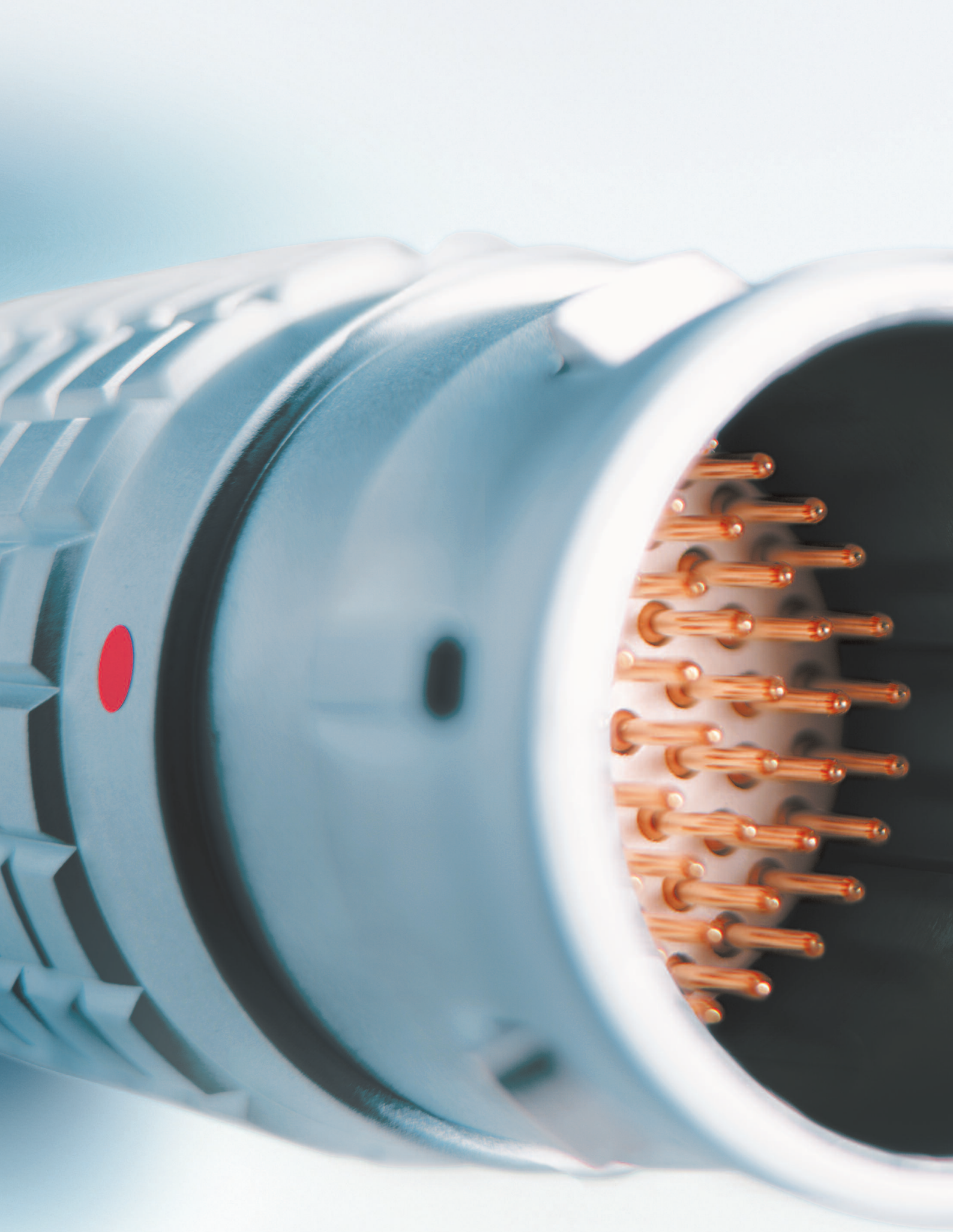
UNIPOLE & MULTIPOLE CONNECTORS

LEMO®



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LEMO unipole and multipole connectors

This catalogue gives the complete description of LEMO unipole and multipole type connectors. The LEMO manufacturing programme has been extended to almost 40 series divided into 7 product families with specific mating and environmental characteristics. Each series includes a wide variety of plug, socket, coupler and bridge plug models, available in contact configurations adapted to all round cables, including up to 114 conductors, and a maximum diameter of 30 mm. Watertight and vacuumtight models are also available. Since LEMO connectors are perfectly screened and designed to guarantee very low resistance to shell electrical continuity, they are particularly adapted to applications where electromagnetic compatibility (EMC) is important.

