14)

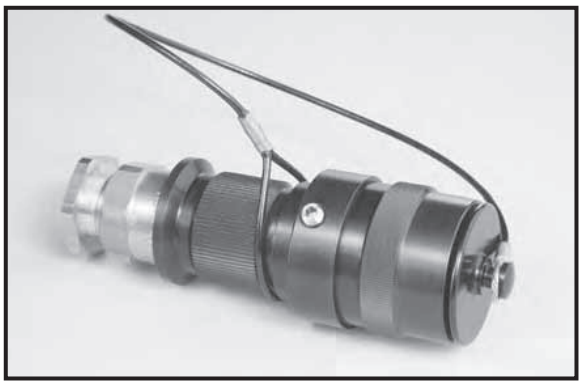
Inches (Millimeters)

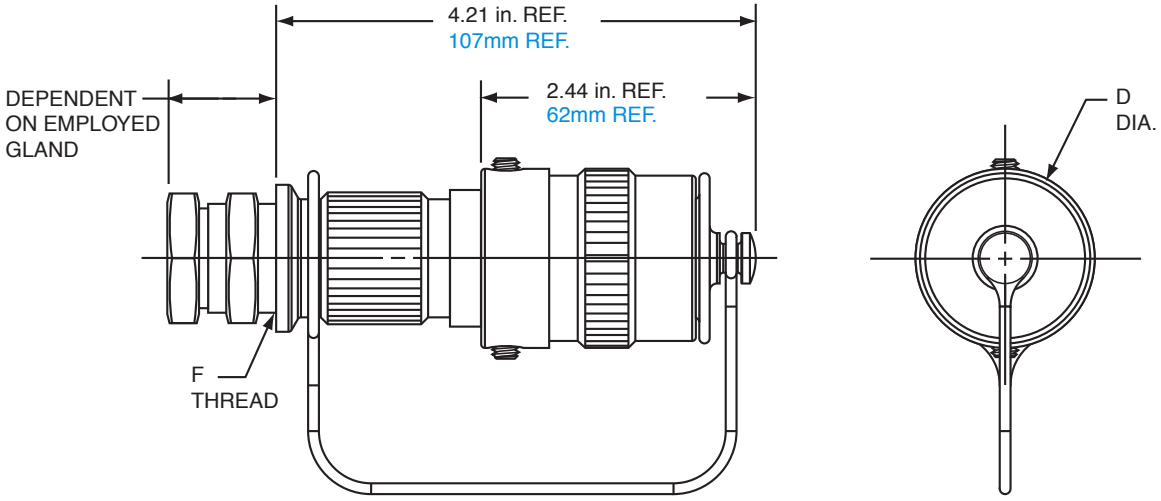
Shell Size	A Flange Dimension	B Mounting Dimension	F Metric Cable Gland Entry Thread
9	1.658 (42,11)	2.058 (52,27)	M16X1.5mm
11	1.786 (45,36)	2.180 (55,37)	M16X1.5mm
13	1.900 (48,26)	2.366 (60,09)	M20X1.5mm
15	2.025 (51,43)	2.454 (62,33)	M25X1.5mm
17	2.150 (54,61)	2.576 (65,43)	M25X1.5mm
19	2.256 (57,30)	2.698 (68,52)	M32X1.5mm
21	2.381 (60,47)	2.819 (71,60)	M32X1.5mm

All dimensions for reference only.

Amphe-EX™ Series
EXM-A06 Straight Plug

EXM-A06*





* To complete PN see how to order in page 3.
Assembly includes contacts, metal cap, lanyard and EX gland (page 14)

Inches (Millimeters)

Shell Size	D Diameter ±.0625 ±1.5875	F Metric Cable Gland Entry Thread
9	1.3125 (33,33)	M16X1.5mm
11	1.4375 (36,51)	M16X1.5mm
13	1.5625 (39,68)	M20X1.5mm
15	1.6875 (42,86)	M25X1.5mm
17	1.8125 (46,03)	M25X1.5mm
19	1.9375 (49,21)	M32X1.5mm
21	2.0625 (52,38)	M32X1.5mm

All dimensions for reference only.

Amphe-EX™ Series

insert availability and identification, contacts, sealing plugs

Shell Size/Arrg.	Service Rating	Total Conatcts	Contact Size							
			22D	20	16	12	12 (coax)	10 (power)	8 (coax)	8†† (Twinax)
9-35	M	6	6							
9-94	M	2		2						
9-98	I	3		3						
11-2	I	2			2					
11-5	I	5		5						
11-35	M	13	13							
11-98	I	6		6						
11-99	I	7		7						
13-4	I	4			4					
13-8	I	8		8						
13-13	I, Fiber Optic	4			2*	2				
13-35	M	22	22							
13-98	I	10		10						
13-71	I	2				2				
15-2	I	2						2		
15-5	II	5			5					
15-15	I	15		14	1					
15-18	I	18		18						
15-19	I	19		19						
15-35	M	37	37							
15-97	I	12		8	4					
15-AC	M	26	24		2					
17-2	M	39	38							1
17-6	I	6				6				
17-8	II	8			8					
17-22	NA	4					2		2	
17-26	I	26		26						
17-31	M	19	4	11	4					
17-35	M	55	55							
17-99	I	23		21	2					
19-11	II	11			11					
19-31	M	15	12			1			2	
19-32	I	32		32						
19-35	M	66	66							
19-RJ	CAT 5/6									
21-11	I	11				11				
21-16	II	16			16					
21-35	M	79	79							
21-39	I	39		37	2					
21-41	I	41		41						
21-75	M	4							2	

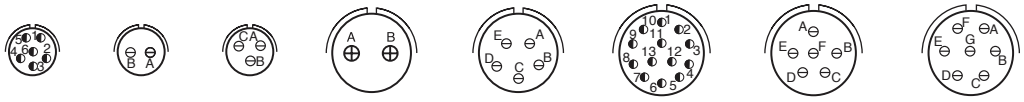
STANDARD CONTACTS AND SEALING PLUGS FOR AMPHE-EX SERIES

CONTACTS			SEALING PLUGS	
Conatct Size	Pin Part Number	Socket Part Number	Contact Size	Proprietary No.
8 (Coax)	21-33102-21	21-33101-21	8 (Coax)	10-482099-8
8 (Twinax)	21-33190-529	21-33191-530	8 (Twinax)	T3-4008-59P
10 (Power)	10-597448-105	10-597449-105	10 (Power)	10-576225
12	10-597448-125	10-597449-125	12	10-405996-121
16	10-597448-165	10-597449-165	16	10-405996-161
20	10-597448-205	10-597449-205	20	10-405996-201
22D	10-597448-725	10-597449-452	22D	10-405996-221

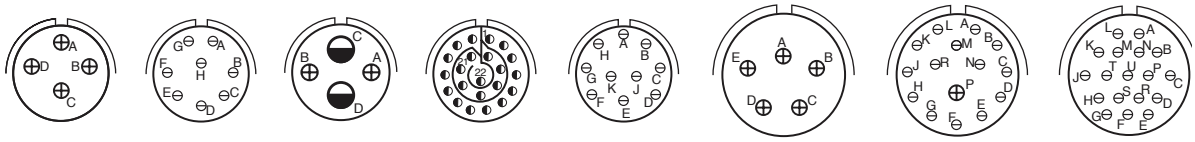
Above part numbers include standard 500 cycle finish designation - gold plating over suitable underplate in accordance with MIL-C-39029. For other contact options available for use in Amphe-EX connectors, (thermocouple) consult Amphenol, Sidney, NY.

