Amphenol®/Pyle®
LMD & LMS Connectors

LM-300-1

Linear Modular Connectors for Instrumentation and Avionic Control Environments

Amphenol

Amphenol® /Pyle® LMD & LMS Modular Connectors

interconnection products at the wire harness level

LMD Modular Connectors

The LMD Connector Series was designed to provide flexibility in the assembly of wire harnesses that are used in instrumentation and avionic control environments.

Design Features

- An LMD Connector is comprised of a housing, modules and contacts - each ordered separately, requiring assembly
- Lightweight housings are offered in three materials
  - standard black thermoplastic
  - high performance composite material for EMI Shielding
  - white thermoplastic nylon material with increased solvent resistance
- Four standard modules are available with the following contact arrangements: 1 #8, 4 #16, 9 #20, 16 #22
- Modules are available in sealed and unsealed versions
- Linear module design may be used for rack and panel or cable to cable applications
- Right angle receptacle design with fixed pin contacts available for printed circuit board attachments
- Bussing modules available to allow for a plurality of circuit network configurations without extra hardware
- Diode modules provide a current protection system for avionic instrumentation packages and eliminate the need for dedicated PC boards and other hardware
- Miniature relay modules can be added which eliminate the need for printed circuit boards and hardware

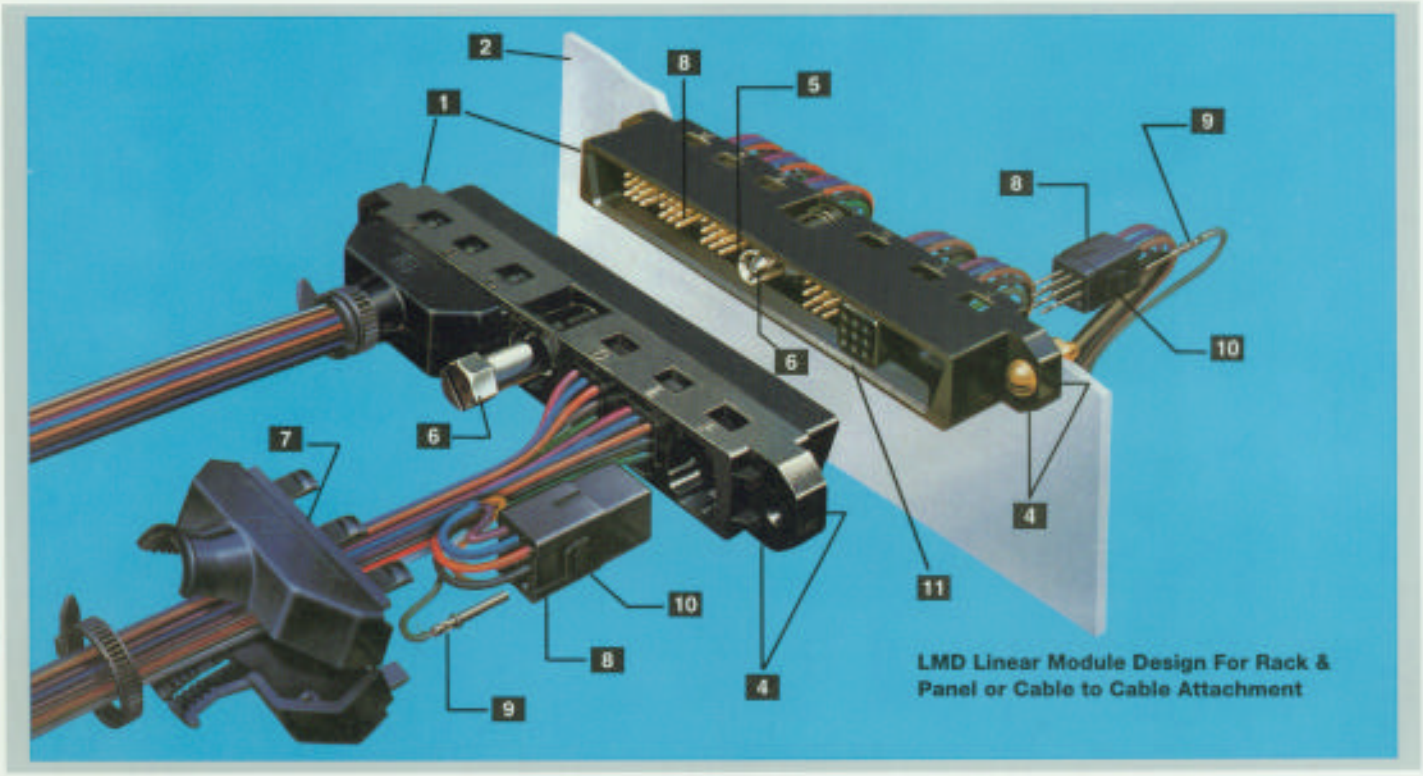
LMD Benefits

- Reduces assembly and production costs
- Eliminates costly PC board and associated hardware
- Reduces inventory levels and associated costs
- Allows for a variety of circuit configurations
- Permits ease of circuit upgrading
- Facilitates equipment maintenance

LMS Modular Connectors

Supplementing the LMD connector family, Amphenol/Pyle National offers two styles of the LMS in-line splice connector, low cost interconnects that incorporate the LMD modules and contacts.

- Standard LMS splice connector - 3 piece assembly with module removal tool access
- Tool-less splice connector - 3 piece assembly with a push button module release for easy module removal
- Two-piece bracket available for panel mounting
- Used in wire harness, instrument and equipment terminations and test points



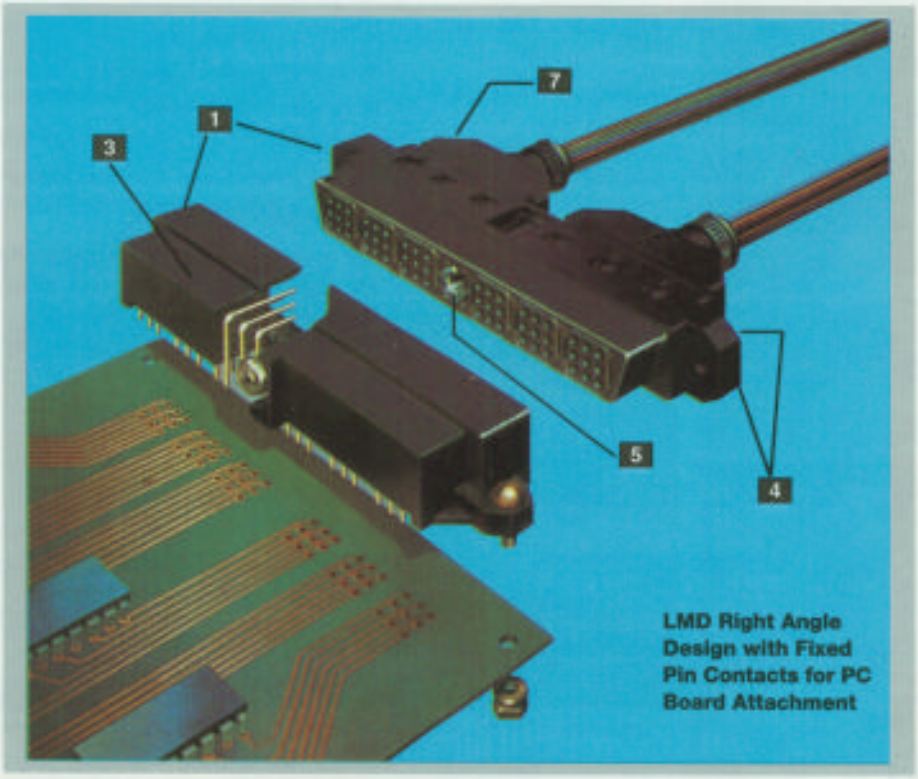
LMD Linear Module Design For Rack & Panel or Cable to Cable Attachment

LMD Design Flexibility

module options provide a mix of both active and passive devices within one connector

LMD Features and Options

1. LMD Standard components are molded of a U/L rated 94VO flame retardant, light-weight thermoplastic material. Alternate white nylon material and composite material are available. See performance capabilities on the following page and consult Amphenol, Sidney, NY for availability of these optional materials.
2. The linear LMD connector may be used for rack and panel or cable-to-cable applications.
3. An LMD right angle printed circuit board receptacle with fixed pin contacts is available.
4. Plug and receptacle housings may be front or rear panel mounted.
5. Optional keying post provides six position keying capability.
6. The optional center jackscrew provides ease of mating and unmating and insures high reliability under vibration.
7. Two types of cable strain reliefs are available; for either internal or external attachment.
8. Sealed and unsealed modules accept rear release #8, #16, #20 and #22 gauge contacts. PC tail contacts are also available. (Consult Amphenol, Sidney, NY).
9. A variety of contacts accept #8 through #28 AWG wire. Commercially available automated crimp terminating equipment may be used.
10. Wired or unwired modules are rear inserted and held by two retention tines. With the aid of a front release tool, the modules are easily removed from the rear.
11. Pin or socket modules may be intermixed in plug or receptacle housings.



