

# Amphenol® Amphe-EX™ Connectors for Hazardous Environments

12-056

*High Performance  
Connectors Designed  
for use in:*

- *High temperatures*
- *Harsh chemicals*
- *Potentially explosive environments*



**IECEX**

**AEX**

*Smaller interface  
than most heavy duty  
hazardous rated  
connectors.*

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



*Signal Contacts  
Size 20 and 22D*



*Power Coax  
Contacts*



*USB Insert*



*RJ45 Insert*

# Amphenol





**Amphenol  
Sidney, New York Facility**

Amphenol Industrial Operations was consolidated and made a separate division in 2001 in order to give increased focus on the commercial, industrial interconnect marketplace. Dedicated to meeting customer needs for industries such as process control, factory automation, power generation plants, oil and gas, heavy equipment and mass transportation. Amphenol Industrial products meet a multitude of these applications with cost effective and reliable interconnects.

Amphenol Industrial operations are highly integrated to design, manufacture, assemble and ship an extensive array of electrical, mechanical, filtered, sealed, fiber optic and flex circuit interconnect solutions.



# Amphe-EX™ Series

## Hazardous Rated Connectors; smaller size and more contact options

### AMPHE-EX FIBRE OPTIC HYBRID CONNECTOR

#### INTRODUCTION

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

#### Designed for Hazardous Environments

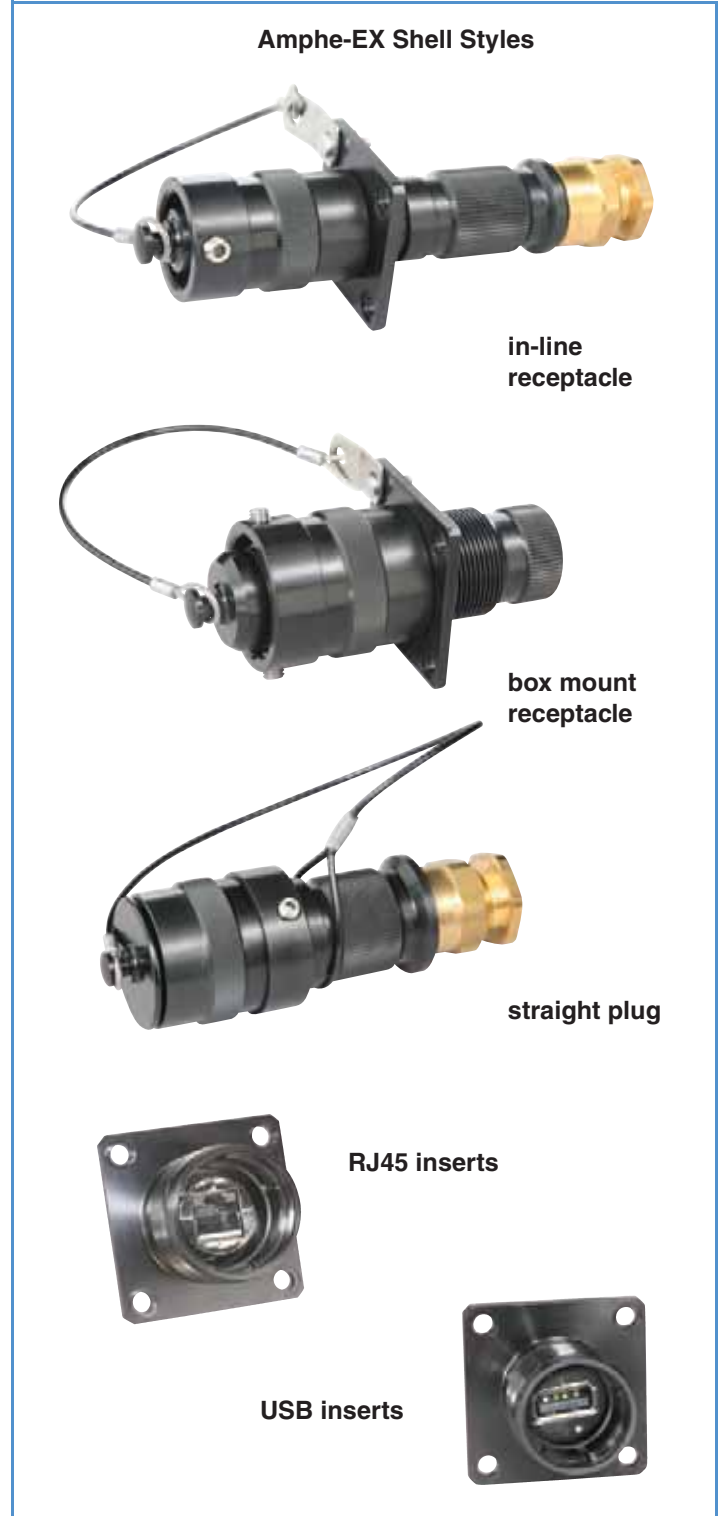
AMPHE-EX Connector Series is designed for use in ATEX and IECEx rated areas. AMPHE-EX connectors are equipped to handle signal, power, RF or fiber optic requirements in the most harsh environments. AMPHE-EX connectors offer a complete array of insert patterns, ranging from 2 # 20 contacts, right up through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

