HARSH ENVIRONMENTS
RATCHET COUPLING
M SERIES CONNECTOR

Rapid ratchet coupling mechanism

The M Series connector offers a new innovative design for motorsport applications and military systems. Made of high-strength aluminium, this connector is one of the lightest and most compact of the LEMO product line. A one-grip ratchet screw system enables quick and secure coupling of the connectors. The arctic grip makes it easy to manipulate the connector while wearing gloves or when the connector is located in a difficult to access area.

Features

- Ratchet-coupling mechanism
- Quick mating: 1/2 turn to seat
- Compact design for space savings
- Lightweight
- Oil and fuel resistant
- High vibration and shock resistance
- 360° screening for full EMC shielding
- Sealed to IP68 when mated
- Colour coding / keying
- Requires 1.5x the coupling force to unmate
- Scoop proof
- Reverse sex configuration

Technical Characteristics

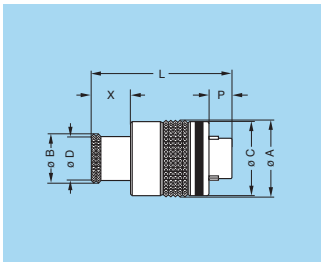
Characteristics	Value	Standard
Endurance	3000 cycles	IEC 60512-5 test 9a
Operating temperature (mated)	-55°C/+200°C	–
Resistance to vibration	10-2000Hz, 15g	IEC 60512-4 test 6d
Shock resistance	satisfied	EIA-364-27
Salt spray corrosion test[2)]	tbc	IEC 60512-6 test 11f
Protection index (at 2m, 15 hr.)	IP68	IEC 60529
Gunfire vibration	satisfied	MIL STD-810-E
Lightning test	satisfied	EIA-364-75
Acceleration	satisfied	MIL STD-1344 (2011-1)

Material and treatment

Characteristics	Value	Surface treatment
Outershell, coupling nut	Aluminium (AA 6262A)	Ni (5 µm)[1)]
Earthing crown	Bronze (UNS C 54400)	Au (1.5 µm)
Ratchet	PEEK graphite	–
Insulator	PEEK	–
Contacts	Brass/Bronze	Ni (3 µm) + Au (1.5 µm)
Gaskets	FPM + FVMQ	–
Sealing resin	Epoxy	–

Note: 1) Anthracite colour. 2) Recommended chrome plated brass shell.

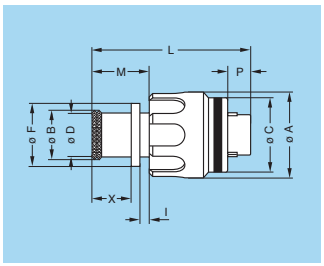
Models



FM• Straight plug, key (N) or keys (P and U) with knurled grip

Reference		Dimensions (mm)							Weight max (g)
Model	Series	A	B	C	D	L	P	X	
FM•	0M	13.1	8.8	12.7	8.0	24.1	4.0	6.7	4.3
FM•	1M	14.6	10.5	14.2	9.7	24.1	4.0	6.7	5.6
FM•	2M	17.6	14.0	17.2	13.0	24.5	4.0	7.1	8.5

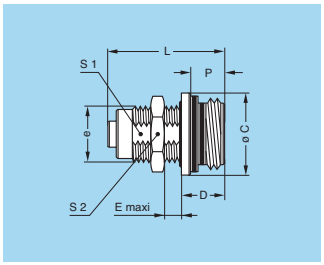
Part number example: FMN.1M.305.XLC



FG• Straight plug, key (N) or keys (P and U) with arctic grip and optional mold stop

Reference		Dimensions (mm)										Weight max (g)
Model	Series	A	B	C	D	F	I	L	M	P	X	
FG•	0M	14.4	8.8	12.7	8.0	10.7	1.5	27.1	9.7	4.0	6.7	4.4
FG•	1M	15.9	10.5	14.2	9.7	12.4	1.5	27.1	9.7	4.0	6.7	5.8
FG•	2M	18.9	14.0	17.2	13.0	15.5	1.5	27.5	10.1	4.0	7.1	7.4

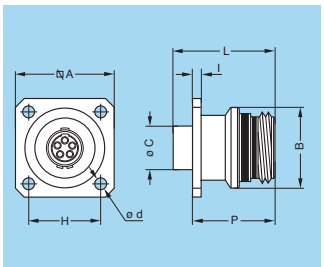
Part number example: FGN.1M.305.XLCT



EG• Fixed socket, nut fixing, key (N) or keys (P and U)