LMD Right Angle Design with Fixed Pin Contacts for PC Board Attachment

Table of Contents

LMD Design Flexibility

material options, contact data, performance characteristics

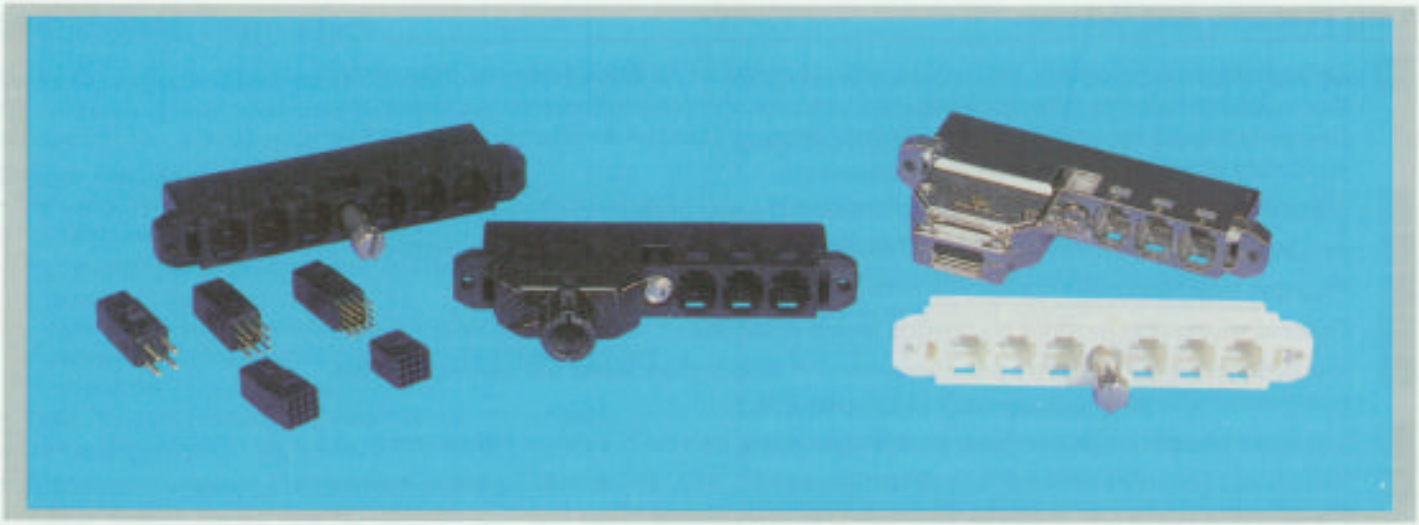


Photo above shows the variety of materials that are offered for LMD connector housings and strain reliefs.

CONTACT DATA

Contact Size	Wire Size	Contact Resistance: Test Current (Amperes)	Contact Resistance: Max. Millivolts	Dielectric Withstanding Voltage AC (RMS)	Max. Recommended Working Voltage AC (RMS)
22	22 28	5.0 1.5	73 54	1800	600
20	20 24	7.5 3.0	55 45	1800	600
16	16 20	13.0 7.5	49 46	2300	900
8 with #12 Wire Well	12 14	23 17	42 40	2300	900
8	8 10	46 33	26 28	2300	900

Contact Size	Wire Size	Contact Crimp Tensile Strength Lbs. Minimum	Maximum Wire Insulation
22	28 26 24 22	3 5 8 12	.054
20	24 22 20	8 12 20	.083
16	20 18 16	20 30 50	.103
8 with #12 Wire Well	14 12	70 110	.255
8	10 8	150 220	.255

MATERIAL OPTIONS FOR LMD HOUSINGS

Black Thermoplastic: Molded of U/L rated 94VO flame retardant, lightweight thermoplastic.

High Performance Composite: NOT AVAILABLE — Molded of Composite material, nickel plated for added EMI shielding effectiveness

White Thermoplastic Nylon: Provides increased resistance to industrial oils and solvents.

PERFORMANCE CHARACTERISTICS

Temperature Rating	–55˚C to +140˚C (–67˚F to +284˚F)
Insulation Resistance (min.)	5000 megohms initial; 1000 megohms after 96 hours humidity
Durability	250 cycles (mating & unmating)
Vibration	Maximum discontinuity of one microsecond when subjected to sinusoidal vibration of 10 to 2000 Hz at 15 gravity units
Physical Shock	Maximum discontinuity of one microsecond when subjected to ½ sine-wave transient shock of 50 gravity units with pulse duration of 11 milliseconds
Module Insertion & Removal Force	5 lbs. maximum
Module Retention	70 lbs. minimum

See page 9 for information on strain reliefs.

NOTE: Module inserts are currently available in the standard black thermoplastic only. For future availability of material other than standard black, consult Amphenol, Sidney, NY.

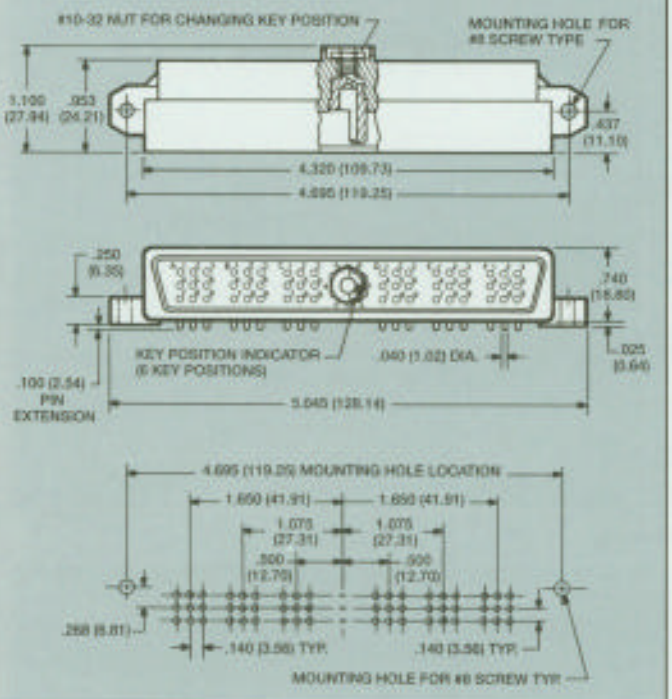
LMD Connector
housing specifications

NOT AVAILABLE

6 BAY LMD HOUSINGS

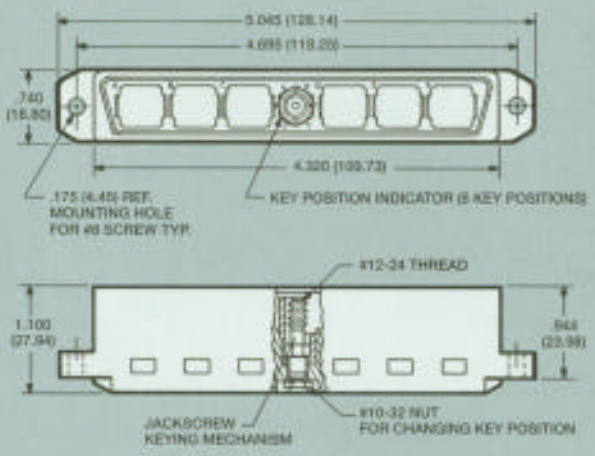
RECEPTACLE HOUSING
RIGHT ANGLE PC TYPE, 6 BAY

Standard Black Thermoplastic:	LMD-06BE( )-01PJ*
High Performance Composite:	LMD-C6BE( )-01PJ*
White Nylon Material:	LMD-F6BE( )-01PJ*



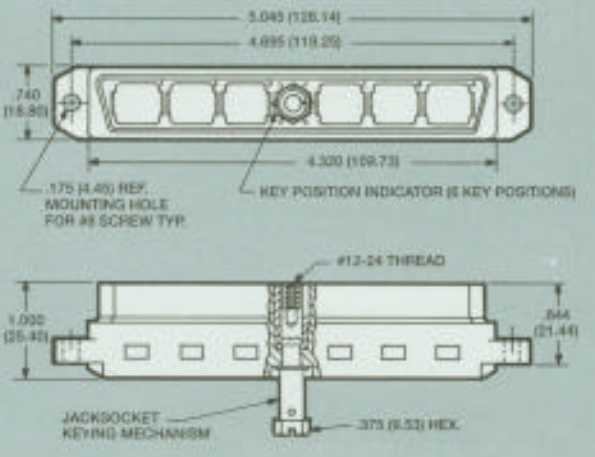
RECEPTACLE HOUSING,
6 BAY

Standard Black Thermoplastic:	LMD-06RK( )*
High Performance Composite:	LMD-C6RK( )*
White Nylon Material:	LMD-F6RK( )*



PLUG HOUSING,
6 BAY

Standard Black Thermoplastic:	LMD-06PJ( )*
High Performance Composite:	LMD-C6PJ( )*
White Nylon Material:	LMD-F6PJ( )*



HOW TO ORDER LMD HOUSINGS

* Housings are ordered separately from modules and contacts. Sample part number is shown as follows:

LMD – 0 6 P J ( )

PRODUCT DESIGNATION

HOUSING MATERIAL**
0 designates standard black thermoplastic material
C designates high performance composite material
F designates white thermoplastic nylon material

NUMBER OF MODULES
(Cavities in plug or receptacle housing)

CONNECTOR TYPE
P designates plug
R designates receptacle
B designates PC receptacle with 90° fixed pin contacts

COUPLING MECHANISM
J designates jack-socket, rotating
K designates jack-screw, fixed
E designates without coupling mechanism

ALTERNATE KEYING (6 Positions) 1, 2, 3, 4, 5 or 6
Replace parenthesis ( ) with alternate keying position desired.
7 designates keying hardware shipped unassembled for field assembly
8 designates no alternate keying hardware. Keyed through housing only.