In addition, AMPHE-EX is able to provide both RJ45 and USB connections 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™ Series

## performance criteria, specifications

### Amphenol® Amphe-EX connectors

ATEX Certified for Zone 1-IIc hazardous environment. Cert. # SIRA 07ATEX1229X

IECEX and AEX Certified

Cenelec IP68 Rated

- Listed under EEx d IIc T6
- Plugs and receptacles listed under EEx de IIc T6

**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.

**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 100 # 22D awg contacts. Numerous hybrid inserts available that offer combination copper and Coax/Twinax. In addition, Fiber Optic, RF45 and USB options available.

**RoHS COMPLIANT PRODUCT AVAILABLE:** Consult Amphenol Industrial Operations

### CONTACT RATING

Contact Size	Test Current		Maximum Millivolt Drop Crimp*	Crimp Well Data	
	Crimp	Hermetic		Well Diameter	Nominal Well Depth
22D	5	3	73	.0345 ±.0010	.141
20	7.5	5	55	.047 ±.001	.209
16	13	10	49	.067 ±.001	.209
12	23	17	42	.100 ±.002	.209
10 (Power)	33	NA	33	.137 ±.002	.355

\* When using silver plated wire.

### SERVICE RATING

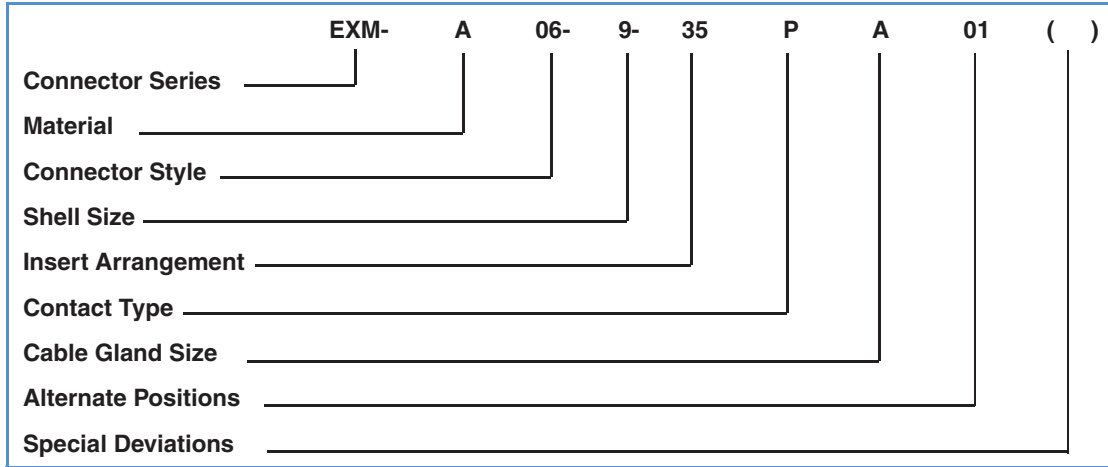
Service Rating	Suggested Operating Voltage (Sea Level)		Test Voltage (Sea Level)
	AC (RMS)	DC	
M	400	550	1300 VRMS
N	300	450	1000 VRMS
I	600	850	1800 VRMS
II	900	1250	2300 VRMS

\*\* Please note that the establishment of electrical factors is left entirely in the designers hands, since he is 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:



### Connector Series

EXM . . .designates Amphe-EX Series

### Material

A. . . .designates Aluminum Alloy Black Hardcoat

S. . . .designates Stainless Steel

B. . . .designates Brass

### Connector Style

06 . . .designates Plug with EX Cable Gland

02 . . .designates Panel Mounting Receptacle

01 . . .designates Inline Receptacle with EX Cable Gland

### Shell Size

9 thru 21 available

### Insert Arrangement

See insert arrangement chart, page 7. See insert configurations illustrated on page 8.

### Contact Type

P. . . .designates standard 500 cycle pin contacts

S. . . .designates standard 500 cycle socket contacts

### Cable Gland Size

See chart page 11 for appropriate cable O.D.