Reference		Dimensions (mm)								Weight max (g)
Model	Series	C	D	e	E	L	P	S1	S2	
EG•	0M	12.7	6.8	M9x0.6	5.0	18.1	5.3	8.2	11.0	2.7
EG•	1M	14.2	6.8	M11x1.0	4.5	18.1	5.3	9.5	13.0	3.3
EG•	2M	17.2	6.8	M14x1.0	4.5	18.1	5.3	12.5	17.0	4.5

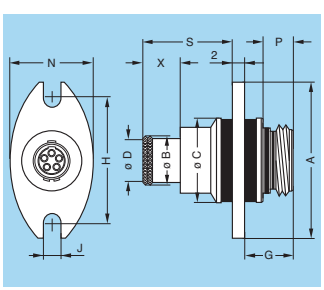
Part number example: EGN.1M.305.XLM



ED• Fixed socket with square flange, key (N) or keys (P and U)

Reference		Dimensions (mm)								Weight max (g)
Model	Series	A	B	C	d	H	I	L	P	
ED•	0M	16.0	12.7	4.7	2.7	11.0	1.5	18.5	14.3	3.7
ED•	1M	18.4	14.2	6.0	3.3	12.9	1.5	18.5	14.3	4.8
ED•	2M	20.6	17.2	9.0	3.3	15.1	1.5	18.5	14.3	7.7

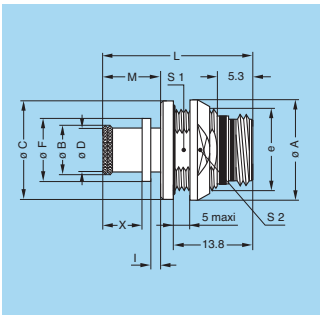
Part number example: EDN.1M.305.XLM



PB• Fixed socket with antivibration flange, key (N) or keys (P and U), 2 holes fixing

Reference		Dimensions (mm)										
Model	Series	A	B	C	D	G	H	J	N	P	S	X
PB•	0M	27.0	8.8	14.5	8.0	8.3	21.4	3.3	16.0	5.3	15.3	6.7
PB•	1M	29.0	10.5	16.5	9.7	8.3	23.4	3.3	18.0	5.3	15.3	6.7
PB•	2M	32.0	14.0	19.5	13.0	8.3	26.4	3.3	21.0	5.3	15.7	7.1

Part number example: PBN.1M.305.XLM

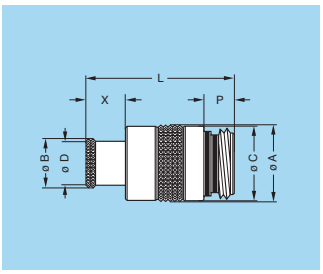


PE• Fixed socket, nut fixing, key (N) or keys (P and U) and mold stop (back panel mounting)

Reference		Dimensions (mm)										
Model	Series	A	B	C	D	e	F	L	M	S1	S2	X
PE•	0M	17	8.8	16.8	8.0	M13x0.75	10.7	25.6	9.7	11.5	14	6.7
PE•	1M	18	10.5	17.8	9.7	M14x1.00	12.4	25.6	9.7	12.5	16	6.7
PE•	2M	21	14.0	20.8	13.0	M17x1.00	15.5	26.0	10.1	15.5	18	7.1

Note: the dimension «l» is the same as the FG• models.
This model is only available with mold stop.

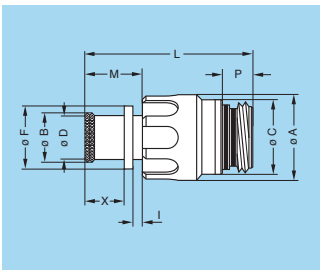
Part number example: PEN.1M.305.XLMT



PM• Free socket, key (N) or keys (P and U) with knurled grip

Reference		Dimensions (mm)						
Model	Series	A	B	C	D	L	P	X
PM•	0M	13.1	8.8	12.7	8.0	25.6	5.3	6.7
PM•	1M	14.6	10.5	14.2	9.7	25.6	5.3	6.7
PM•	2M	17.6	14.0	17.2	13.0	26.0	5.3	7.1

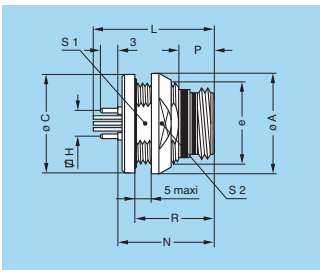
Part number example: PMN.1M.305.XLM



PH• Free socket, key (N) or keys (P and U) with arctic grip and optional mold stop