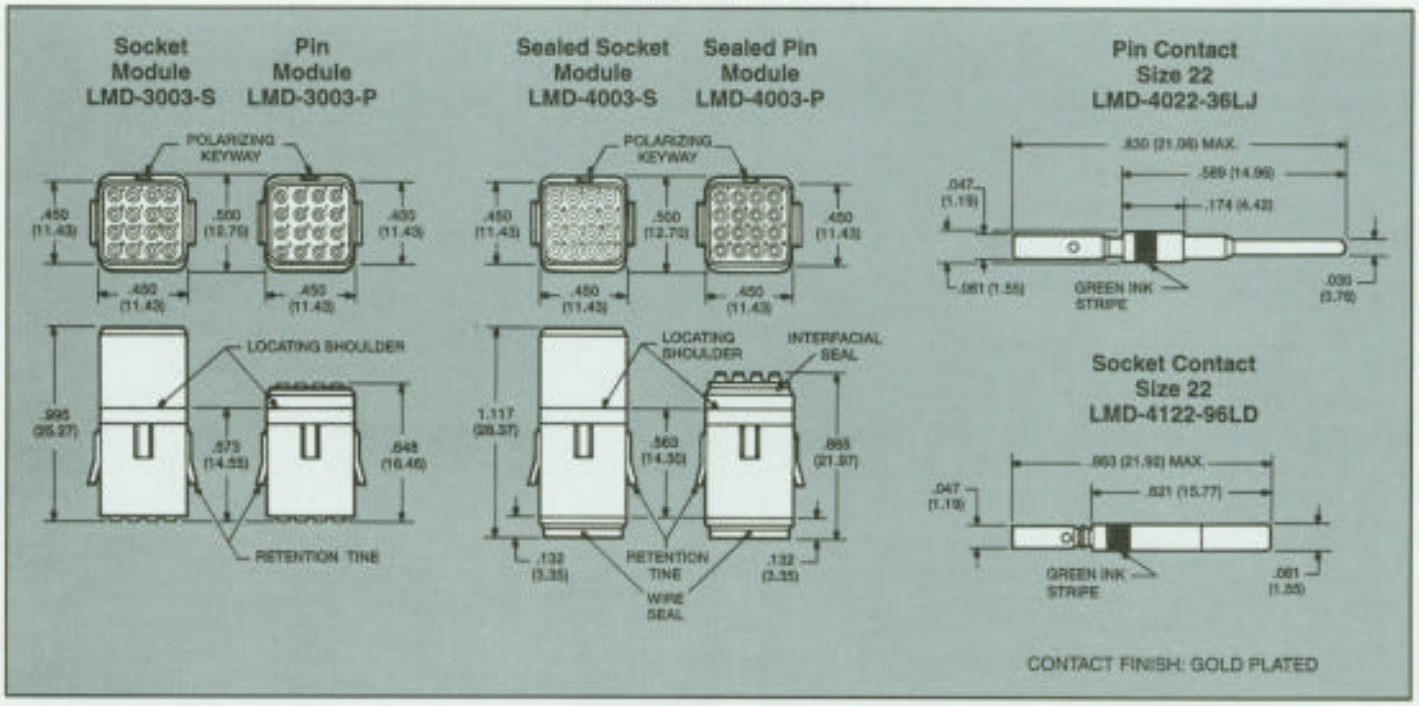
** Housing material is standard black thermoplastic; for other materials, consult Amphenol, Sidney, NY for availability.

Note: See strain reliefs for use with 6 bay LMD connectors on page 9.

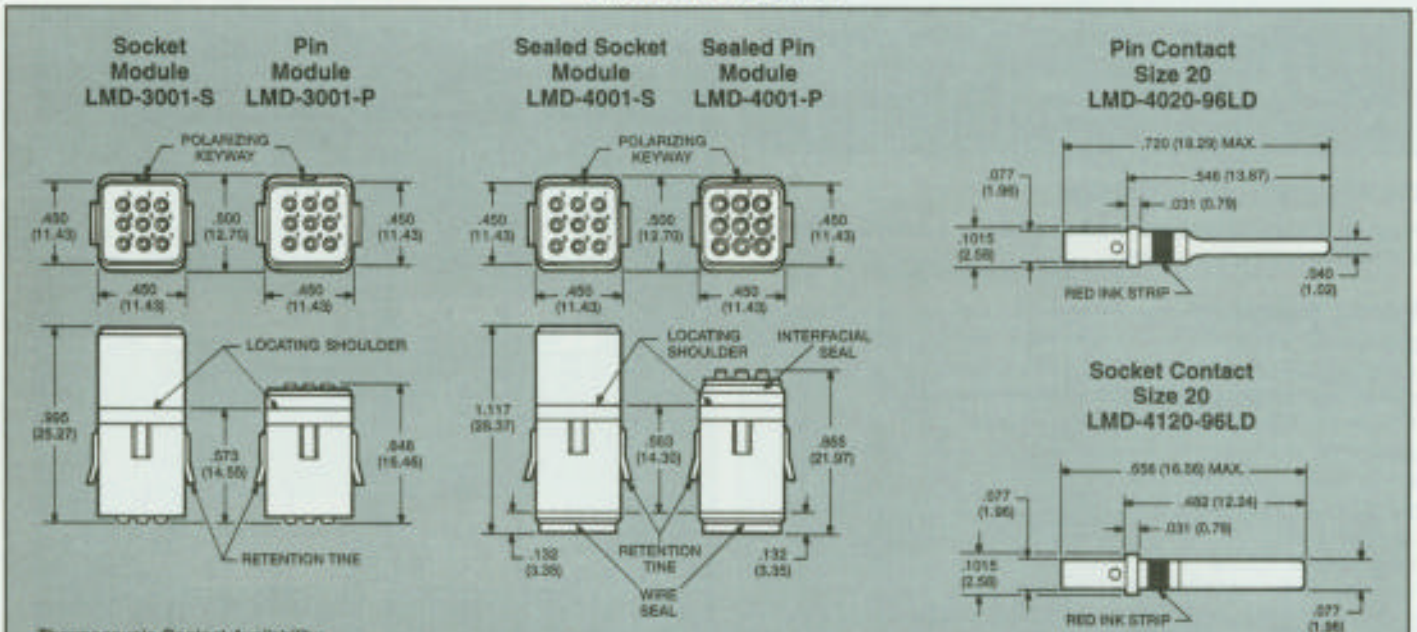
See Amphenol Product Data Sheet #178 which provides information on the availability of 4 bay and 2 bay plug and receptacle housings.

LMD Connector
module contact configurations and specifications

16 #22 CONTACTS



9 #20 CONTACTS



Thermocouple Contact Availability:

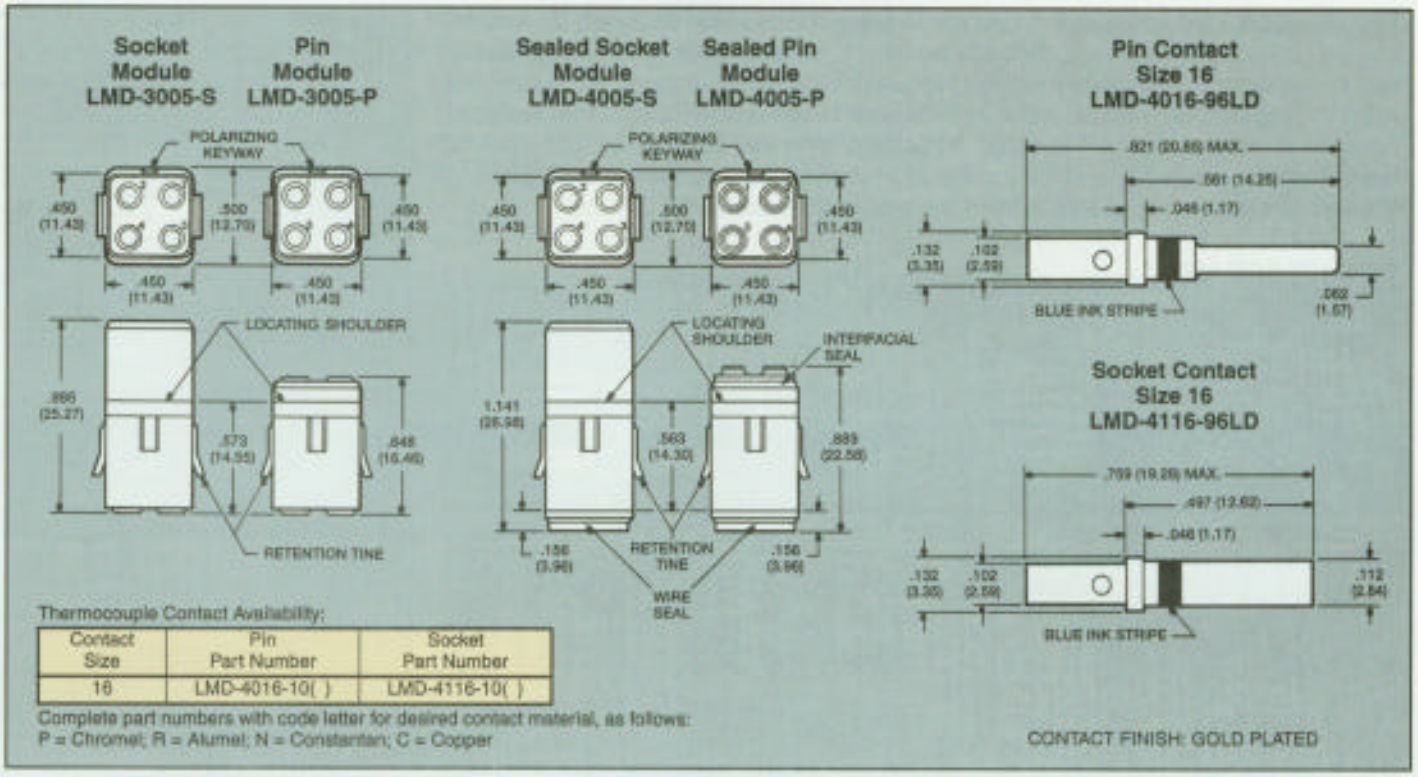
Contact Size	Pin Part Number	Socket Part Number
20	LMD-4020-10( )	LMD-4120-10( )

Complete part numbers with code letter for desired contact material, as follows:
P = Chromel; R = Alumel; N = Constantan; C = Copper

NOTE: MODULES AND CONTACTS ARE SOLD SEPARATELY FROM CONNECTOR HOUSINGS.
Order modules and contacts by part numbers shown above.
For information on the availability of module material other than black thermoplastic, consult Amphenol, Sidney, NY.