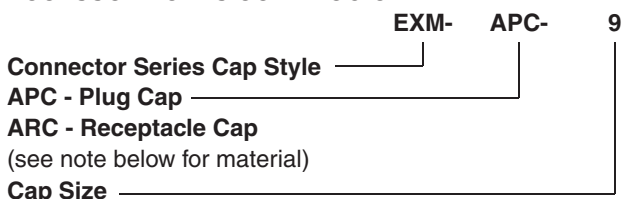
### Alternate Positions

Rotation of minor keys. See page 9. "N" not required for normal position.

### Specials Deviations

Position available for future planned special customer requirements

### ACCESSORY CAPS CODE LOGIC



Size 9-21 available (caps come standard on all assemblies)

APC-Aluminum Plug Cap          ARC-Aluminum Receptacle Cap

SPC-Stainless Plug Cap          SRC-Stainless Receptacle Cap

BPC-Brass Plug Cap              BRC-Brass Receptacle Cap

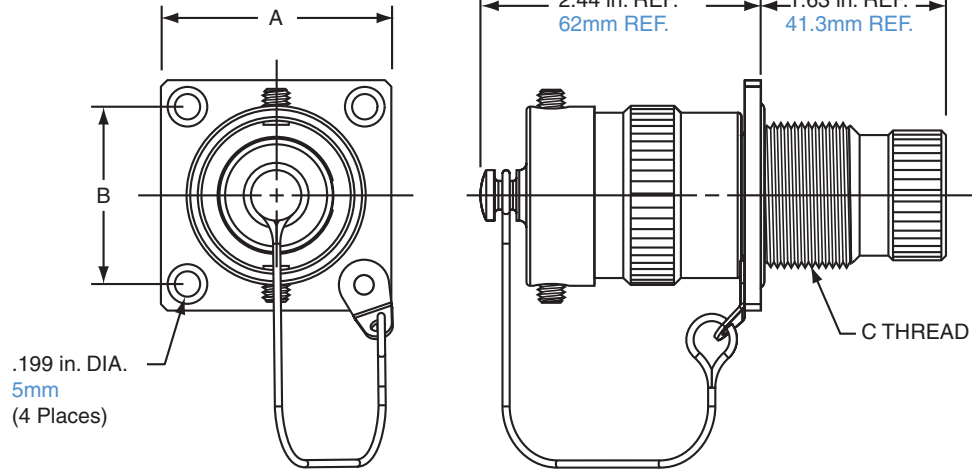


**RoHS COMPLIANT PRODUCT AVAILABLE** - Consult Amphenol Industrial Operations.

# Amphe-EX

## EXM-A02 box mount receptacle

**EXM-A02\***



\* To complete order number see how to order on page 3.  
Assembly includes metal protective cover and lanyard.

Inches

Shell Size	A Flange Dimension	B Mounting Dimension	C Thread Adapter NPT Type
9	1.772	1.299	.750 NPT
11	1.772	1.299	.750 NPT
13	2.008	1.535	1.00 NPT
15	2.008	1.535	1.00 NPT
17	2.126	1.693	1.25 NPT
19	2.126	1.693	1.25 NPT
21	2.126	1.693	1.25 NPT

Millimeters

Shell Size	A Flange Dimension	B Mounting Dimension	C Thread Adapter Metric
9	45	33	M25
11	45	33	M25
13	51	39	M32
15	51	39	M32
17	54	43	M40
19	54	43	M40
21	54	43	M40

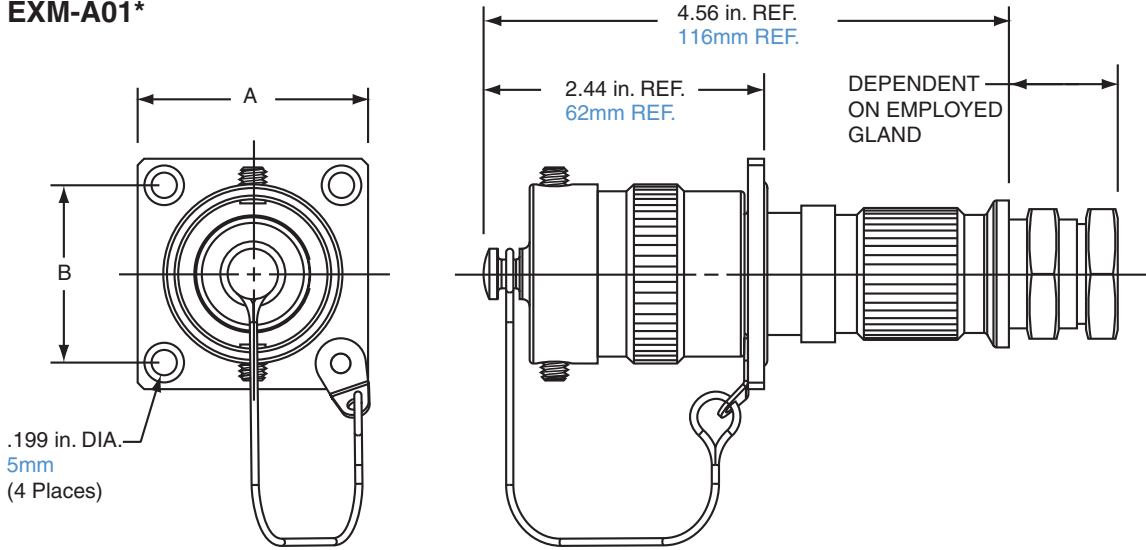
All dimensions for reference only.