Amphe-EX™ Series
insert arrangements

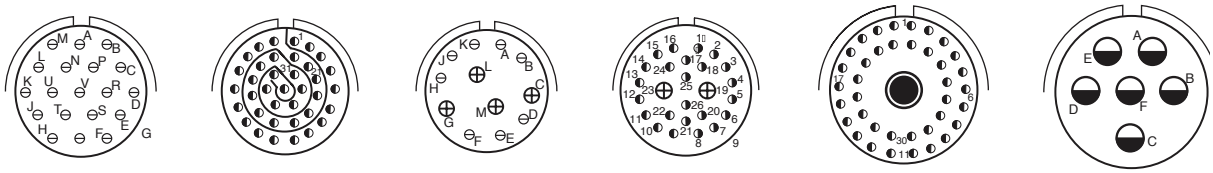
front face of pin inserts illustrated



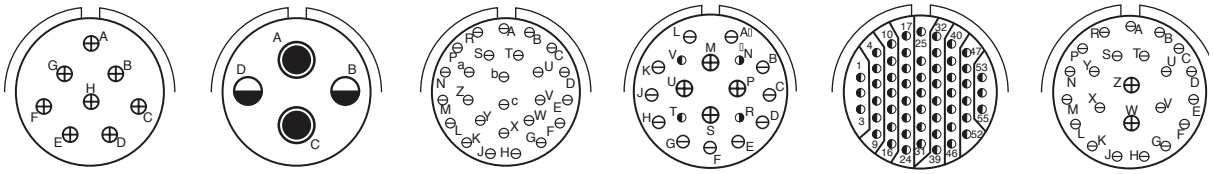
Insert Arrangement	9-35	9-94	9-98	11-2	11-5	11-35	11-98	11-99
Service Rating	M	M	I	I	I	M	I	I
Number of Contacts	6	2	3	2	5	13	6	7
Contact Size AWG	22D	20	20	16	20	22D	20	20



Insert Arrangement	13-4	13-8	13-13	13-35	13-98	15-5	15-15	15-18
Service Rating	I	I	I, Fiber Optic	M	I	II	I	I
Number of Contacts	4	8	2 2	22	10	5	14 1	18
Contact Size AWG	16	20	16 12	22D	20	16	20 16	20
			Dedicated to Fiber Optics					



Insert Arrangement	15-19	15-35	15-97	15-AC	17-2	17-6
Service Rating	I	M	I	M	M	I
Number of Contacts	19	37	8 4	24 2	38 1	6
Contact Size AWG	20	22D	20 16	22D 16	22D 8 Twinax	12



Insert Arrangement	17-8	17-22	17-26	17-31	17-35	17-99
Service Rating	II	Coax	I	M	M	I
Number of Contacts	8	2 2	2	4 11 4	4	21 2
Contact Size AWG	16	12 Coax 8 Coax	20	22D 20 16	16	20 16

CONTACT LEGEND

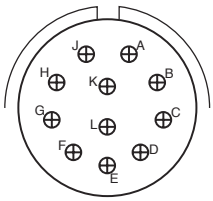
8 10 12 16 20 22D

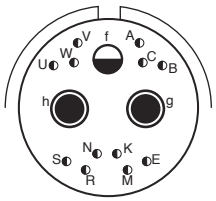
*please check crimp well diameter on page 2

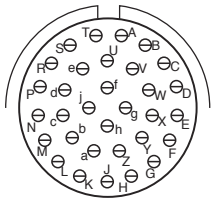
Note: Size 8 cavities can be supplied with either twinax or coax per customer requirement.

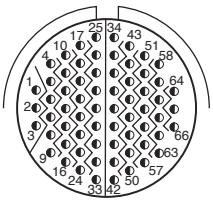
Amphe-EX™ Series
insert arrangements

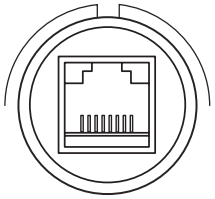
front face of pin inserts illustrated



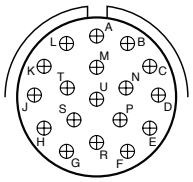


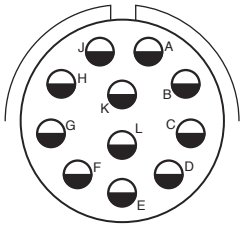


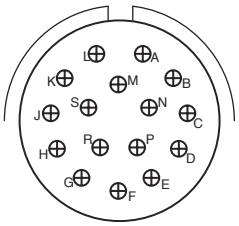


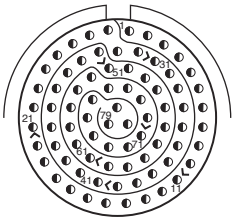


Insert Arrangement	19-11	19-31			19-32	19-35	19-RJ
Service Rating	II	M			I	M	CAT5-CAT6
Number of Contacts	11	2	1	12	32	66	ETHERNET
Contact Size AWG	16	8 Coax	12	22D	20	22D	

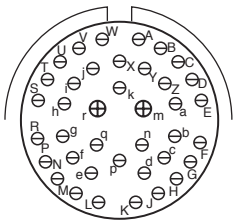


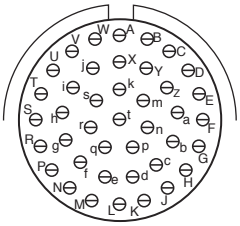


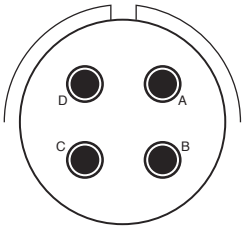




Insert Arrangement	19-68	21-11	21-16	21-35
Service Rating	I	I	II	M
Number of Contacts	18	11	16	79
Contact Size AWG	16	12	16	22D







Insert Arrangement	21-39		21-41	21-75
Service Rating	I		I	M
Number of Contacts	37	2	41	4
Contact Size AWG	20	16	20	8 Coax

Note: Size 8 cavities can be supplied with either twinax or coax per customer requirement.