LMD Connector
module contact configurations and specifications

4 #16 CONTACTS



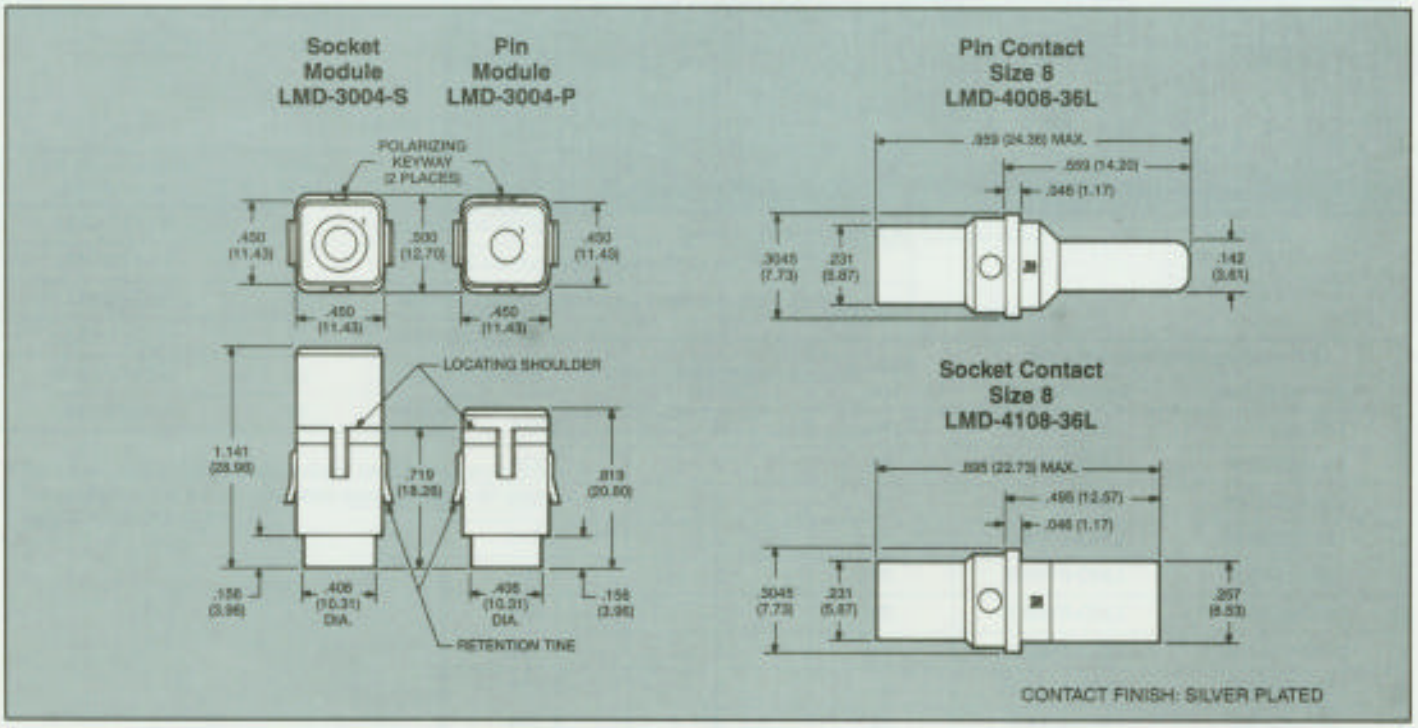
Thermocouple Contact Availability:

Contact Size	Pin Part Number	Socket Part Number
16	LMD-4016-10( )	LMD-4116-10( )

Complete part numbers with code letter for desired contact material, as follows:
P = Chromel; R = Alumel; N = Constantan; C = Copper

CONTACT FINISH: GOLD PLATED

1 #8 CONTACT



CONTACT FINISH: SILVER PLATED

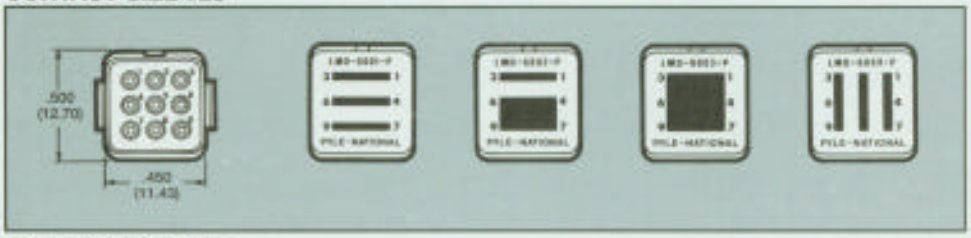
NOTE: MODULES AND CONTACTS ARE SOLD SEPARATELY FROM CONNECTOR HOUSINGS.
Order modules and contacts by part numbers shown above.
For information on the availability of module material other than black thermoplastic, consult Amphenol, Sidney, NY.

LMD Connector
bussing modules – for plural circuit networks

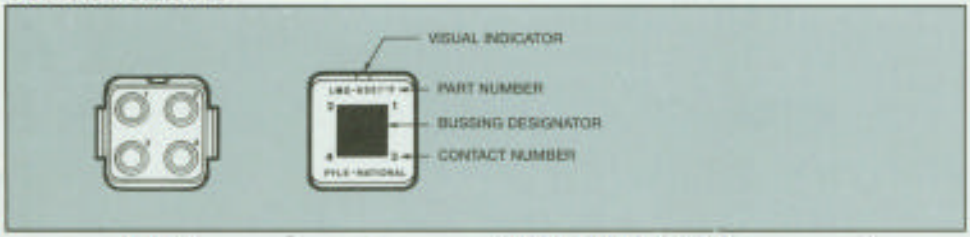
Expanding the LMD connector family, the Bussing Module was designed by Amphenol, Pyle-National to provide a complete terminal junction system. This module conveniently and simply allows for a plurality of circuit network configurations, eliminating the need for "pigtails", termination strips or termination hardware. Nine bussing configurations are currently available* in either a standard or sealed module. Sealed modules have a rubber interfacial seal for increased environmental resistance. LMD Bussing Modules are currently available in black thermoplastic material.**

CONTACT SIZE #22

CONTACT SIZE #20



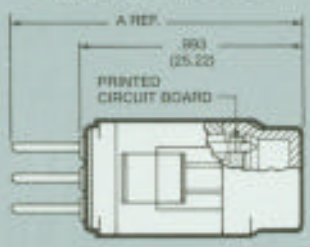
CONTACT SIZE #16



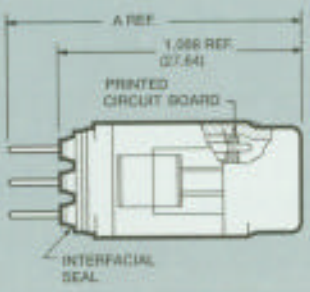
CONTACT (FRONT VIEW)

BUSSING CONFIGURATION (REAR VIEW)

STANDARD MODULE



SEALED MODULE



MODULE (SIDE VIEW)

HOW TO ORDER

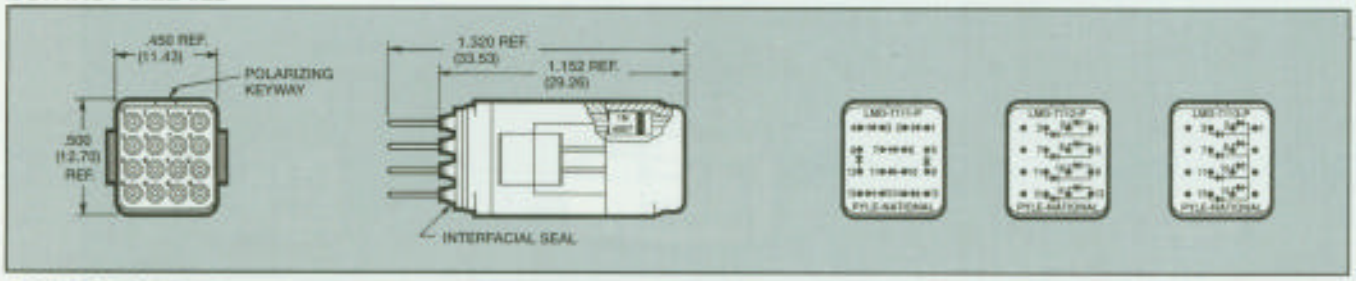
LMD Bussing Module Part Number		Contact Size	Bussing Circuits	A Ref.
Standard Module	Sealed Module			
LMD-6001-P	LMD-6101-P	20	3	1.326
LMD-6002-P	LMD-6102-P	20	2	1.326
LMD-6003-P	LMD-6103-P	20	1	1.326
LMD-6004-P	LMD-6104-P	22	4	1.256
LMD-6005-P	LMD-6105-P	22	2	1.256
LMD-6006-P	LMD-6106-P	22	1	1.256
LMD-6007-P	LMD-6107-P	16	1	1.326
LMD-6008-P	LMD-6108-P	22	3	1.256
LMD-6009-P	LMD-6109-P	20	3	1.326

* For other circuit network configurations, consult Amphenol, Sidney, NY.
** For availability of materials other than standard black thermoplastic, consult Amphenol, Sidney, NY.