# Amphe-EX

## EXM-A01 in-line receptacle

**EXM-A01\***



\* To complete order number see how to order on page 3.  
 Assembly includes metal protective cover and lanyard.  
 Assembly also includes gland of choice; see page 11.



**Inches**

Shell Size	A Flange Dimension	B Mounting Dimension
9	1.772	1.299
11	1.772	1.299
13	2.008	1.535
15	2.008	1.535
17	2.126	1.693
19	2.126	1.693
21	2.126	1.693

**Millimeters**

Shell Size	A Flange Dimension	B Mounting Dimension
9	45	33
11	45	33
13	51	39
15	51	39
17	54	43
19	54	43
21	54	43

All dimensions for reference only.

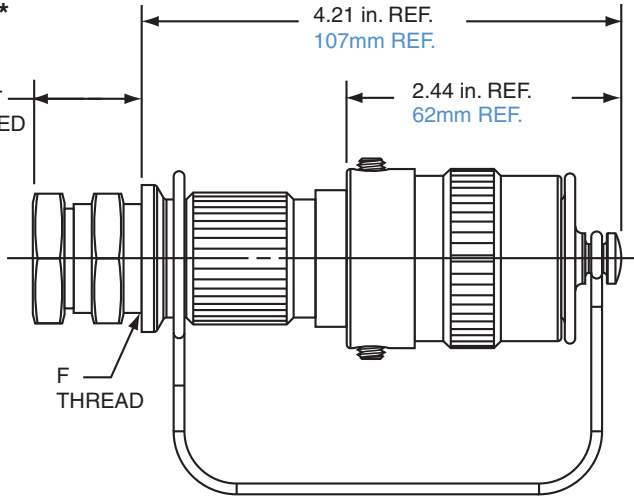


# Amphe-EX

## EXM-A06 straight plug

**EXM-A06\***

DEPENDENT  
ON EMPLOYED  
GLAND



\* To complete order number see how to order on page 3.  
Assembly includes metal protective cover and lanyard.  
Assembly also includes gland of choice; see page 11.



Inches

Shell Size	D Diameter ±.0625
9	1.3125
11	1.4375
13	1.5625
15	1.6875
17	1.8125
19	1.9375
21	2.0625

Millimeters

Shell Size	D Diameter ±1.5875	F Metric Cable Gland Entry Thread
9	33.3375	M16X1.5mm
11	36.5125	M16X1.5mm
13	39.6875	M20X1.5mm
15	42.8625	M25X1.5mm
17	46.0375	M25X1.5mm
19	49.2125	M32X1.5mm
21	52.3875	M32X1.5mm

All dimensions for reference only.

# Amphe-EX

insert availability and identification,  
contacts, sealing plugs

Shell Size/Arrg.	Service Rating	Total Contacts	Contact Size							
			22D	20	16	12	12 (Coax)	10 (Power)	8 (Coax)	8†† (Twinax)
9-35	M	6	6							
9-98	I	3		3						
11-2★	I	2			2					
11-35	M	13	13							
11-99	I	7		7						
13-4★	I	4			4					
13-13	I, Fiber Optic	4			2*	2				
13-35	M	22	22							
13-98	I	10		10						
15-15	I	15		14	1					
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
17-22★	NA	4					2		2	
17-26	I	26		26						
17-35	M	55	55							
19-31	M	15	12			1			2	
19-35	M	66	66							
21-35	M	79	79							
21-41	I	41		41						
21-75★	M	4								(See Note)

★ Ground plane proprietary option available. Arrg. 9-5 is exclusively ground plane type. See page 24 for further information of ground plane connectors.

\* Two size 16 contacts dedicated to fiber optics. Consult Amphenol, Sidney, NY or catalog 12-352 for fiber optic information.

† For RG180/U and RG195/U cables only. (Contact Amphenol, Sidney, NY for other cable application).

†† Size 8 Coax and Twinax are interchangeable.