Reference		Dimensions (mm)									
Model	Series	A	B	C	D	F	I	L	M	P	X
PH•	0M	14.4	8.8	12.7	8.0	10.7	1.5	28.6	9.7	5.3	6.7
PH•	1M	15.9	10.5	14.2	9.7	12.4	1.5	28.6	9.7	5.3	6.7
PH•	2M	18.9	14.0	17.2	13.0	15.5	1.5	29.0	10.1	5.3	7.1

Part number example: PHN.1M.305.XLMT



HE• Fixed socket, nut fixing, key (N) or keys (P and U) for printed circuit, watertight (back panel mounting)

Reference		Dimensions (mm)								
Model	Series	A	C	e	H	L	N	P	R	S1	S2
HE•	0M	17.0	16.8	M13x0.75	5.08	20.8	16.8	5.3	13.8	11.5	14.0
HE•	1M	18.0	17.8	M14x1.00	7.62	20.8	16.8	5.3	13.8	12.5	16.0
HE•	2M	21.0	20.8	M17x1.00	8.89	20.8	16.8	5.3	13.8	15.5	18.0

Part number example: HEN.1M.305.XLNP

Part Numbering System

FM | N | . | 1M | . | 307 | . | X | L | C | T

Model

Keyway (color code):
N = blue (standard)
P = yellow
U = green
S = red (inverted contacts)
T = orange (inverted contacts)

Series: 0M to 2M

Variant: T = Mold stop, P = Potted

Contact type:
C = Male to crimp
M = Female to crimp
N = Female to print
D = Male to print

Insert configuration

Part Number Example
FMN.1M.307.XLCT = Straight plug with key (N), 1M series, multipole type with 7 male crimp contacts, with mold stop.

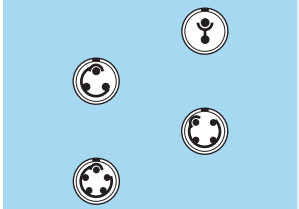
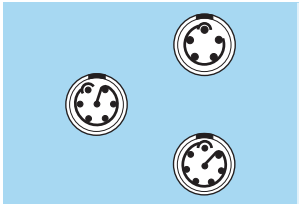
Alignment Key and Polarized Keying System

M series connector model part numbers are composed of three letters. The LAST LETTER indicates the keys corresponding to a particular contact type. Straight plugs with N, P or U keys, are fitted with male contacts. Straight plugs with S or T keys, are fitted with female contacts.

Front view of a socket

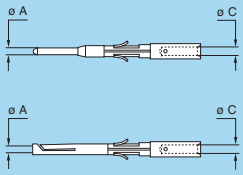
Model	Nb of keys	Series 0M to 2M Angles β	Angles γ	Colour code	Contact type Electrical Plug	Socket
●●N	3	165°	30°	blue	male	female
●●P		150°	60°	yellow		
●●U		130°	100°	green		
●●S		155°	50°	red	female	male
●●T		135°	90°	orange		

Insert configuration and electrical characteristics

	Male crimp contacts for plug	Female crimp contacts for sockets	Reference	Number of contacts	ø A (mm)	Contact type Crimp	Contact type Print (straight)[2]	AWG	Test voltage (kV rms)[1] Contact-contact	Test voltage (kV rms)[1] Contact-shell	Rated current (A)
0M			302	2	0.9	●	●	20-22-24	1.45	1.00	10.0
			303	3	0.9	●	●	20-22-24	1.70	1.40	8.0
			304	4	0.7	●	●	22-24-26	1.35	0.90	7.0
			305	5	0.7	●	●	22-24-26	1.25	1.00	6.5
1M			305	5	0.9	●	●	20-22-24	1.30	1.30	9.0
			307	7	0.7	●	●	22-24-26	1.45	1.20	7.0
			308	8	0.7	●	●	22-24-26	1.30	1.10	5.0
2M			308	8	0.9	●	●	20-22-24	1.95	1.10	10.0
			310	10	0.9	●	●	20-22-24	1.80	1.20	8.0
			312	12	0.7	●	●	22-24-26	1.65	1.15	7.0
			319	19	0.7	●	●	22-24-26	1.20	1.00	4.0

Note: 1) Test voltage according to IEC 60512-2 test 4a. 2) For HE• socket.