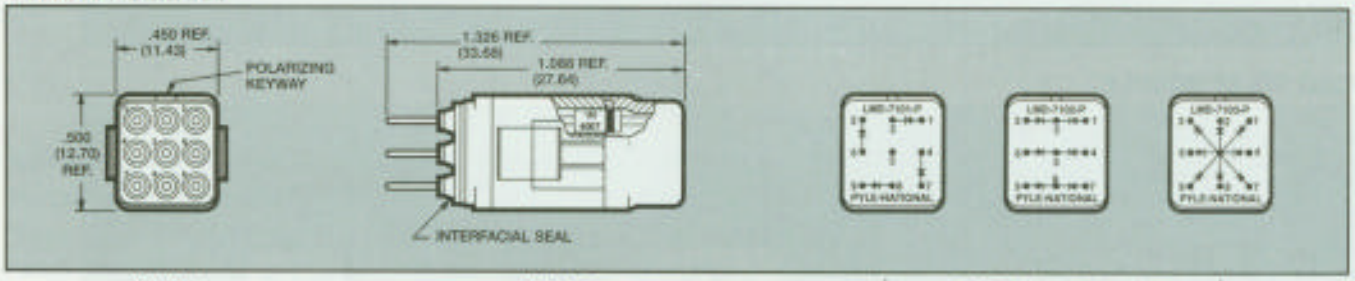
LMD Connector
diode modules – for increased current protection

The Diode Module was designed to provide a current protection system for Avionic instrumentation packages. Module configurations represent standard system and test application requirements.*
Diode Modules eliminate dedicated P. C. boards and other assorted hardware. These modules are available in sealed type only, incorporating an interfacial seal for environmental protection, and are manufactured of black thermoplastic material.**

CONTACT SIZE #22



CONTACT SIZE #20



CONTACT (FRONT VIEW) *MODULE (SIDE VIEW)* *DIODE CONFIGURATION (REAR VIEW)*

HOW TO ORDER

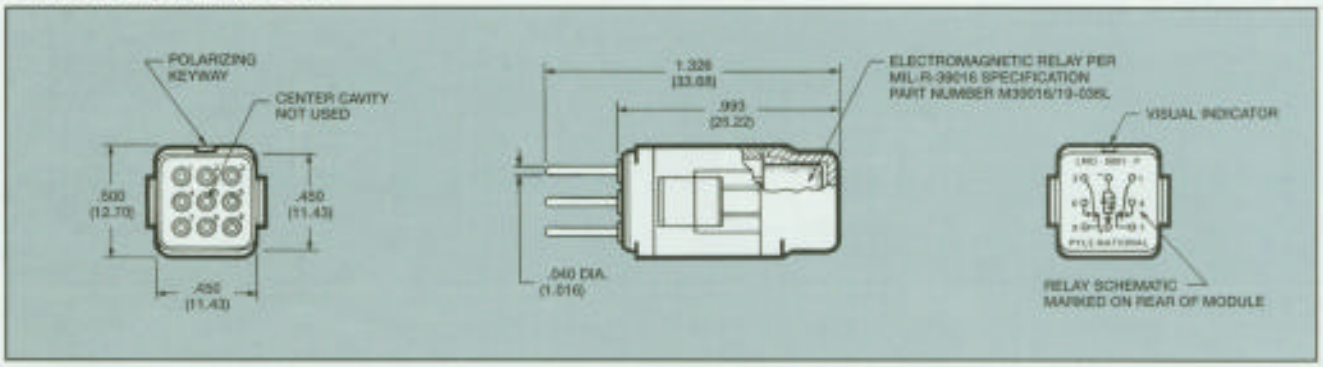
LMD Diode Module Part Number	Contact Size	Circuit Description
LMD-7111-P	22	8 discrete diodes
LMD-7112-P	22	4 pair of diodes, each pair with common cathode
LMD-7113-P	22	8 diodes with common cathode (pin #1)
LMD-7101-P	20	4 discrete diodes
LMD-7102-P	20	3 pair of diodes, each pair with common cathode
LMD-7103-P	20	8 diodes with common cathode (pin #5)

* For other circuit network configurations, consult Amphenol, Sidney, NY.
** For availability of materials other than standard black thermoplastic, consult Amphenol, Sidney, NY.

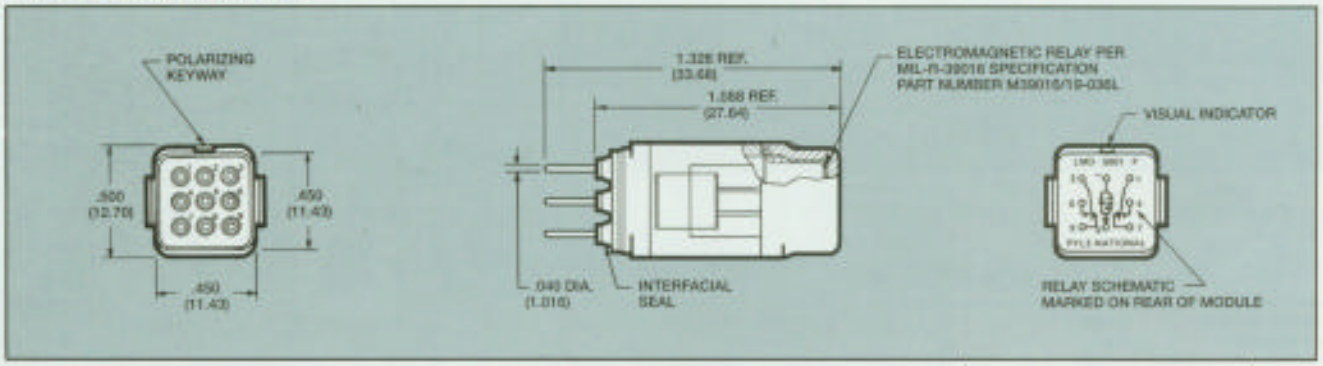
LMD Connector
relay modules – improved component packaging

The Relay Module represents another innovative concept which was designed for the LMD connector. Incorporating an industry standard miniature relay per MIL-R-39016 specification part number M39016/19-036L*, these modules eliminate the need for a printed circuit board and all related hardware. These modules are available in unsealed or sealed types as shown below, and are manufactured of black thermoplastic material.**

STANDARD RELAY MODULE



SEALED RELAY MODULE



CONTACT (FRONT VIEW) *MODULE (SIDE VIEW)* *RELAY CONFIGURATION (REAR VIEW)*

HOW TO ORDER

LMD Relay Module Part Number	
Standard Module	**Sealed Module**
LMD-5001-P	LMD-5101-P

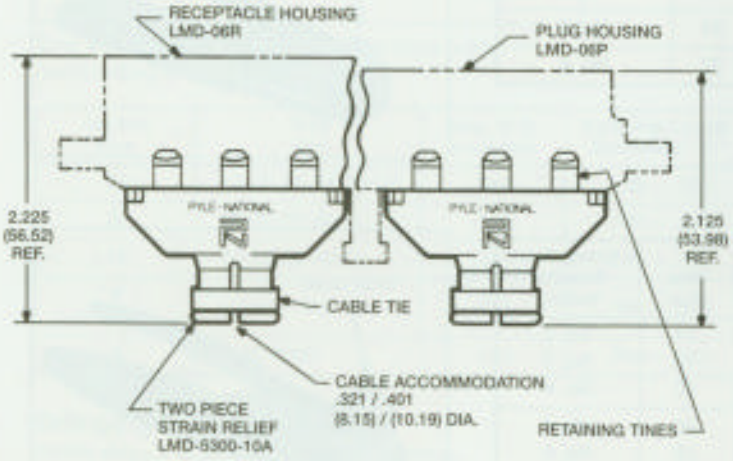
* For other circuit network configurations, consult Amphenol, Sidney, NY.
** For availability of materials other than standard black thermoplastic, consult Amphenol, Sidney, NY.

LMD Accessories
strain reliefs

STRAIN RELIEF FOR INTERNAL ATTACHMENT

Part Number LMD-5300-10A

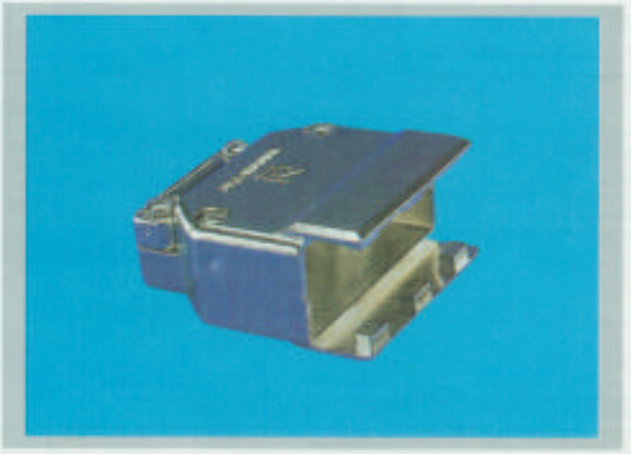
Two-piece strain relief with cable tie included, for internal attachment to LMD 6 bay connector housings. Molded in black thermoplastic material.