CONTACT LEGEND

8	10	12	16	20	22D

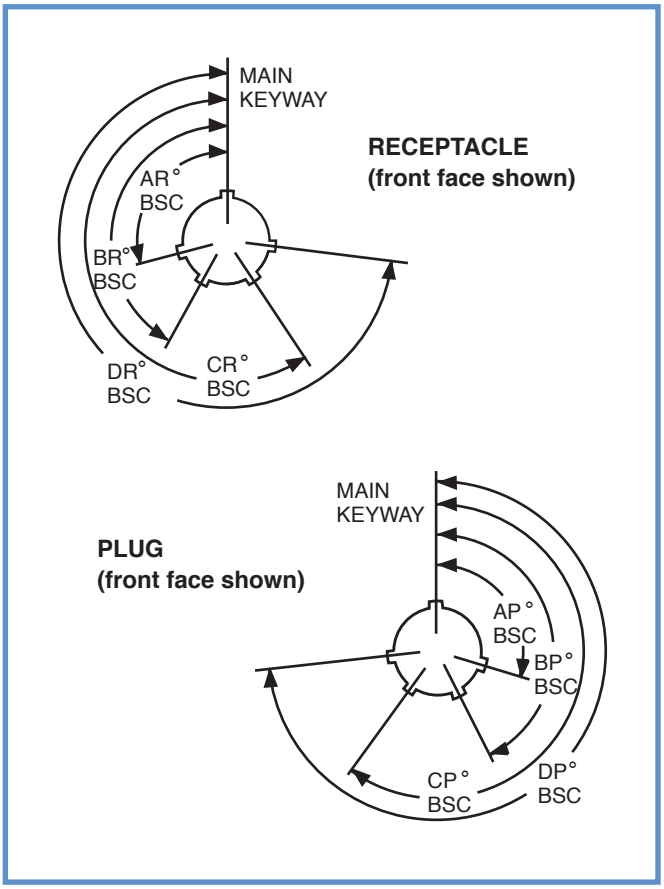
*please check crimp well diameter on page 2

Amphe-EX™ Series
standard insert alternate positioning

MASTER KEY/KEYWAY POSITION

Shell Size	Key & keyway arrangement identification letter	AR° or AP° BSC	BR° or BP° BSC	CR° or CP° BSC	DR° or DP° BSC
9	N	105	140	215	265
	01	102	132	248	320
	02	80	118	230	312
	03	35	140	205	275
	04	64	155	234	304
	05	91	131	197	240
11, 13, and 15	N	95	141	208	236
	01	113	156	182	292
	02	90	145	195	252
	03	53	156	220	255
	04	119	146	176	298
	05	51	141	184	242
17 and 19	N	80	142	196	293
	01	135	170	200	310
	02	49	169	200	244
	03	66	140	200	257
	04	62	145	180	280
	05	79	153	197	272
21, 23, and 25	N	80	142	196	293
	01	135	170	200	310
	02	49	169	200	244
	03	66	140	200	257
	04	62	145	180	280
	05	79	153	197	272

A plug with a given rotation letter will mate with a receptacle with the same rotation letter. The angles for a given connector are the same whether it contains pins or sockets. Inserts are not rotated in conjunction with the master key/keyway.



Amphe-EX™ Series
with RJ45

In addition to a complete line of power and signal inserts, the Amphe-EX also offers RJ45 ethernet connection systems. The Amphe-EX RJ45 assemblies offer all the same performance characteristics as the standard Amphe-EX hardware.

Material
A= Aluminum (Standard)
S= Stainless Steel

Insert Type
RJ2= Picture 1 or 4
RJ1= Picture 2
RJF-00=Picture 3
RJF= Picture 5

Cable Type
Blank for unarmored
BS for armored cable

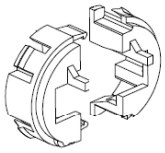
EXM–A06–19–RJF–A–BS–LXX

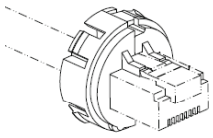
Product Series

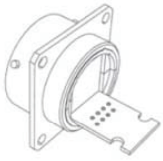
Connector Style
00=Flangeless Panel Mount Receptacle
01=Fix Inline Receptacle
02=Panel Mount Receptacle (standard)
03=Flangeless Inline Receptacle
06=Plug

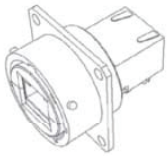
EX Gland size

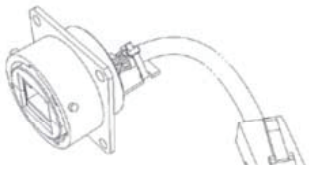
Cable length
L05=0.5 meter
L15=1.5 meter

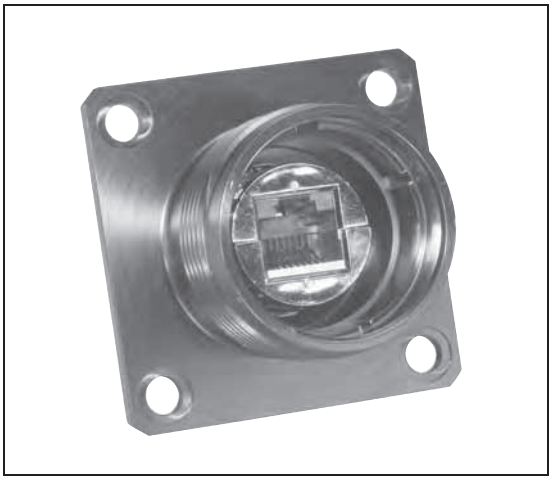

RJ2 for 06
Picture 1


RJ1 for 06
Picture 2

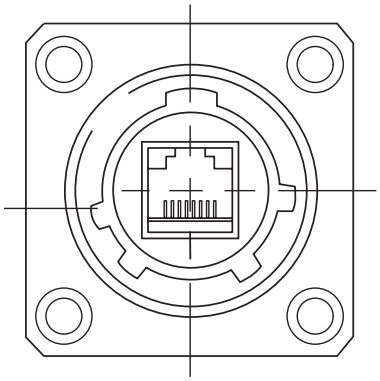

RJF-00 for 02/00
Picture 4


RJ2 for 01/03
Picture 4


RJF for 02/00
Picture 5



The Amphe-EX with RJ45 allows you to use an Ethernet Class 5/ Cat. 5e connection for 10Base T, 100 BaseTX or 1000 BaseT networks in hazardous environments. With the patented RJStop® system, you can use the standard RJ45 cordset in our Amphe-EX connector sets which will provide a flame-proof protection system.