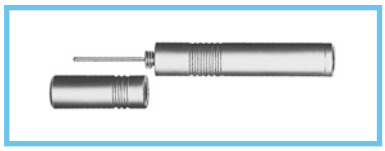
Accessories



FGN-EGN Crimp contacts

Connector Series	Connector Type	Contact ø ø A	Contact ø ø C	Conductor AWG min	AWG max	Section (mm2) min.	Section (mm2) max	Part number male for plug	Part number female for socket
0M	302-303	0.9	1.10	24	20	0.25	0.50	FGN.0M.560.ZZC	EGN.0M.660.ZZM
	304-305	0.7	0.87	26	22	0.14	0.34	FGN.0M.555.ZZC	EGN.0M.655.ZZM
1M	305	0.9	1.10	24	20	0.25	0.50	FGN.0M.560.ZZC	EGN.0M.660.ZZM
	307-308	0.7	0.87	26	22	0.14	0.34	FGN.0M.555.ZZC	EGN.0M.655.ZZM
2M	308-310	0.9	1.10	24	20	0.25	0.50	FGN.0M.560.ZZC	EGN.0M.660.ZZM
	312-319	0.7	0.87	26	22	0.14	0.34	FGN.0M.555.ZZC	EGN.0M.655.ZZM

DCF Extractors for crimp contacts



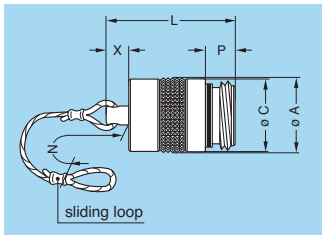
Contact ø	Extractors part number
0.9	DCF.93.090.4LT
0.7	DCF.93.070.4LT

Note: this model is used for male and female contacts.

Heatshrink boot

Supplier	Part Number		Note	Cable ø (mm)	
	Straight	Elbow 90°		min.	max
Raychem®	202 A 111-25/86	222 A 111-25/86	1)	3.8	11
	202 A 111-25	222 A 111-25	2)	3.8	11
Hellerman®	104-1-G	1108-1-G	2)	3.8	11

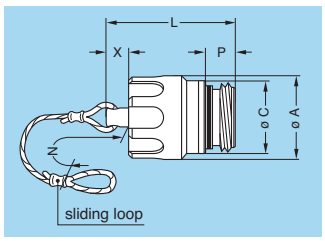
Note: 1) modified elastomer resistant to fluids with hot melt sealant.
2) elastomer resistant to fluids. We recommend a thermosetting sealant with this type of boot.



BMF Blanking caps for plugs

Part number	Dimensions (mm)					
	A	C	L	N	P	X
BMF.0M.100.XAV	13.1	12.7	24.6	85.0	5.3	6.0
BMF.1M.100.XAV	14.6	14.2	24.6	85.0	5.3	6.0
BMF.2M.100.XAV	17.6	17.2	24.6	85.0	5.3	6.0

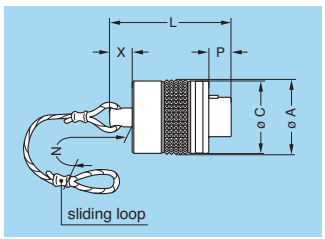
Note: this cap is suitable for use with any alignment key configuration.



BGF Blanking caps for plugs

Part number	Dimensions (mm)					
	A	C	L	N	P	X
BGF.0M.100.XAV	14.4	12.7	24.6	85.0	5.3	6.0
BGF.1M.100.XAV	15.9	14.2	24.6	85.0	5.3	6.0
BGF.2M.100.XAV	18.9	17.2	24.6	85.0	5.3	6.0

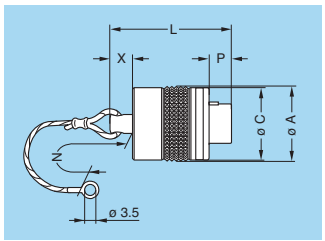
Note: this cap is suitable for use with any alignment key configuration.



BMF Blanking caps for free sockets

Part number	Dimensions (mm)					
	A	C	L	N	P	X
BMF.0M.200.XAZ	13.1	12.7	23.4	85.0	4.0	6.0
BMF.1M.200.XAZ	14.6	14.2	23.4	85.0	4.0	6.0
BMF.2M.200.XAZ	17.6	17.2	23.4	85.0	4.0	6.0

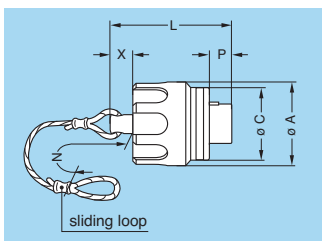
Note: this cap is suitable for use with any alignment key configuration.