## STANDARD CONTACTS AND SEALING PLUGS FOR AMPHE-EX SERIES

CONTACTS			SEALING PLUGS	
Contact 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

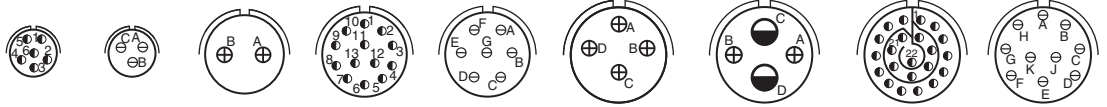
Above part numbers include standard 500 cycle finish designation - gold plating over suitable underplate in accordance with MIL-C-39029.

For other contact options available for use in Amphe-EX connectors, (thermocouple) consult Amphenol, Sidney, NY.

# Amphe-EX

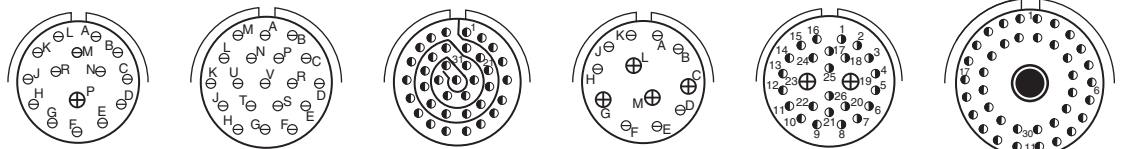
## insert arrangements

front face of pin inserts illustrated

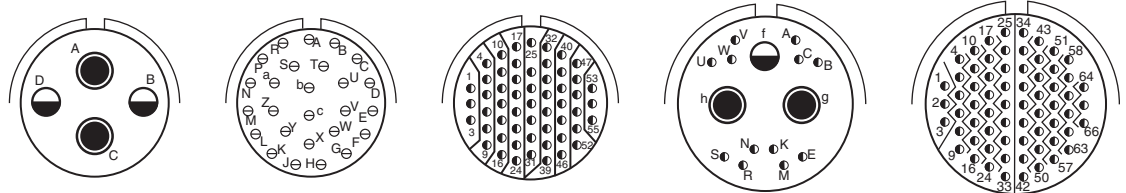


<b>Insert Arrangement</b>	9-35	9-98	11-2	11-35	11-99	13-4	13-13	13-35	13-98
<b>Service Rating</b>	M	I	I	M	I	I	I, Fiber Optic	M	I
<b>Number of Contact</b>	6	3	2	13	7	4	2 2	22	10
<b>Contact Size</b>	22D	20	16	22D	20	16	16 12	22D	20

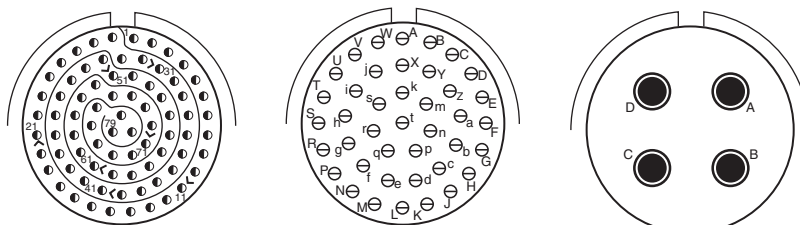
Dedicated to  
Fiber Optics



<b>Insert Arrangement</b>	15-15	15-19	15-35	15-97	15-AC	17-2
<b>Service Rating</b>	I	I	M	I	M	M
<b>Number of Contacts</b>	14 1	19	37	8 4	24 2	38 1
<b>Contact Size</b>	20 16	20	22D	20 16	22D 16	22D 8 Twinax



<b>Insert Arrangement</b>	17-22	17-26	17-35	19-31	19-35
<b>Service Rating</b>	Coax	I	M	M	M
<b>Number of Contacts</b>	2 2	26	55	2 1 12	66
<b>Contact Size</b>	12 Coax 8 Coax	20	22D	8 Coax 12 22D	22D



<b>Insert Arrangement</b>	21-35	21-41	21-75
<b>Service Rating</b>	M	I	M
<b>Number of Contacts</b>	79	41	4
<b>Contact Size</b>	22D	20	8 Coax