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Precision modular connectors to suit your application

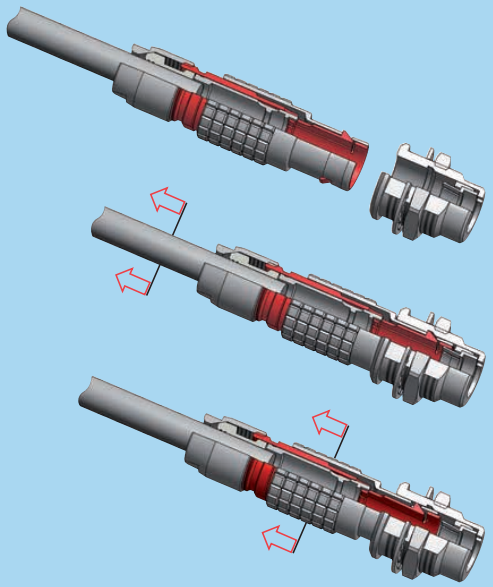
Since its creation in Switzerland in 1946 the LEMO Group has been recognized as a global leader of circular Push-Pull connectors and connector solutions. Today LEMO and its affiliated companies, REDEL and COELVER, are active in more than 80 countries with the help of over 40 subsidiaries and distributors.

Over 90000 connectors

The modular design of the LEMO range provides over 90000 connectors from miniature ø 3 mm to ø 50 mm, capable of handling cable diameters up to 30 mm and for up to 114 contacts. This vast portfolio enables you to select the ideal connector configuration to suit almost any specific requirement in most markets, including medical devices, test and measurement instruments, machinery, audio video broadcast, telecommunications and military.

LEMO's Push-Pull Self-Latching Connection System

This self-latching system is renowned worldwide for its easy and quick mating and unmating features. It provides absolute security against vibration, shock or pull on the cable, and facilitates operation in a very limited space.



The LEMO self-latching system allows the connector to be mated by simply pushing the plug axially into the socket.

Once firmly latched, connection cannot be broken by pulling on the cable or any other component part other than the outer release sleeve.

When required, the connector is disengaged by a single axial pull on the outer release sleeve.
This first disengages the latches and then withdraws the plug from the socket.

UL Recognition

LEMO connectors are recognized by the Underwriters Laboratories (UL). The approval of the complete system (LEMO connector, cable and your equipment) will be easier because LEMO connectors are recognized.

CE marking CE

CE marking CE means that the appliance or equipment bearing it complies with the protection requirements of one or several European safety directives. CE marking CE applies to complete products or equipment, **but not to electromechanical components, such as connectors**.

RoHS

LEMO connector specifications conforms the requirements of the RoHS directive (2011/65/EU) of the European Parliament and the latest amendments. This directive specifies the restrictions of the use of hazardous substances in electrical and electronic equipment marketed in Europe.

Product safety notice & disclaimers

Please read and follow all instructions specified on the last page or on our website carefully and consult all relevant national and international safety regulations for your application. Improper handling, cable assembly, or wrong use of connectors can result in hazardous situations.

LEMO products and services are provided "as is." LEMO makes no warranties or representations with regard to LEMO product & services or use of them, express, implied or statutory, including for accuracy, completeness, or security.

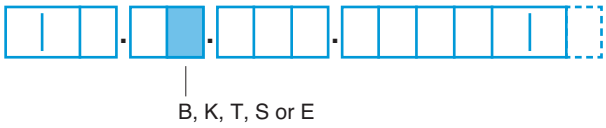
In no event shall LEMO be liable for any direct, indirect, punitive, incidental, special consequential damages, to property or life, whatsoever arising out of or connected with the use or misuse of LEMO's products.

3 steps to select the right connector

Step 1: Select connector series

Select the appropriate LEMO connector series according to the environmental parameters that will affect your device or cable such as indoor, outdoor, temperature range, ingress protection of the mated connector and of your device. Use the table shown on page 4.