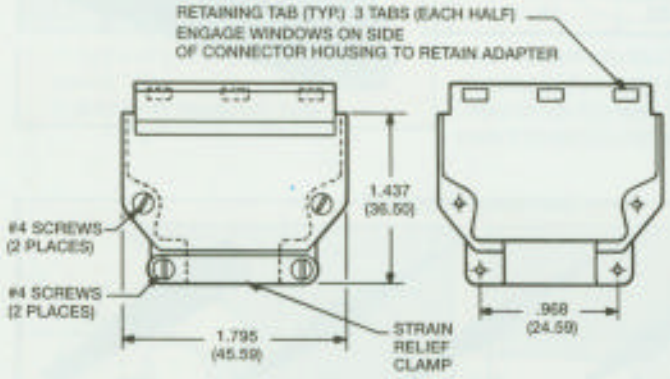


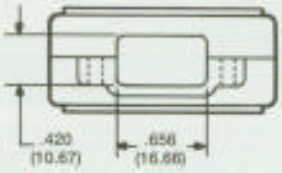
STRAIN RELIEF FOR EXTERNAL ATTACHMENT

Part Number LMD-5300-50-A

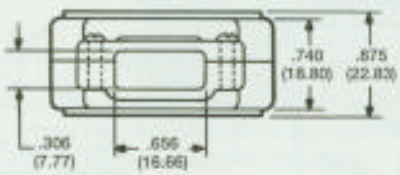
Two-piece strain relief with screws and adjustable clamp (see below for variations), for external attachment to LMD 6 bay connector housings. Material is high performance composite, nickel plated.



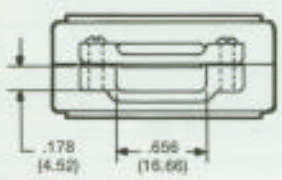




WIRE OUTLET
WITHOUT STRAIN RELIEF CLAMP



WIRE OUTLET
WITH STRAIN RELIEF CLAMP



WIRE OUTLET
WITH STRAIN RELIEF CLAMP REVERSED

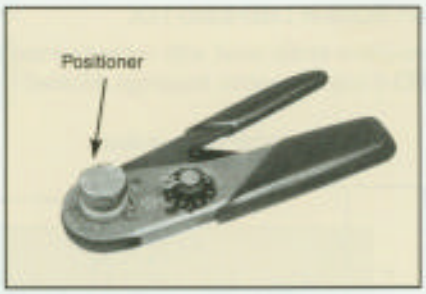
LMD Accessories

crimping and insertion/removal tools, module removal tool

CRIMPING TOOL for Size #22 Contacts

	Crimping Tool Part Number	Positioner	
		For Pin Contact	For Socket Contact
Amphenol/Pyle-National No.	TP-201401-H2	TP-201409	TP-201401-2-07
Military No.	M22520/2-01	–	M22520/2-07

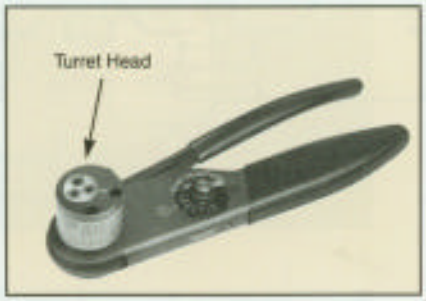
Wire Size	Crimp Tool Selector Setting
28	No. 1
26	No. 2
24	No. 3
22	No. 4



CRIMPING TOOL for Size #20 and Size #16 Contacts

	Crimping Tool Part Number	Turret Head
Amphenol/Pyle-National No.	TP-201354	TP-201355
Military No.	M22520/1-01	M22520/1-02

Contact Size	Wire Size	Crimp Tool Selector Setting
20	24	No. 2
	22	No. 3
	20	No. 4
16	20	No. 4
	18	No. 5
	16	No. 6



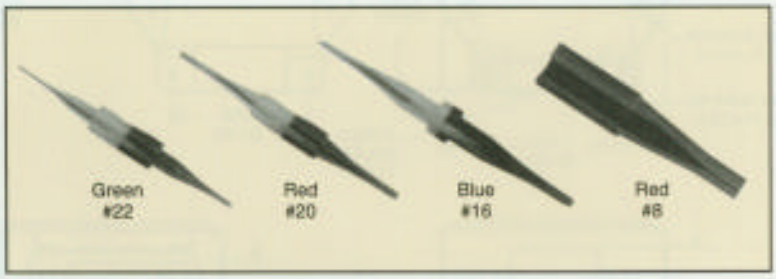
CRIMPING TOOL for Size #8 Contacts

	Crimping Tool Part Number	Locator
Amphenol/Pyle-National No.	TP-201393	TP-201408
Military No.	–	–

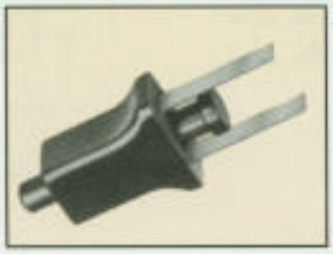
For Size 8 Contacts		For Size 8 Contacts with #12 Wire Well	
Wire Size	Crimp Tool Selector Setting	Wire Size	Crimp Tool Selector Setting
10	No. 5	14	No. 2
8	No. 7	12	No. 3

CONTACT INSERTION/REMOVAL TOOLS

Contact Size	Color	Amphenol/ Pyle-National Part No.	Military Part No.
22	Green	10-538988-22D	MIL-I-81969/14-01
20	Red	10-538988-201	MIL-I-81969/14-02
16	Blue	10-538988-016	MIL-I-81969/14-03
8	Red	TP-201406	MIL-I-81969/29-02



LMD MODULE REMOVAL TOOL
Part Number TP-201397



See on the following page the assembly instructions for proper crimping, insertion and removal of contacts in LMD connectors. See also instructions for insertion of modules and how to use the LMD module removal tool, on page 12.

LMD tools can be purchased from Daniels Manufacturing Company.

Assembly Instructions for LMD Connectors

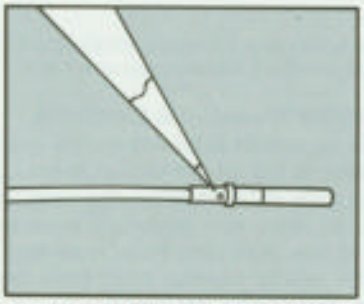
Wire Preparation

Strip wires to dimension "A" shown in table below.
Avoid cutting or nicking wire strands.

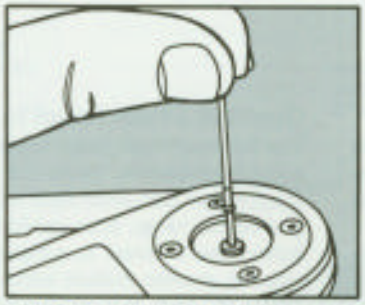
Contact Size	Wire Size	Max. O. D. Insulation	Stripping Length Dimension "A"
22	22-24-26-28 AWG	.054	.156 – .125
20	20-22-24 AWG	.083	.185 – .155
16	16-18-20 AWG	.103	.260 – .230
8 (with #12 crimp)	12-14 AWG	.255	.395 – .365
8	8-10 AWG	.255	.395 – .365

Crimping Wire to Contacts

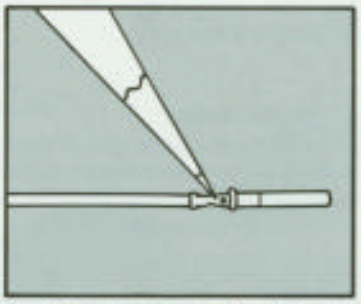
Follow steps 1–3 for proper contact crimping.



1. Fully insert wire into contact crimp pocket. Wire must be visible through wire inspection hole.

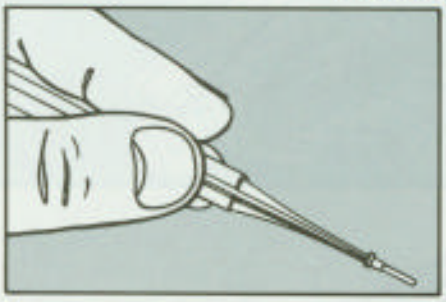


2. Insert contact into tool (use proper crimping tool as listed on page 10). Crimp contact to wire. Tool will not open if contact is not fully crimped.