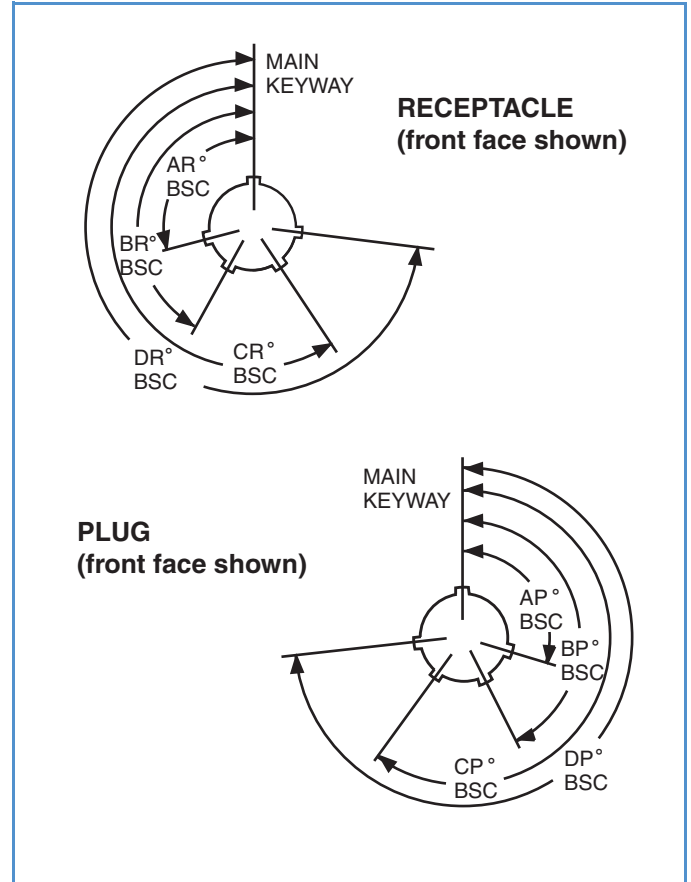
# Amphe-EX

## 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

## with RJ45 inserts and USB inserts

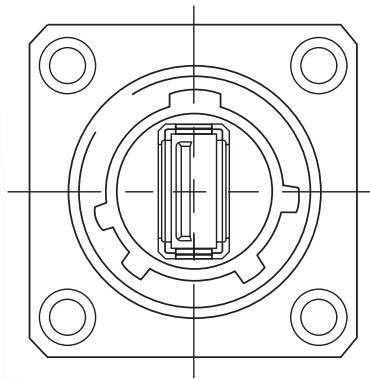
In addition to a complete line of power and signal inserts, the Amphe-EX also offers RJ45 ethernet and USB connection systems. The Amphe-EX RJ45 and USB assemblies offer all the same performance characteristics as the standard Amphe-EX hardware.

Applications include:

- Data acquisition and transmission
- Process control
- Communication systems
- Embedded computers
- Other applications where Zone or Class rated connectors are required



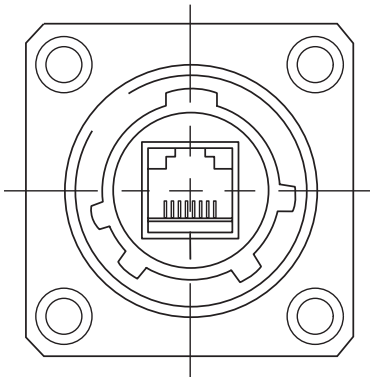
The Amphe-EX with USB allows the user to insert a standard USB 2.0 cordset into the Amphe-EX connector sets which will provide a flame-proof protection system.



Part No:  
EXM-A02-13-USBM



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.



Part No:  
EXM-A02-17-RJSM



# Amphe-EX

## cable glands

EEx d Cable Gland Size Code	Unarmored Cable No deviation if Unarmored		Armored & Sheathed Cable -BS				Armored & Sheathed with reduced bore -BSR	
			UA		Standard		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)



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.



### 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 terminus 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)

Connector and cable materials are extensively inspected prior to assembly. Every completed cable assembly receives 100% inspection for both insertion loss and visual defects. Interferometers are used for accurate end-face geometry testing.

You specify the optical and mechanical requirements of the cable assembly and Amphenol's fiber optic application's engineers will develop an "end-to-end" interconnect solution. Design creativity, experience and an understanding of harsh environments will ensure a functional and manufacturable design.