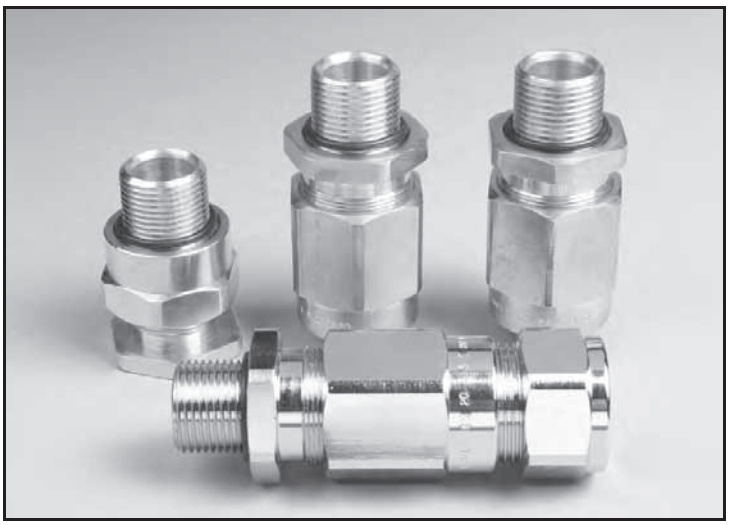


Amphe-EX™ Series
cable glands

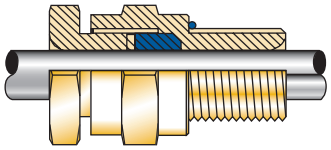
Inches (Millimeters)

EEx d Cable Gland Size	Unarmored Cable No deviation if Unarmored		Armored & Sheathed Cable-BS				Armored & Sheathed with reduced bore	
			Under Armor		Standard Outer Diameter		OD-Reduced	
	Min	Max	Min	Max	Min	Max	Min	Max
A1	.1575 (4.0)	.3307 (8.4)	.1339 (3.4)	.3307 (8.4)	.3543 (9.0)	.5315 (13.5)	.2638 (6.7)	.4055 (10.3)
A2	.2835 (7.2)	.4606 (11.7)	.2835 (7.2)	.4606 (11.7)	.4528 (11.5)	.6299 (16.0)	.3701 (9.4)	.4921 (12.5)
A	.3780 (9.6)	.5512 (14.0)	.3701 (9.4)	.5512 (14.0)	.6102 (15.5)	.8307 (21.1)	.4724 (12.0)	.6929 (17.6)
B	.5315 (13.5)	.7874 (20.0)	.5315 (13.5)	.7874 (20.0)	.7992 (20.3)	1.079 (27.4)	.6614 (16.8)	.9409 (23.9)
C	.7677 (19.5)	1.035 (26.3)	.7677 (19.5)	1.035 (26.3)	1.051 (26.7)	1.339 (34.0)	.9134 (23.2)	1.201 (30.5)

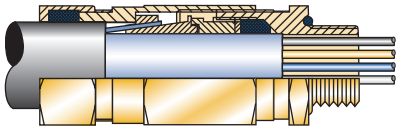
Shell size 9 and 11 can only accept A1 gland type
Shell size 13 can only accept A1 A2 and A gland type



Amphenol offers an extensive line of explosion proof and general duty cable glands. Consult Amphenol Industrial Operations and ask for new catalog 12-055, Amphenol Cable Glands and Cord Grips.



EX-35 glands provide a single pull resistant seal on the outer sheath of unarmored cable.



EX-20 provide a seal on the inner and outer sheath, an entry thread seal with a universal armor clamp.

Fiber Optic Custom Cable Assembly Design and Fabrication

Amphenol's cable assembly expertise dates back to the first industry standard fiber optic connector, over 25 years ago. Our depth of understanding of connector and termini design, and the complete control of connector materials, make Amphenol Fiber Optic cable assemblies one of the best in the industry. Amphenol offers a comprehensive line of single mode and multi-mode cable assemblies in a variety of cable configurations. From simplex jumpers to multi-fiber custom assemblies, Amphenol can design and supply all of your cable needs.

High quality polishing processes have been developed to meet and exceed industry standard specifications for insertion loss, return loss and endface geometry. All assemblies are designed to intermateability standards for optical and physical performance criteria.

Amphenol can assemble, polish and test many harsh environment and commercial grade connectors including:

MIL-PRF-29504 standard
MTC/MP0 (for availability, consult Amphenol Industrial)

Amphe-EX™ Series

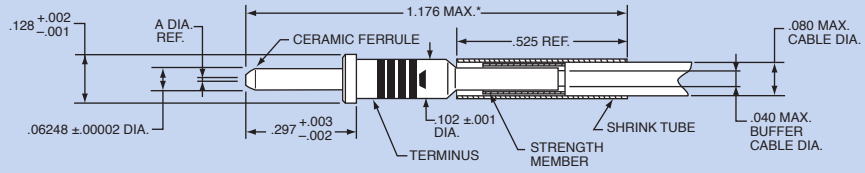
fiber optic termini – MIL-PRF-29504/4 & /5 multi-mode, size 16

Amphenol® Multi-mode, Size 16 Termini Features:

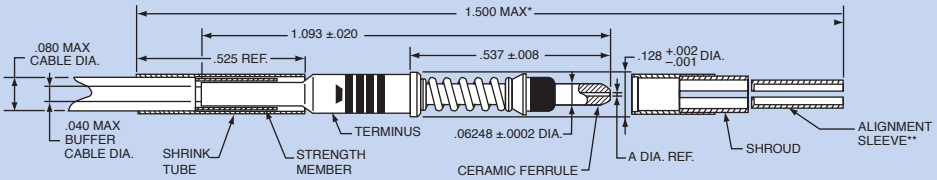
- Precision ceramic ferrules which precisely position the fiber within the termini.
- Precision ceramic alignment sleeves insure accurate fiber to fiber alignment.
- Socket has threaded protective shroud with anti-rotation key, manufactured from rugged PEEK™ material, provides protection for the ceramic alignment sleeve.
- Stainless steel termini bodies and springs.
- Laser welded components for stronger construction.
- Allows for multiple fiber accommodations

Order multi-mode termini by Amphenol part number designation or MIL-PRF-29504 designation as shown in the charts below. Consult Amphenol, Sidney, NY for further availability.