BME Blanking caps for fixed sockets

Part number	Dimensions (mm)					
	A	C	L	N	P	X
BME.0M.200.XAZ	13.1	12.7	23.4	85.0	4.0	6.0
BME.1M.200.XAZ	14.6	14.2	23.4	85.0	4.0	6.0
BME.2M.200.XAZ	17.6	17.2	23.4	85.0	4.0	6.0

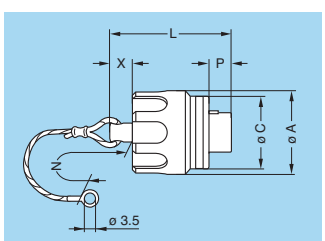
Note: this cap is suitable for use with any alignment key configuration.



BGF Blanking caps for free sockets

Part number	Dimensions (mm)					
	A	C	L	N	P	X
BGF.0M.200.XAZ	14.4	12.7	23.4	85.0	4.0	6.0
BGF.1M.200.XAZ	15.9	14.2	23.4	85.0	4.0	6.0
BGF.2M.200.XAZ	18.9	17.2	23.4	85.0	4.0	6.0

Note: this cap is suitable for use with any alignment key configuration.



BGE Blanking caps for fixed sockets

Part number	Dimensions (mm)					
	A	C	L	N	P	X
BGE.0M.200.XAZ	14.4	12.7	23.4	85.0	4.0	6.0
BGE.1M.200.XAZ	15.9	14.2	23.4	85.0	4.0	6.0
BGE.2M.200.XAZ	18.9	17.2	23.4	85.0	4.0	6.0

Note: this cap is suitable for use with any alignment key configuration.

Tooling

Male

Female

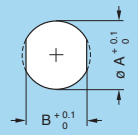
Note: These positioners are suitable for use with both manual and pneumatic crimping tools according to the MIL-C-22520/7-01 standard.

DCE Positioners for crimp contacts

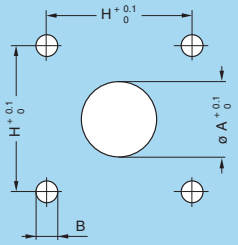
Connector		Contact ø		Postioners part number	
Series	Type	ø A	ø C	For male contacts	For female contacts
0M	302-303	0.9	1.10	DCE.91.090.5MVC	DCE.91.090.3MVM
	304-305	0.7	0.87	DCE.91.070.5MVC	DCE.91.070.3MVM
1M	305	0.9	1.10	DCE.91.090.5MVC	DCE.91.090.3MVM
	307-308	0.7	0.87	DCE.91.070.5MVC	DCE.91.070.3MVM
2M	308-310	0.9	1.10	DCE.91.090.5MVC	DCE.91.090.3MVM
	312-319	0.7	0.87	DCE.91.070.5MVC	DCE.91.070.3MVM

Panel cut-outs

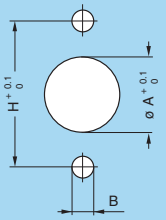
EG•-HE•-PE•



ED•



PB•



Cut-outs

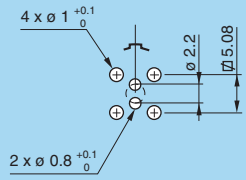
Series	Models											
	EG•		HE•		PE•		ED•			PB•		
	ø A	B	ø A	B	ø A	B	ø A	B	H	ø A	B	H
0M	9.1	8.3	13.1	11.6	13.1	11.6	5.1	M2.5	11.0	14.8	M3.0	21.4
1M	11.1	9.6	14.1	12.6	14.1	12.6	6.1	M3.0	12.9	16.8	M3.0	23.4
2M	14.1	12.6	17.1	15.6	17.1	15.6	9.1	M3.0	15.1	19.8	M3.0	26.4

Mounting nut torque (on panel)

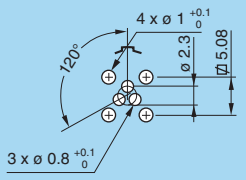
Series	Torque (N.m)
0M	1.0
1M	1.5
2M	2.0

PCB drilling pattern (HE•)