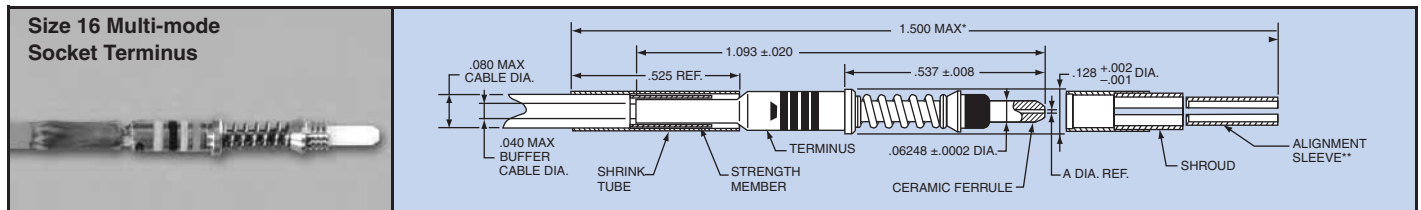
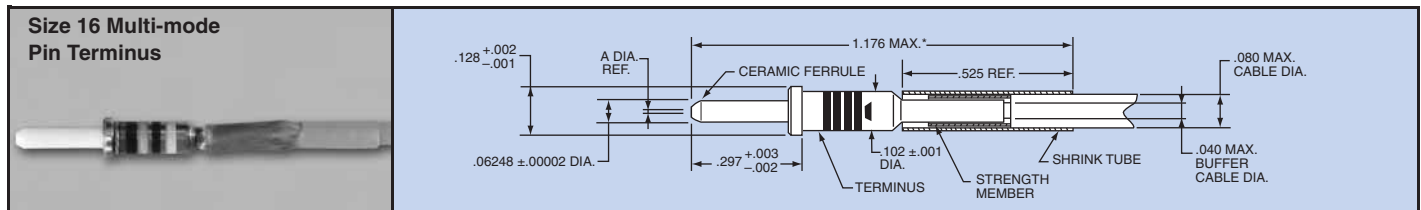
# Amphe-EX

## 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.



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

### 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 M29504/5*-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

\* Consult Amphenol Aerospace, Sidney NY for qualification status.  
† Additional fiber optic termini sizes available upon request; consult Amphenol Aerospace for availability.

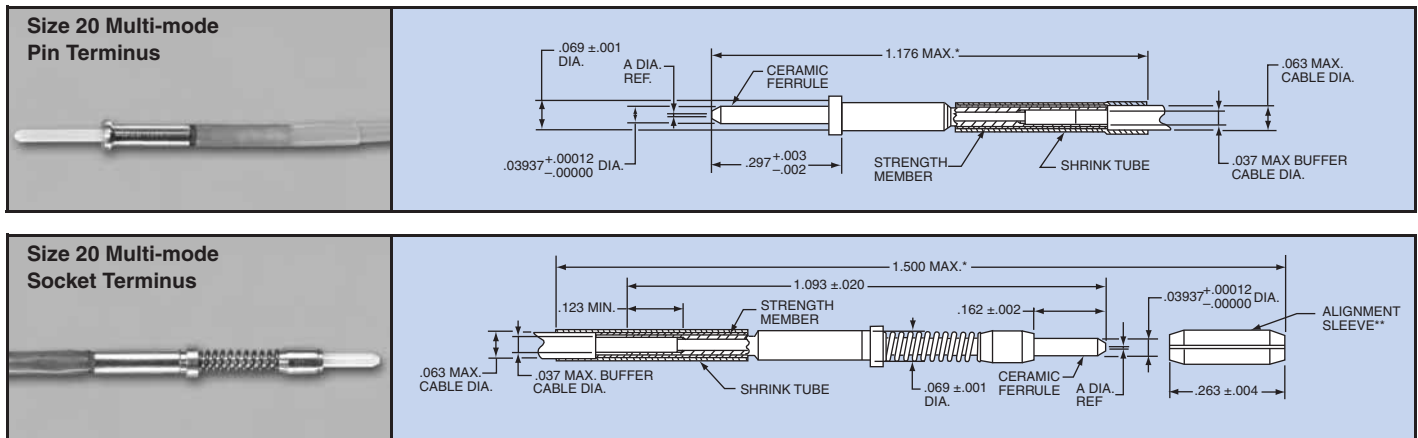
# Amphe-EX

## 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.



\* 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

## 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

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

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.

### INSERTION TOOLS

Use with Contact Size	Plastic Tools		Metal Tools			
	MS Part Number	Color	Angle Type		Straight Type Proprietary Part Number	Color
			MS Part Number	Proprietary Part Number		
10 (Power)	M81969/14-05*	Gray / (White)	M81969/8-11	†	†	Green
12	M81969/14-04*	Yellow / (White)	M81969/8-09	11-8674-12	11-8794-12	Yellow
16	M81969/14-03*	Blue / (White)	M81969/8-07	11-8674-16	11-8794-16	Blue
20	M81969/14-10*	Red / (Orange)	M81969/8-05	11-8674-20	11-8794-20	Red
22/22D	N/A	N/A	N/A	N/A	TP-201465	Brown
22D	M81969/14-01*	Green / (White)	M81969/8-01	11-8674-24	11-8794-24	Black
8 Coaxial	None Required					
8 Twinax	None		M81969/46-06**	None		Red