Size 16 Multi-mode Pin Terminus



Size 16 Multi-mode Socket Terminus***



* Indicated dimension when fully assembled.
** Alignment sleeve shipped unassembled.
*** FO Socket Termini its not suitable for Resin (Potting)
Do not install FO Sockets terminus on EXM-A00 or EXM-A02

Fiber Optic Pins Ordering Information

Amphenol Part Number	Fiber Size† Core/ Cladding	A Dia. Ref. (Microns)	Ferrule Hole Tolerance	Reference Only M29504/4*-XXXX
CF-198142-009	50/125 & 62.5/125	126	+2,–0	M29504/4-4210
CF-198036-010	50/125 & 62.5/125	127	+2,–0	superseded by MIL-PRF
CF-198142-010	50/125 & 62.5/125	127	+2,–0	M29504/4-4040
CF-198036-017	100/140	145	+3,–0	superseded by MIL-PRF
CF-198142-017	100/140	145	+3,–0	M29504/4-4044
CF-198036-29A	100/140/172 (Polyimide)	173.5	+1,–0	superseded by MIL-PRF
CF-198142-29A	100/140/172 (Polyimide)	173	+1,–0	M29504/4-4293
CF-198036-053	200/230	236	+4,–0	superseded by MIL-PRF
CF-198142-053	200/230	236	+4,–0	M29504/4-4214

Fiber Optic Sockets Ordering Information

Amphenol Part Number	Fiber Size† Core/ Cladding	A Dia. Ref. (Microns)	Ferrule Hole Tolerance	Reference Only M29504/4*-XXXX
CF-198143-009	50/125 & 62.5/125	126	+2,–0	M29504/4-4210
CF-198035-010	50/125 & 62.5/125	127	+2,–0	superseded by MIL-PRF
CF-198143-010	50/125 & 62.5/125	127	+2,–0	M29504/4-4040
CF-198035-017	100/140	145	+3,–0	superseded by MIL-PRF
CF-198143-017	100/140	145	+3,–0	M29504/4-4044
CF-198035-29A	100/140/172 (Polyimide)	173.5	+1,–0	superseded by MIL-PRF
CF-198143-29A	100/140/172 (Polyimide)	173	+1,–0	M29504/4-4293
CF-198035-053	200/230	236	+4,–0	superseded by MIL-PRF
CF-198143-053	200/230	236	+4,–0	M29504/4-4214

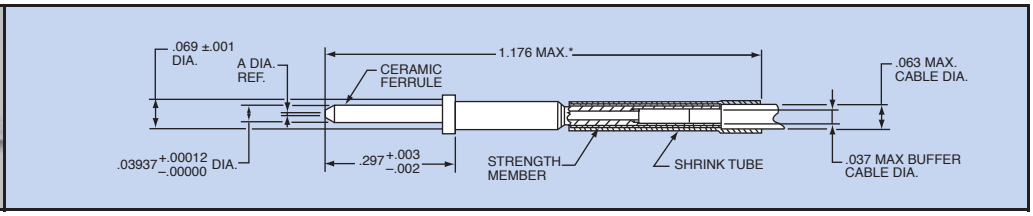
Amphe-EX™ Series
fiber optic termini – multi-mode, size 20

Amphenol® Multi-mode, Size 20 Termini Features:

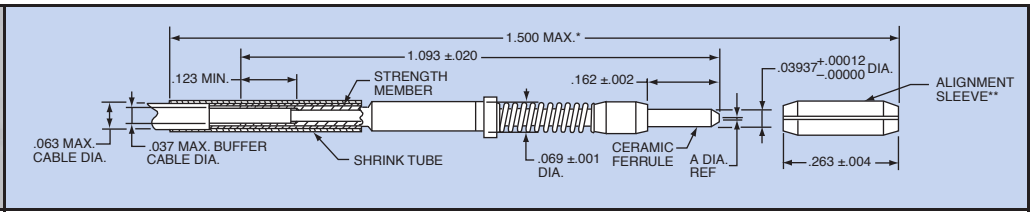
- Offers increased termini density
- Designed with similar high performance components as the proven size 16 termini
- Maintains fiber optic/electrical hybrid capabilities
- Allows for multiple fiber accommodations
- Termination accomplished using the industry proven epoxy/polish method. Can be polished Air Gap (AG) or Physical contact (PC).

Order multi-mode termini by Amphenol part number designation as shown in the chart below. Consult Amphenol, Sidney, NY for further availability.

Size 20 Multi-mode Pin Terminus



Size 20 Multi-mode Socket Terminus



* Indicated dimension when fully assembled.
** Alignment sleeve shipped unassembled.

Ordering Information
Multi-mode Termini (Size 20) for MIL-DTL-38999 Connectors

Fiber Size† Core/Cladding Dia (Microns)	Amphenol Part Numbers		A Dia Ref		Ferrule Hole Tolerance
	Size 20 Socket	Size 20 Pin	Inches	Microns	
50/125	CF-198080-010	CF-198081-010	0.0050	127	+3,–0
62.5/125					
100/140	CF-198080-017	CF-198081-017	0.0057	145	+3,–0

† Additional sizes available upon request: consult Sidney, NY for availability.

Amphe-EX™ Series
application tools

The following data includes information pertaining to the application tools which have been established for crimping, inserting, and removing contacts incorporated in the Amphe-Lite Series connectors. For additional information on coaxial contact tools see catalog 12-130.

All crimping tools included are the “full cycling” type.

There is a possibility of additional crimping tools other than those included being available at present or in the future for this specific application.

RECOMMENDED CRIMPING TOOLS

Contact Size/Type	Crimping Tool	Turret Die or Positioner
12 Pin and Socket	M22520/1-01	M22520/1-04
16 Pin and Socket	M22520/1-01 M22520/7-01	M22520/1-04 M22520/7-04
20 Pin and Socket	M22520/1-01 M22520/2-01 M22520/7-01	M22520/1-04 M22520/2-10 M22520/7-08
22D Pin	M22520/2-01 M22520/7-01	M22520/2-09 M22520/7-07
22D Socket	M22520/2-01 M22520/7-01	M22520/2-07 M22520/7-05
8 Twinax Center Pin and Socket	M22520/2-01	M22520/2-37
8 Twinax Intermediate Outer Pin & Socket	M22520/5-01	M22520/5-200

Where 2 or 3 tools are listed for a contact size, only one tool and its die or positioner are required to crimp the contact.

The above crimping tools and positioners are available from the approved tool manufacturer.

Contact Size/Type	Crimping Tool	Turret Die or Positioner
8 Coaxial Inner Pin and Socket	M22520/2-01	M22520/2-31
8 Coaxial Outer Pin and Socket	M22520/5-01	M22520/5-05 Die Closure B
	M22520/5-01	M22520/5-41 Die Closure B
	M22520/10-01	M22520/10-07 Die Closure B
16 Coaxial Inner Pin and Socket	M22520/2-01	M22520/2-35
16 Coaxial Outer Pin and Socket	M22520/4-01	M22520/4-02
12 Coaxial Inner Pin and Socket	M22520/2-01	M22520/2-34
12 Coaxial Outer Pin and Socket	M22520/31-01	M22520/31-02
10 (Power)	TP201423	1716P-1

INSERTION TOOLS

Use with Contact	Plastic Tools		Metal Tools			
			Angle Type		Straight Type	
	MS Part Number	Color	MS Part Number	Proprietary Part Number	Proprietary Part Number	Color
10 (Power)	M81969/14-05*	Gray / (White)	N/A	N/A	†	Green
12	M81969/14-04*	Yellow / (White)	N/A	N/A	11-8794-12	Yellow
16	M81969/14-03*	Blue / (White)	N/A	N/A	11-8794-16	Blue
20	M81969/14-10*	Red / (Orange)	N/A	N/A	11-8794-20	Red
22/22D	N/A	N/A	N/A	N/A	TP-201465	Brown
22D	M81969/14-01*	Green / (White)	N/A	N/A	11-8794-24	Black
8 Coaxial	None Required					
8 Twinax	None			None		Red