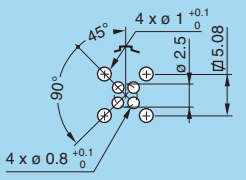
0M.302



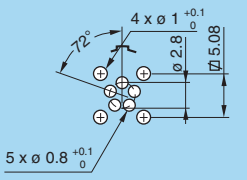
0M.303



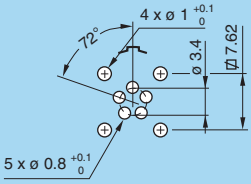
0M.304



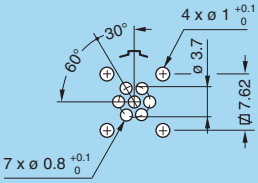
0M.305



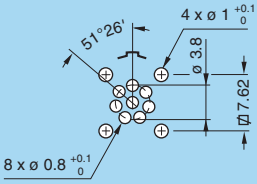
1M.305



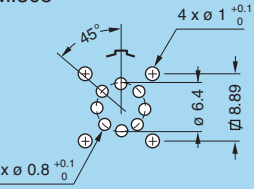
1M.307



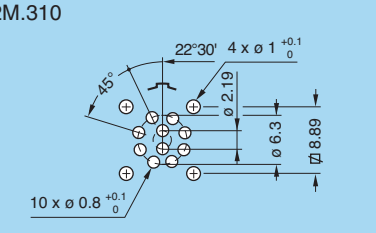
1M.308



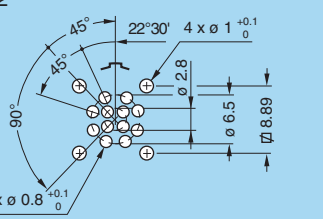
2M.308



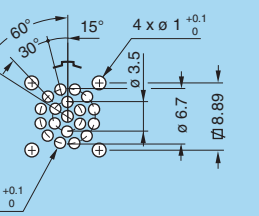
2M.310



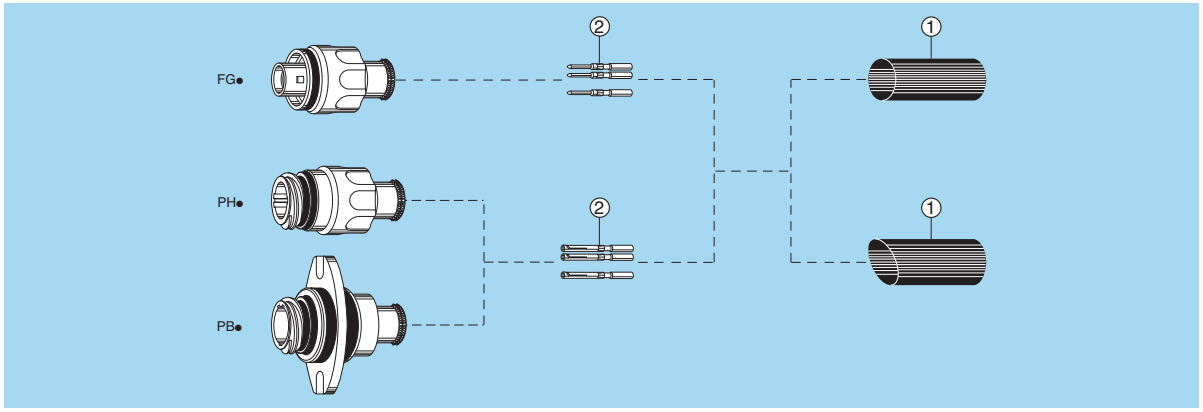
2M.312

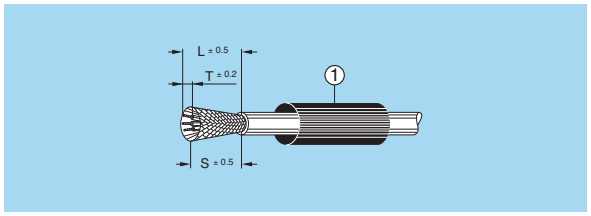


2M.319



Assembly instructions for plugs and sockets



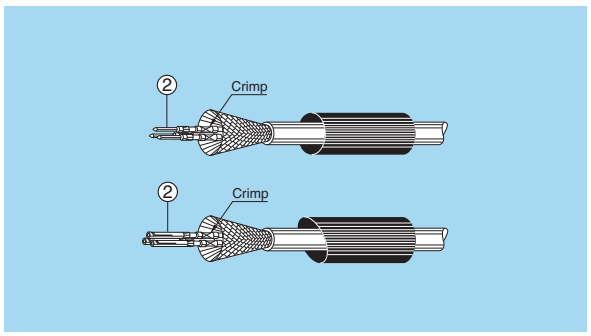


1. Cable preparation

First place the heatshrink boot ① over the cable. Strip the cable according to dimensions of the table, then widen the shield.