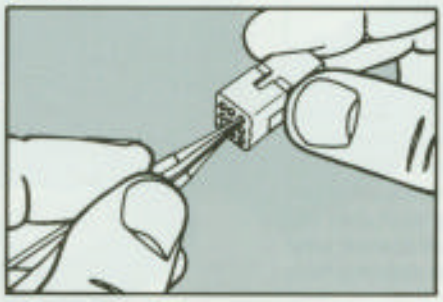


3. After crimping, wire should be visible through wire inspection hole.

Contact Insertion

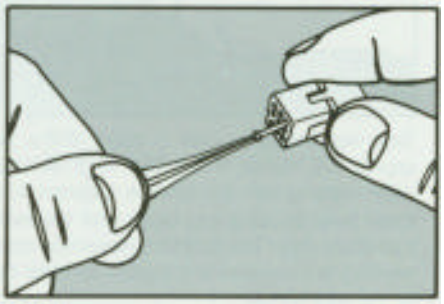


Using proper insertion/removal tool as listed on page 10, slip wire into insertion end (colored end), placing crimp end of contact inside the slotted portion and contact shoulder against end of tool.



Align contact with the cavity at the rear face of the module. Carefully push the contact into the full depth of the cavity. Withdraw tool. A slight axial pull on the wire will confirm contact is locked in proper position.

Contact Removal

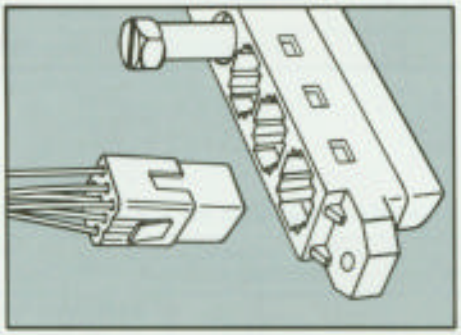


Snap the extraction end (white end) of the tool over the wire of the contact selected for removal. Carefully push the tool into the full depth of the contact cavity releasing the contact retaining collet. Hold the wire against the serrations on the tool, and withdraw the tool and the wired contact from the module.

Assembly Instructions for LMD Connectors

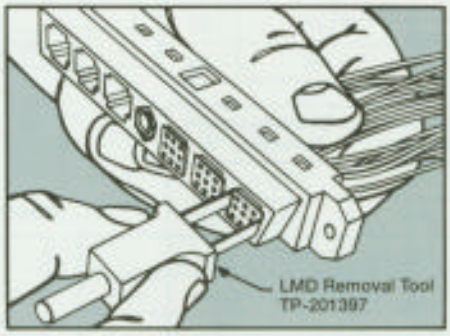
Pin or socket modules, wired or unwired, can be inserted or intermixed in plug or receptacle housings. Select from standard module configurations shown on pages 4 and 5, or select the optional bussing, diode or relay modules offered, shown on pages 6-8. The next instructions illustrate the proper method of insertion and removal of modules within the LMD connector.

Module Insertion

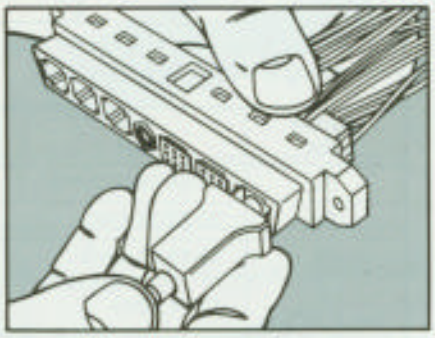


Align the module with the proper cavity at the rear of the housing. The module keyway must be positioned to accept key in housing cavity. Carefully insert the module straight into the cavity until fully seated and locked in place. A slight axial push on the front of the module or a pull on the cable bundle will confirm module is locked in proper position.

Module Removal



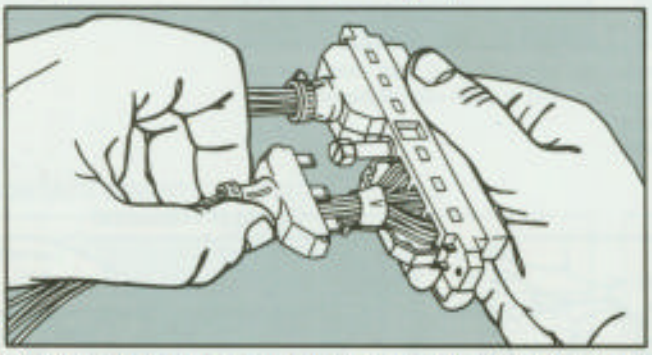
Select module to be removed and place the blades of removal tool into the removal slots at the front of the connector. Push the removal tool into the full depth of the cavity, releasing the module retention tines.



With the module removal tool fully inserted, push the extraction plunger to eject the module out of the rear of the connector.

Assembly of Internal Strain Relief

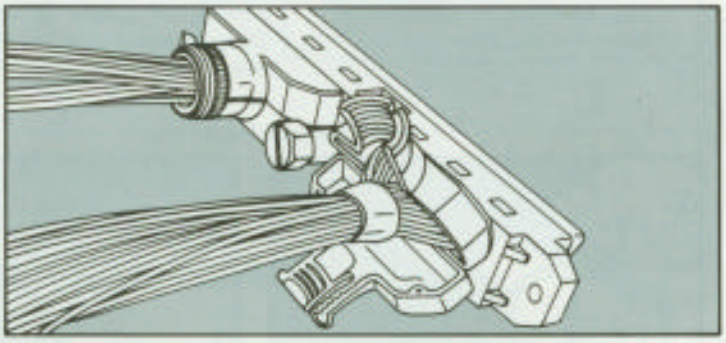
Strain reliefs, if required, may be assembled to plug or receptacle connectors which have a full complement of modules installed. The following is instruction for assembling the internal attachment strain relief, part number LMD-5300-10A (see page 9).



Tape wire bundle in area of cable clamp, and build up diameter to approx. 3/8 inches, if required. Align self-locking tines of the strain relief housing with the cavities adjacent to each module. Push the strain relief housing into place until the self-locking tines snap and lock strain relief into position. Assemble opposite half of strain relief housing to connector and tighten tie-strap to provide clamping force on the wire bundle.

Opening Strain Relief to Service Modules & Contacts

Internal attachment strain reliefs may be opened to provide module and/or contact accessibility. To service connectors, first cut and discard tie-strap on strain relief. Open strain relief halves approx. 45° each by bending along integral flexible hinge. After servicing, close strain relief halves and install and tighten new tie-strap. To completely remove strain relief from the housing in order to provide module access: first remove tie-strap, open strain relief halves 45° each, then remove module, then remove strain relief.



Assembly of External Strain Relief

External attachment strain relief, part number LMD-5300-50-A (see page 9), has a simpler procedure of assembly and removal, as follows: To attach, position the strain relief housing into slots of connector housing and the clamp bar over wires. Tighten clamp bar with screws. The cable opening can be adjusted by repositioning the clamp bar (refer to page 9 to see the variations of using this clamp bar. To disassemble, in order to service modules and contacts, simply loosen the screws of the cable clamp and remove the strain relief housing.

LMS In-Line Splice Connector
simple, low cost interconnection device

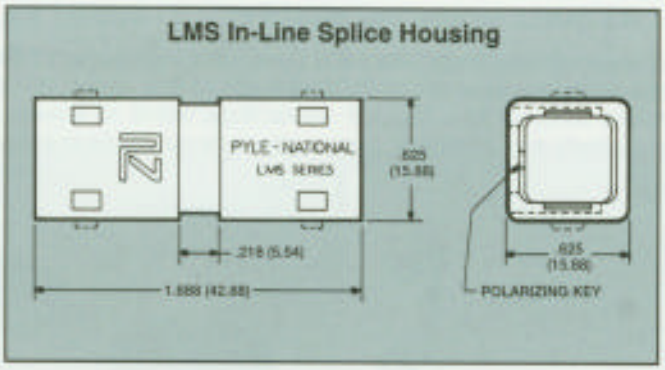
To supplement the LMD Connector family, Amphenol/Pyle offers two styles of the LMS in-line splice connector which incorporates the LMD modules and contacts.

These simple, compact, three-piece assemblies are used in the following applications:

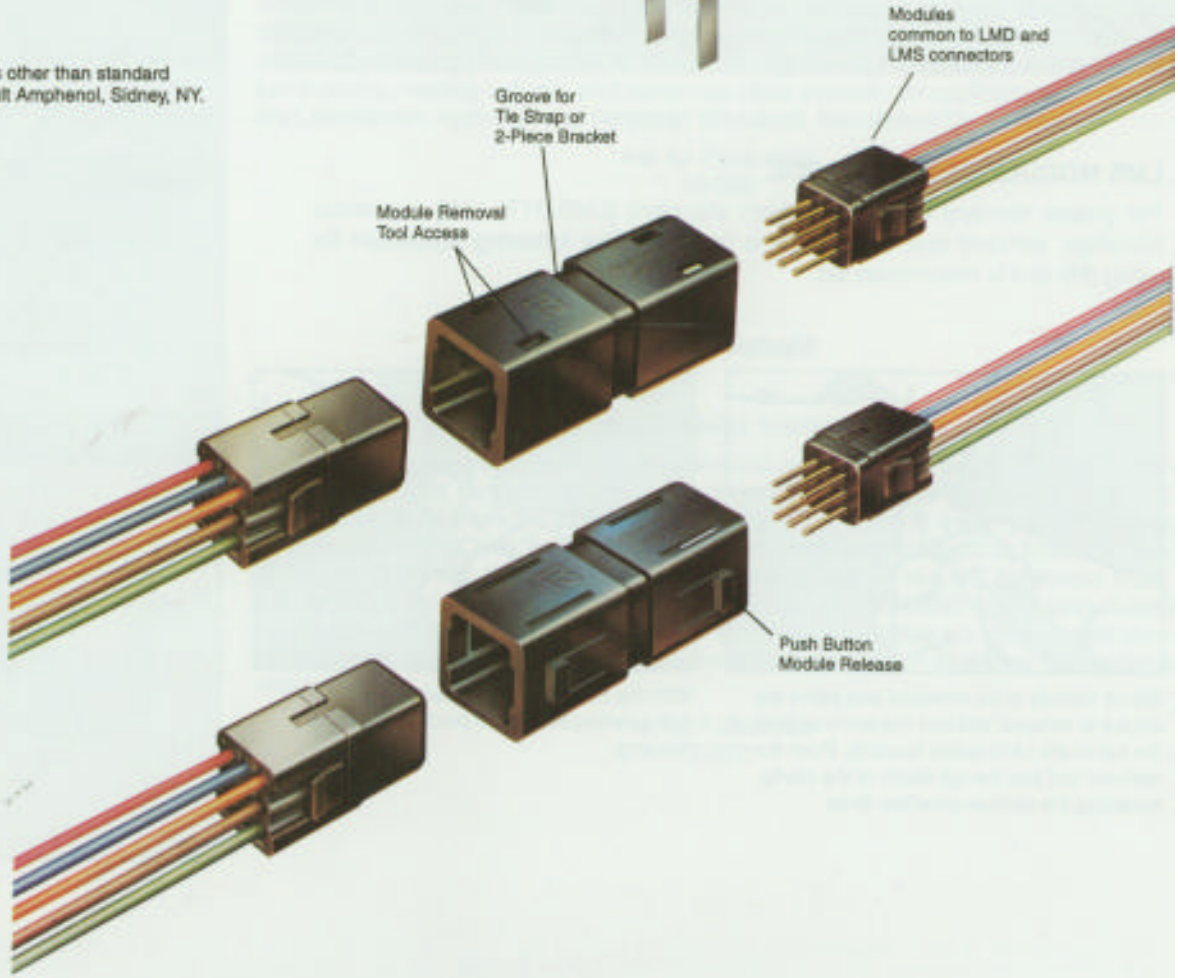
- Instrument terminations
- Wire harness terminations
- Equipment terminations
- Test points

The LMS-01T standard splice requires module removal tool TP-201399. (See page 14 for instructions on removing modules from LMS connectors). The LMS-01T-TL incorporates an integral release mechanism for easy tool-less module removal. Both types are manufactured of black thermoplastic material* and are temperature rated at –55°C to +140°C (–67°F to +284°F). Both types can be attached to panels with either a tie strap or with the LMS-B1-01 two-piece bracket which is shown on page 14.

Refer to pages 4-8 for the available modules and contact configurations that can be incorporated into LMS connectors.



* For availability of materials other than standard black thermoplastic, consult Amphenol, Sidney, NY.



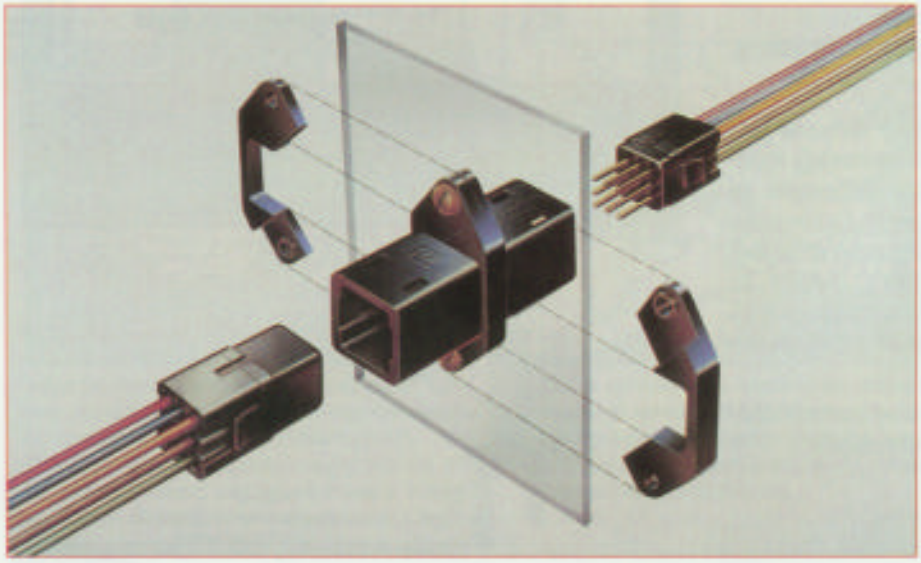
LMS-01T
Standard Splice

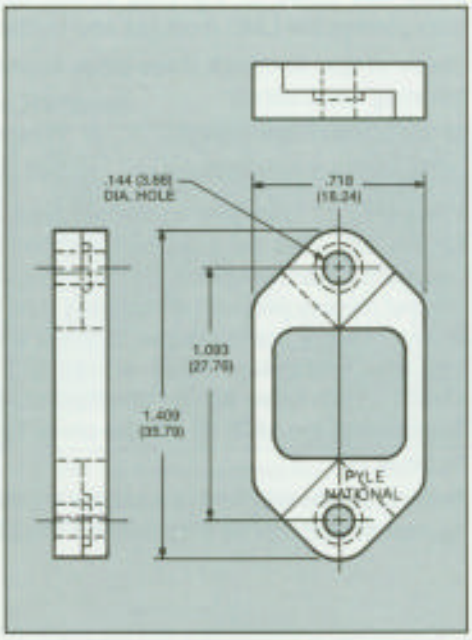
LMS-01T-TL
Double-ended
Tool-less Splice
Housing

LMS Accessories
panel mounting bracket, module removal tool/instructions

LMS PANEL MOUNTING BRACKET

For panel mounting of the LMS Connector, a two-piece bracket is available as shown below:



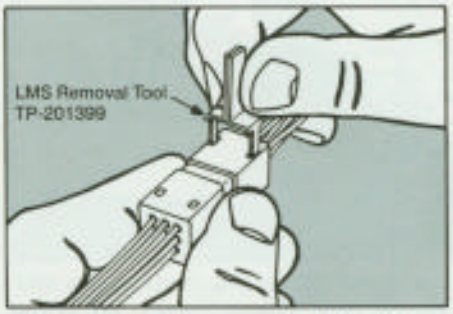


LMS MODULE REMOVAL TOOL

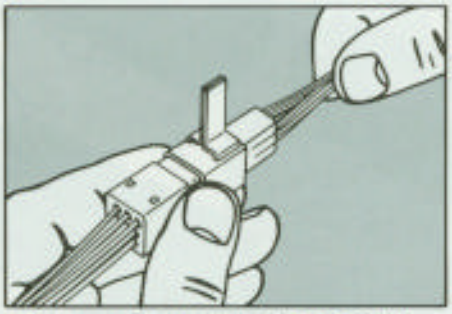
For proper removal of modules from standard (LMS-01T) LMS connector housings, removal tool TP-201399 is required. The following procedure for using this tool is recommended.

LMS MODULE REMOVAL TOOL
Part Number TP-201399

Module Removal

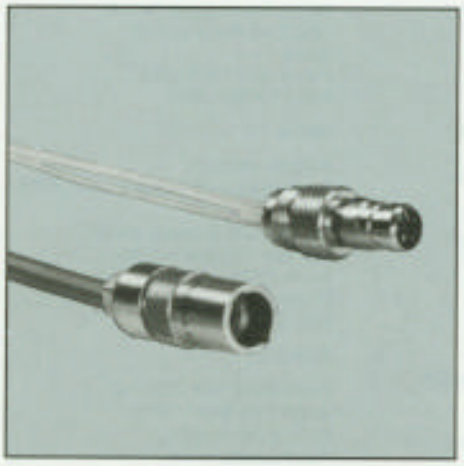


Select module to be removed and place the blades of removal tool into the removal slots at the top of the LMS splice housing. Push the removal tool into the full depth of the cavity, releasing the module retention tines.



With the module removal tool fully inserted, pull on wires to remove module from splice housing.

Other Products from Amphenol
interconnection products for aerospace and industrial applications



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Amphenol/Pyle-National® T-Line subminiatures are a push-pull, space saving connecto design utilizing MIL-C-38999 inserts and standard M39029/56,/58 series contacts. Eas ily adapted for lanyard release or in-line applications. Rugged environmental design available with stainless steel or aluminum shell with various plating options. Used in the mass transportation market.

Ask for Publication
TL-100

97 SERIES MS-A, MS-B

Low cost general duty, non-environmental MIL-C-5015 type connectors featuring hard dielectric inserts. Available in either MS-A type solid or MS-B type split shell styles with solder or crimp (rear release) terminations. This series of cylindrical connectors has threaded coupling and a single key/keyway polarization. Special plating finishes are available, including black zinc alloy. The 97 Series is used extensively in the machine tool industry, welding industry and numerous other commercial applications. Underwriters Laboratories Approved and Canadian Standards Association Certification.

Ask for Publication
12-022

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Medium size, environmental resistant cylindrical connector that is MIL-C-26482 qualified. This family of connectors, known as either PT or PC types, operates at 1000 VAC (RMS) voltage (sea level), has quick bayonet coupling, and has seven mounting styles and ten shell sizes. Other features include: crimp, solder or printed circuit board termination; sizes 12 through 20 contacts, coax and thermocouple on request. Numerous industrial plating finishes are available. Also available are hermetic seal (glass fused) receptacles with EMI protection, if required. Miniature cylindricals are used in instrumentation/control, machine tool and the geophysical industries. Underwriters Laboratories recognized.

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