REMOVAL TOOLS

Use with	Plastic Tools		Metal Tools				
				Angle Type		Straight Type	
	MS Part Number	Color	For Unwired Contacts Proprietary Part	MS Part Number	Proprietary Part Number	Proprietary Part Number	Color
10 (Power)	M81969/14-05*	(Gray) / White	†	N/A	N/A	†	Green / White
12	M81969/14-04*	(Yellow) / White	11-10050-11	N/A	N/A	11-8795-12	Yellow / White
16	M81969/14-03*	(Blue) / White	11-10050-10	N/A	N/A	11-8795-16	Blue / White
20	M81969/14-10*	(Orange) / Red	11-10050-9	N/A	N/A	11-8795-20	Red / White
22D	M81969/14-01*	(Green) / White	11-10050-7	N/A	N/A	11-8795-24	Green / White
8 Coaxial	M81969/14-12	Green	None	N/A	N/A	DRK264-8††	N/A
8 Twinax	M81969/14-12	Green	None	N/A	N/A	N/A	N/A

The M81969/8, 11-8674, 11-8675,and 11-8794 metal contact insertion and removal tools will accommodate wires having the maximum outside diameter as follows: Contact size 12–.155, 16–.109, 20–.077, 22D–.050. When wire diameters exceed those specified, the plastic tools must be used.

Amphe-EX™ Series
assembly instructions

L-2124

1. Read manufacturer's assembly instructions before actually starting to assemble connectors. Besides the matter of instruction on correct procedures, there are two important reasons for this preliminary step: To identify the various component parts, and to check for any missing parts.

2. Cut cable jacket and sheathing squarely and sheathing squarely and to correct length, using only wire strippers that have been approved for the operation. In preparing the individual wires in cables and harnesses for assembly, make allowances in length for reaching the outer most circle of contacts cavities in the conductors. The insulation should be cut progressively longer as they extend out from the center of the cable or harness to assure sufficient length.

3. Follow chart on Page 5 covering maximum cable stripping lengths for effective cable gland sealing. All conductors should be fit into contact wire wells correctly. A practice layout should be done so that an assembler can oversee what the finished will look like when finished.

4. Before starting actual termination of wires, it is essential that cables and harnesses be laid out in a specific order in accordance with the wiring diagram. Proper layout will eliminate the need for twisting and crossover of conductors. If the wiring layout is not correct, the termination operation will be difficult or even impossible and the chances for making errors will be increased. Cable and harness assemblies having a spiral layout must also be matched carefully to the correct contacts in both the male and female inserts.

5. Some cables that will be used will have a "basket weave" type of armor under the outer jacket (sheath) and over the inner jacket. Since many regulatory entities require that the armor be grounded at least at the source end, it is beneficial to ground the armor via a spare contact within the connector. Follow the removal of sufficient amount of outer jacket (see chart on Page 5) ample amount of armor can be clipped away, but not all. An adequate amount should remain in order that a small cross-section conductor, short in length, be woven into the remaining armor weave and either soldered or covered with mastic impregnated heat shrink, creating an intimate bond to the armor. At the opposite end of the short piece of wire a contact should be crimped and inserted into the insert.

6. Use only correctly sized and ingress protected certified glands provided to assure resistance to moisture and other contaminates.

7. Use only the proper crimping tools that have been set or calibrated with precision gages.

8. Make certain that all contacts are the correct size before attempting to assemble in insert cavities. This point is particularly important when both power and control types of contacts are used in the same connector.

9. Be sure that any ground contacts (when applicable) are correctly located.

10. Seat all contacts properly so that they will not be damaged or become disengaged during connectors mating operation.

11. Use only the proper insertion tools and be sure that they are aligned axially when pushing contact into their fully seated position.

12. When inserts have more cavities than the conductors, plug unused cavities with furnished contacts.

13. After all terminated contacts are inserted in their respective cavities and inspected (detailed on page 5), the cable adapter should be installed and tightened with a strap wrench (detailed on page 8).

14. When handling cables, use adequate support to prevent damage to the internal wires. Exd glands are intended for sealing purposes and should not be used as a cable grip.

15. If for any reason, terminated conductors have to be removed from an insert because of an assembly error or change in circuitry, be sure to remove the cable gland or cable adapter first before extracting the contact and re-inserting it.

16. If one of the connector poles is a ground wire, make sure that it is grounded properly before the connector actually is engaged.

17. When connectors have the same configuration are to be mounted closer together, different or alternate key arrangements should be used to prevent mismatching and possible damage to the electrical system.

18. Always inspect all aspects of connector assembly operations before putting connector into actual operation.

19. Crimping and terminating of conductors to contacts must be done carefully. Make certain that all wire strands are fully bottomed in contact wells by checking through inspection hole provided (detailed on page 5).

20. Never try to straighten bent contacts. Straightening cannot be done properly and the plating on contacts very likely will be marred. This will result in a high resistance connection and will expose the base material to possible corrosion.

21. Each assembly operator should be his own inspector. Worn, damaged, or defective tolls should be reported immediately to foreman and supervisors. Assembly operators should be indoctrinated with this attitude and made to understand the importance of always guarding quality. Assembly workmanship is significant factor in terminating the quality of multiple contact connectors. Quality cannot be "inspected" into connectors; it must be "built-in" during each and every assembly operation.

Amphe-EX™ Series
assembly instructions

The following instructions apply to equipment covered by certificate number: SIRA 07ATEX1229X

The equipment may be used with flammable gases and vapors with apparatus group(s) IIA, IIB, & IIC and with temperature classes T6, T5 & T4

The equipment is only certified for use in ambient temperatures in the range -40°C to +55°C and should not be used outside this range.

The product compliances with the following standards:

EN 60079-0:2006	General requirements for electrical apparatus for explosive gas atmospheres
EN 60079-1:2007	Electrical apparatus for explosive gas atmospheres - Part 1: Flameproof enclosures“d” (Plus Cor 1) (IEC 60079-1:2003)
EN 60079-7:2007	Electrical apparatus for explosive gas atmospheres - Part 7: Increased safety “e” (IEC 60079-7:2001)
EN 61241-0:2006	General requirements for electrical apparatus for use in the presence of combustible dust
EN 61241-1:2004	Electrical apparatus for use in the presence of combustible dust. Protection by enclosures “tD”
EN 60079-28:2007	Explosive atmospheres. Protection of equipment and tranmission systems using optical radiation.

Installation shall be carried out by suitably-trained personnel in accordance with the applicable code of practice e.g. EN 60079-14. It is the end user’s responsibility to ensure that the product, as specified and confirmed by the product label, is suitable for it’s intended application.