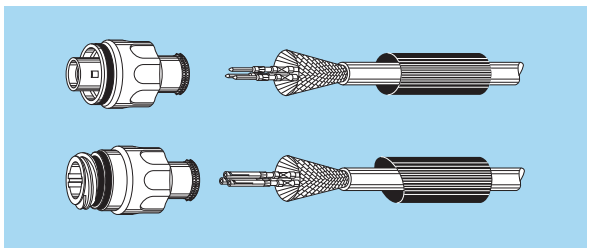
Series	L	S	T
0M	20	15	3.5
1M	20	15	3.5
2M	20	15	3.5

Note: dimensions are in mm.

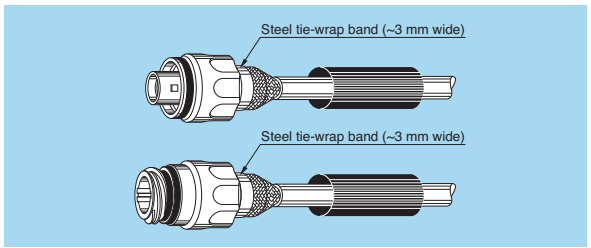


2. Cable termination

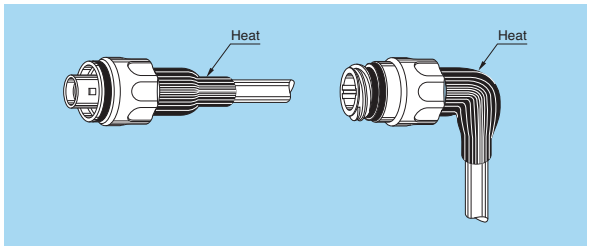
2.1 With shielded cables, widen and pull the shield all the way to the back.
Fix the appropriate positioner onto the crimping tool and set the selector to the number corresponding to the AWG of the conductor used as indicated on the positioner label. Fit the conductor into the contact ②; make sure it is visible through the contact's inspection hole.
Slide the conductor-contact assembly into the open crimping tool; make sure that the contact is pushed fully into the positioner. Close the tool.
Remove from crimping tool and check that conductor is secure in contact and shows in inspection hole.



2.2 Arrange the conductor-contact assemblies according to the markings, into the rear cable seal. Push them deeply into the insulator, using tweezers if necessary; check that all the contacts are correctly located in the insulator: 1) by verifying the alignment of the contacts at the front of the insulator and 2) by gently pulling on each conductor. Verification should also be made using the appropriate retention testing tool.

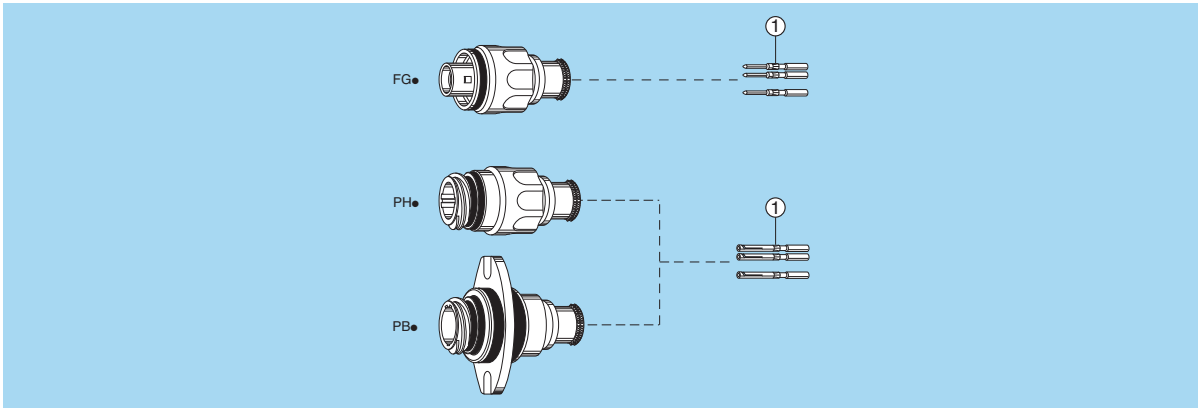


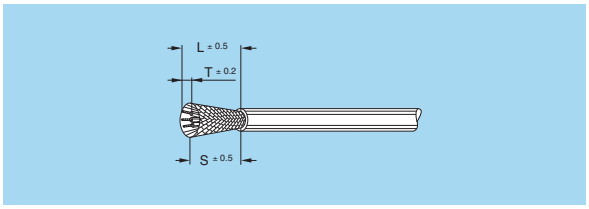
2.3 Bring the shield around the rear of connector. Secure it with a band-it tie-wrap (not furnished) to fix the shield in place. Cut off the possible shield surplus.