### REMOVAL TOOLS

Use with Contact Size	Plastic Tools		Metal Tools				
	MS Part Number	Color	For Unwired Contacts Proprietary Part Number	Angle Type		Straight Type Proprietary Part Number	Color
				MS Part Number	Proprietary Part Number		
10 (Power)	M81969/14-05*	(Gray) / White	†	M81969/8-12	†	†	Green / White
12	M81969/14-04*	(Yellow) / White	11-10050-11	M81969/8-10	11-8675-12	11-8795-12	Yellow / White
16	M81969/14-03*	(Blue) / White	11-10050-10	M81969/8-08	11-8675-16	11-8795-16	Blue / White
20	M81969/14-10*	(Orange) / Red	11-10050-9	M81969/8-06	11-8675-20	11-8795-20	Red / White
22D	M81969/14-01*	(Green) / White	11-10050-7	M81969/8-02	11-8675-24	11-8795-24	Green / White
8 Coaxial	M81969/14-12	Green	None	None	11-9170	DRK264-8††	N/A
8 Twinax	M81969/14-12	Green	None	M81969/46-12**	11-9170	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.

\* Double end insertion/removal tool.

\*\* Twinax insertion tools are available only in a straight type, metal version.

† To be determined.

†† Contact Daniels Manufacturing Co. for availability.

# Amphe-EX

## 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 Table 1 Figure 1 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 termination will look like.
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 Table 1) 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 provided Exd glands 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 ground contacts are correctly located.
10. Seat all contacts properly so that they will not be damaged or become disengaged during connector 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, the cable adapter or insert clamp nut should be tightened with a wrench. This assembly operation should be done by placing the components in a vise with smooth-faced jaws and using a strap wrench.
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.



# Amphe-EX

## assembly instructions

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. Close review should be made of the mixing instructions that follow. Potting of the connector where required should be the very last step the assembler does prior to fastening down the grommet and nut on the cable adapter. 'Ringing' out of the contacts with their mate should be done prior to potting.
22. It is recommended that all receptacles be potted while coupled to their mating connector.
23. Each assembly operator should be his own inspector. Worn, damaged, or defective tools 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.

### 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, T3, T2 & T1.

The equipment is only certified for use in ambient temperatures in the range -20°C to +40°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 60079-7:2003	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"

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 its 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

## 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  
 Potting Compound: Hysol Epoxy Resin Part # ES4412™

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 condition(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 90.1°C.
2. Cables fitted to the plugs and receptacles shall 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:

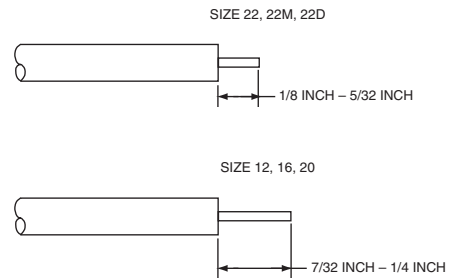
M22520 Series is recommended. See Tool Table for choice of turret head and selection setting according to contact size, part number and wire gage size.

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



Contact Size	Wire Diameters (in.) **	
	Min.	Max.
10	0.135	0.162
12	0.097	0.142
16	0.065	0.109
20	0.040	0.077
22	0.034	0.060
22M, 22D	0.030	0.050

**\*\*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

## 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).

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 its 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

## 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 its proper contact.
3. Populate the insert with contacts by poking each of the wired contacts into its 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-EX™ Potting Instructions

All cable adapters, other than ones suited for mating with an EX-certified gland, must be filled with encapsulant (potted). The material certified for use in filling this connector line is Dexter-Hysol Product #ES4412. The user or installer shall consider the performance of these materials with regard to attack by aggres-

sive substances that may be present in the hazardous area. This material is a two-component casting system with a 1:1 volumetric mix ratio. It has low exothermic qualities, peak at only 102°F during cure in 2 hours at 140°F. The product is available in pre-measured "mix & dispense" packaging. More information is available by contacting the following authorized suppliers:

Amphenol Industrial Operations  
40-60 Delaware Avenue  
Sidney, New York 13838 USA  
Phone (607) 563-5011

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

Amphenol Technology Industrial Operations-Shenzhen  
BLK 4 Fuan 2nd Industrial Park  
Dayang Road Fuyong Baoan  
Shenzhen China  
Phone: 86 755 2991 8389

### 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 its 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

## 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	1.064	0.652	0.355	0.197
11	1.064	0.652	0.355	0.197
13	1.064	0.927	0.718	0.398
15	1.064	0.927	0.718	0.398
17	1.064	1.242	1.289	0.714
19	1.064	1.242	1.289	0.714
21	1.064	1.242	1.289	0.714

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

“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