Inspection and maintenance of this equipment shall be carried out by suitably trained personnel in accordance with the applicable code of practice e.g. EN 60079-17.

Repair of this equipment shall be carried out by suitably trained personnel in accordance with the applicable code of practice e.g. EN 60079-19.

Amphe-EX™ Series
assembly instructions

The certification of this equipment relies upon the following materials used in its construction:

Connector Material: ASTM B211 or B221 6061-T6 Aluminum
O-ring Seal Material: Buna Rubber w/ Durometer of 70 SHORE A
Viton O-ring (Available under request)
Potting Compound: Epoxy Resin Part 50-3150RFR BK

If the equipment is likely to come into contact with aggressive substances, then it is the responsibility of the user to take suitable precautions that prevent it from being adversely affected, thus ensuring that the type of protection provided by the equipment is not compromised.

Aggressive substances: e.g. acidic liquids or gases that may attack metals, or solvents that may affect polymeric materials.

Suitable precautions: e.g. regular checks as part of routine inspections or establishing from the material's data sheets that it is resistant to specific chemicals.

SPECIAL CONDITIONS FOR SAFE USE:

The "X" suffix to the certificate number relates to the following special conditions(s) for safe use:

1. The plugs and receptacles shall only be used with suitable certified cable glands capable of a temperature range at their point of mounting between -20°C to 90.°C.
2. Cables fitted to the plugs and receptacles shell be suitable for continuous operating temperature of at least 90°C.
3. Plugs are not permitted to remain energized when not engaged to the receptacles as per EN 60079-0; clause 20.2
4. The plugs and receptacles are not to be energized when fitted with the environmental blanking caps.
5. An explosion proof receptacle cap must be fitted to the receptacles to be re-energized when they are not mated to a plug.
6. The connector does not incorporate an external earth facility. It is the responsibility of the user or installer to ensure adequate internal earth continuity by means of terminating ground wire to spare contact within the insert patterns for both plug and receptacles to allow for continuity.
7. The panel mount receptacles shall only be used where the temperature at the point of entry in service on the associated enclosure is between -20°C to +105°C.

Contact Preparation Instructions

Crimp Tools:

M22520 Series is recommended. See Tool Table for choice of turret head and selection setting according to contact size, part number and wire gage size.

Setting Up and Operation: Consult Tool Manufacturer

Wire Preparation and Crimping

Strip wire to required length. (See Figure 1). When using hot wire stripping do not wipe melted insulation material on wire strands; with mechanical strippers do no cut or nick strands. See Table 1 for proper finished outside wire dimensions.

Figure 1

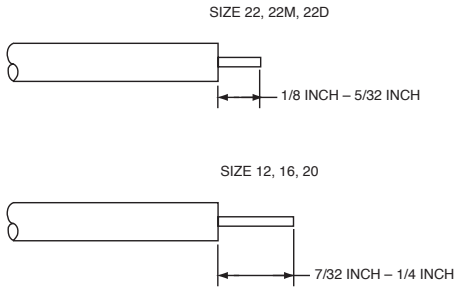


Table 1: Conductor Diameters		
Contact Size	Wire Diameters in. (mm)	
	Min.	Max.
10	0.135 (3.43)	0.162 (4.11)
12	0.097 (2.46)	0.142 (3.60)
16	0.065 (1.65)	0.109 (2.76)
20	0.040 (1.01)	0.077 (1.95)
22	0.034 (0.86)	0.060 (1.52)
22M, 22D	0.030 (0.76)	0.050 (1.27)

****Min. diameters to insure moisture proof assembly; max diameters to permit use of metal removal tools. Twist Strands together to form a form bundle.**

Insert stripped wire into contact applying slight pressure until wire insulation butts against wire well. Check inspection hole to see that wire strands are visible. If there are strayed wire strands, entire wire end should be re-twisted.

Insert wire and contact into crimping tool as far as possible. Crimp contact wire well.

Amphe-EX™ Series
assembly instructions

Contact Insertion and Removal

When inserting or removing contacts, first remove securing devices and slide devices over wires in proper sequence

Consult page 14 for correct insertion or removal tool (metal or plastic) according to contact size

Insertion:

Slip correct size tool (with plastic tool, use colored end) over wire insulation and slide forward until tool bottoms against rear contact shoulder. Contact must be aligned with grommet hole and not inserted at an angle. Push forward until contact is felt to snap into position within insert. Remove tool, holding forward on the wire in order to prevent contact from being dragged back with tool. Gently pull each wire to ensure contact is properly seated.

Uncrimped Contacts and Sealing Plugs: Fill in unused holes with an uncrimped contact. Follow with a teflon sealing plug, small diameter first, so that one end protrudes out the rear of grommet. See Table 2 for sealing plug application data. (Optional insertion of large end first is possible, but not recommended).

Table 2: Sealing Plugs

Contact Size	Color Code	MS Part Number
10	Green	M85049/81-10
12	Yellow	MS27488-12
16	Blue	MS27488-16
20	Red	MS27488-20
22, 22M, 22D	Black	MS27488-22

Slide securing devices forward and tighten using connector pliers. Connector holding tools are recommended while tightening back accessories.

CAUTION: WHEN INSERTING OR REMOVING CONTACTS, DO NOT SPREAD OR ROTATE TOOL TIPS.

Removal:

Slip correct sized tool (with plastic tool, use white end) over wire insulation and slide forward on wire until tool tip enters rear grommet and comes to a positive stop on contact shoulder. Grip wire, and simultaneously remove tool, contact and wire. (On occasion, it may be necessary to remove tool, rotate 90° and reinsert).

Unwired Contacts: Remove sealing plugs. Standard Removal Tools: Using applicable removal tool, insert and carefully work tool tips over wire well. When tips bottom, contact will release from internal retention clip. Push contact from connector front face out connector rear with round ended non-metallic rod. Rod will follow contact. (See page 14 for applicable removal tool and correct rod diameter). Unwired Removal Tool (11-10050-XX): Removal procedure is same as with standard tools with the exception that tool will withdraw contact without pushing from front. Push plunger to remove contact from tool. (See page 15).

Connector Assembly Instructions

Assembling an Inline Plug and Inline Receptacle Connectors

1. Slide the EX gland onto the cable about 12”, threaded end last.
2. Slide the Cable Adapter onto the cable, up to the EX Gland, large diameter first.
3. Slide the Coupling nut onto the cable, up to the Cable Adapter, Grub Screw end first.
4. Group all conductors according to size to facilitate orderly termination.
5. Working on one conductor at a time, strip the insulation off per the wire stripping length given in Figure 1 and terminate a contact to it, using a properly adjusted crimp tool, following crimp instruction found in section II of Contact Preparation Instructions. Repeat the process for each conductor.
6. Make sure the Grub Screws are fully retracted, then slide the Coupling Nut up onto the plug shell, until seated against it’s mating shoulder.
7. Thread the Cable Adapter onto the plug shell, and hand tighten.
8. Thread the EX Gland onto the Cable adapter, and hand tighten.
9. Using a strap wrench, fully tighten the cable adapter onto the plug shell.
10. Position the cable correctly. Using a hex wrench, tighten the EX Gland The seal must grip the outer jacket of the cable when the cable gland is tightened. Tighten Back Nut (or Conduit Receptor) to Entry Body. Ensure seal makes full contact with cable sheath. Tighten an extra 1½ turns (up to 2½ turns for minimum cable).