2.4 Put the heatshrink boot in place and heat gently until it retracts.

Assembly instructions for plugs and sockets (with optional mold stop)



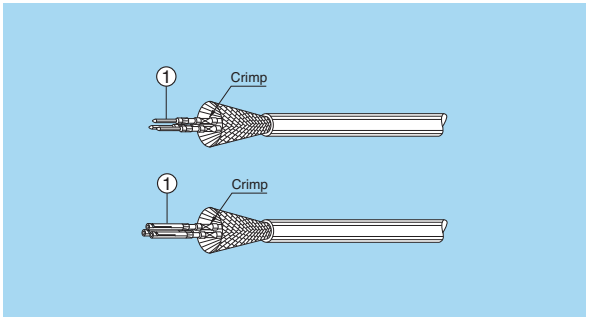


1. Cable preparation

Strip the cable according to dimensions of the table, then widen the shield.

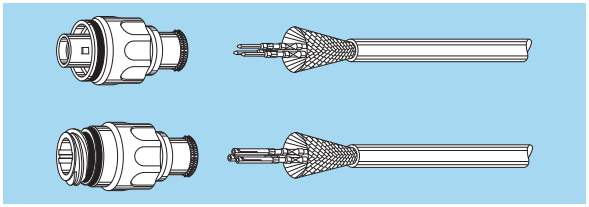
Series	L	S	T
0M	20	15	3.5
1M	20	15	3.5
2M	20	15	3.5

Note: dimensions are in mm.

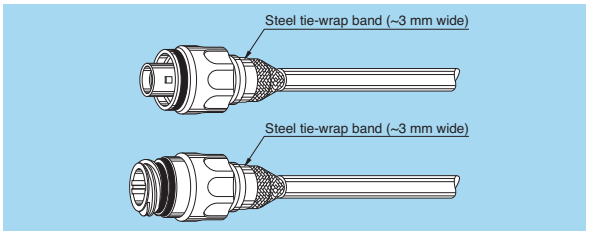


2. Cable termination

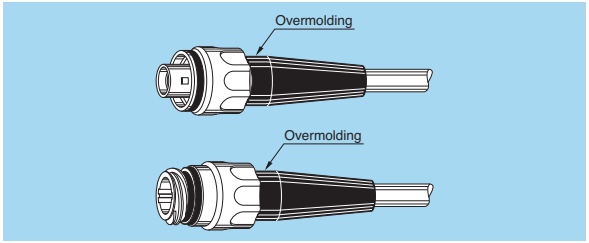
2.1 With shielded cables, widen and pull the shield all the way to the back.
Fix the appropriate positioner onto the crimping tool and set the selector to the number corresponding to the AWG of the conductor used as indicated on the positioner label. Fit the conductor into the contact ①; make sure it is visible through the contact's inspection hole.
Slide the conductor-contact assembly into the open crimping tool; make sure that the contact is pushed fully into the positioner. Close the tool.
Remove from crimping tool and check that conductor is secure in contact and shows in inspection hole.



2.2 Arrange the conductor-contact assemblies according to the markings, into the rear cable seal. Push them deeply into the insulator, using tweezers if necessary; check that all the contacts are correctly located in the insulator: 1) by verifying the alignment of the contacts at the front of the insulator and 2) by gently pulling on each conductor. Verification should also be made using the appropriate retention testing tool.



2.3 Bring the shield around the rear of connector until the mold stop. Secure it with a band-it tie-wrap (not furnished) to fix the shield in place.
Cut off the possible shield surplus.



2.4 Custom overmold cable assembly.

LEMO HEADQUARTERS

SWITZERLAND
LEMO SA
Chemin des Champs-Courbes 28 - P.O. Box 194 - CH-1024 Ecublens
Tel. (+41 21) 695 16 00 - Fax (+41 21) 695 16 02 - e-mail: info@lemo.com

www.lemo.com

CHF 1.50 / EURO 1 / USD 1.1 / RMB 10

Data subject to change, printed in Switzerland, May 2009
Updated, February 2011