Amphe-EX™ Series
assembly instructions

Preparing a Bulkhead Receptacle Connector for Enclosure Mounting.

All receptacle shells have, contained within them, contact positioning inserts that are permanently installed by the factory.

1. Slide the Bulkhead Adapter up onto the cable, or conductor group; knurled end first.
2. Terminate each conductor with it's proper contact.
3. Populate the insert with contacts by poking each of the wired contacts into it's respective insert cavity, following an electrical schematic for the system you are wiring.
4. Slide the bulkhead adapter back down the conductors, and screw it onto the panel mount receptacle.
5. Use a strap wrench to tighten the bulkhead adapter until fully tightened to shoulder.
6. Referring to Amphe-EX potting instructions, stand the assembly vertical, conductors pointing up, and fill the adapter with cement to a level 1/16" below the top of the adapter. After curing, this assembly is now permanently cemented, non-separable and non-repairable, and can be mounted to the bulkhead.
7. It is best to fit the connector to the bulkhead at a time when the free end of the cable is not terminated to the electrical system. If this is not possible, then it is necessary to rotate the connector assembly counter-clockwise to wind the cable/ conductors so that when the assembly is threaded into a bulkhead in the subsequent instruction, the cable/ conductors regain their most natural lay, once the connector is mounted to the bulkhead. (Rotations required to be determined by end-user).
8. Thread the receptacle assembly into the bulkhead until the seal touches down, then tighten it by the smallest fraction of a revolution to the first instance that the mounting holes line up with the threaded enclosure holes.
9. Position the protective covers' lanyard tab over one of the mounting holes and screw a fastener through it. Apply the remaining fasteners to the other three holes with torque suitable for screw size used.
10. Install the protective cover and tighten fully.
11. Secure both grub screws to prevent unauthorized removal.

AMPHE-EXTM Potting Instructions

All cable adapters, other than ones suited for mating with an EX- certified gland, must be filled with epoxy (potted). The material certified for use in filling this connector line is Epoxies Etc., 503150FR/Cat190. The user or installer shall consider the performance of these materials with regard to attack by aggressive substances that may be present in the hazardous area. This material is a two-component casting system with a 100:5 volume.

More information is available by contacting the following authorized suppliers:

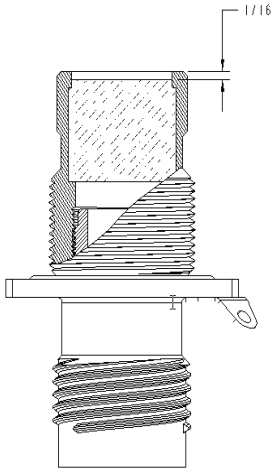
Amphenol Industrial Operations
191 Delaware Avenue Sidney, New York 13838 USA Phone
888-364-9011

Amphenol Industrial Operations Optimize Nogales
180 N Freeport Drive
Nogales, AZ 85621
Phone: 520-397-7053

Bulkhead Adapter

Bulkhead adapters should be filled to a maximum of 1/16" below the top of the adapter. Care must be exercised so that the potting compound does not contaminate the bulkhead threads, or spill onto the outer surfaces of the receptacle flange.

In preparation for potting, the receptacle is to be mated to it's corresponding plug, so that all contacts are mated and in their optimal post-potted position. When potting, the receptacle flange should be rigidly fixtured in a horizontal position. This fixture must be capable of holding the mated connector pair in that position for a minimum of 2 hours at room temperature. The exiting conductor/cable should be fixtured inline above the connector pair, during the entire curing process.



Amphe-EX™ Series
assembly instructions

Mixing/Potting Instructions

1. CAUTION: Wear goggles or other eye protection during all operations.
2. The potting compound is premeasured in “burst bag” packaging. This packaging consists of a single plastic bag that is compartmentalized into two chambers, each containing one part of the two part compound. The segregating feature is called a ‘burst seal’.
3. Lay the bag on a flat surface. Choosing either end of the bag that is parallel to the burst seal, start coiling/rolling the bag so that the compound in that half of the bag is pushed up against the burst seal.
4. Squeeze and apply pressure to the rolled side of the bag so that the compound bursts through the burst seal and joins the compound on the other side of the bag. Unroll the bag.
5. Mix the entire contents of the bag, by alternately squeezing the bag, and working the bag across the edge of a table, to fully move the entire contents of the bag, back and forth, between chambers. Work the material in this manner, constantly, for a minimum of 4 minutes.
6. Once mixed, squeeze all the contents away from one corner of the bag. fully clearing that corner of the bag of all compound.
7. Make a 3/16” pouring spout by snipping off the bags cleared corner.
8. To minimize air entrapment, slowly pour the compound into the back end of the bulkhead adapter, to a level shown in Figure Z.
9. Set the bag containing the remaining compound aside, so that it may cure. After cure, the bag may be disposed of safely, along with common consumer refuse. CAUTION: As the remaining compound cures, the bag will become hot.

Hysol Volume Per Bulkhead Adapter

Shell Size	Fill Length Inside Adapter (inches)	Adapter Diameter (inches)	Internal Volume (in ^ 2)	Internal Volume (ounces
9	1.3	0.652	0.434	0.24
11	1.3	0.652	0.434	0.24
13	1.3	0.927	0.877	0.49
15	1.3	0.927	0.877	0.49
17	1.3	1.242	1.575	0.87
19	1.3	1.242	1.575	0.87
21	1.3	1.242	1.575	0.87

Note: This is the maximum volume of cement needed, without considering volume claimed by the conductors

SIRA Product Labeling Information

Information below must be attached to connectors via non-removable label.

Amphenol Industrial
Sidney NY 13838 USA
Part Number, Size Ref
Work Order Number; Date Code

0518 II 2 GD

EEx dIIC T6 / Ex tD A21 IP68
(Plug and Receptacles)

EEx de IIC T6 / Ex tD A21 IP68
(Panel mount receptacles filled with cement)

Sira 07ATEX1229X

IECEx SIR 08.0029X

EAC No. RU C-US.ГЪ08.B.01483
“max volts, max amp. Current rating per pin”

Do not separate when energized.
Do not open when an explosive gas or dust atmosphere is present.

DIVISION HEADQUARTERS

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