Part number coding

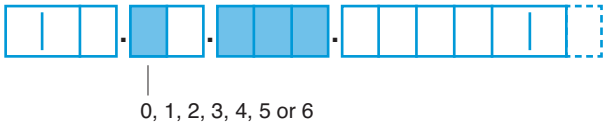


Step 2: Select connector size

Use the section (mm²) or the AWG of your cable wire to select the optimal contact diameter (values vary between solder, crimp or print contact), see page 8.

Use this optimal contact diameter to determine the right connector size as well as the insert configuration, see page 6.

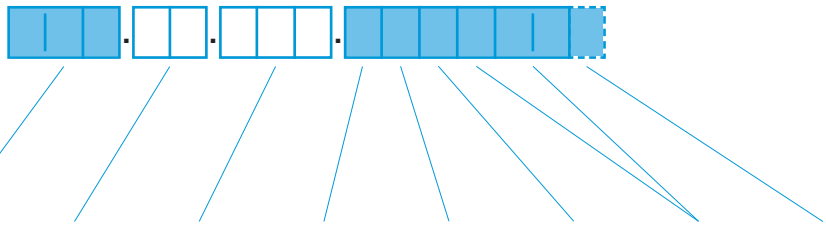
Part number coding



Step 3: Complete the part number

Now that you know the series, as well as the insulator configuration, complete the part numbering system with the help of the following table.

Part number coding



	Model	Series	Insert configuration	Housing material	Insulator material	Contact	Collet	Variant
B Series (indoor, keyed)	14	14	57	64	64	64	67	71
K Series (outdoor, keyed)	39	39	57	64	64	64	68	71
T Series (outdoor, keyed)	53	53	57	64	64	64	70	71
S Series (indoor, stepped insert)	76	76	103	112	112	112	115	121
E Series (outdoor, stepped insert)	95	95	103	112	112	112	119	121

Note: Figures in the above table refer to the catalogue pages.

Step 1: Select Connector Series

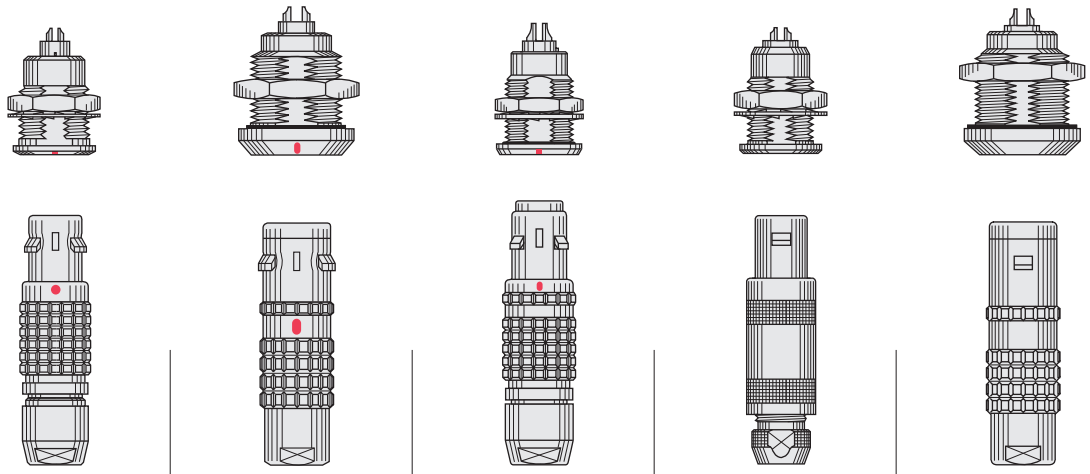
LEMO unipole and multipole connectors

The standard keyed Series (B, 00)
The characteristic feature of these connector series is a keying system which allows higher contact density and prevents all errors in alignment. The various keying alternatives prevent unwanted cross mating of otherwise similar connectors. It is also possible to use crimp contacts to reduce cable assembly time. These connector series, include the 0B to 5B range as well as the 00 multipole, some vacuumtight models are also available.

The watertight keyed Series (K, T)
These series are watertight when mated and assembled to an appropriate cable. They include the 0K to 5K series and the TT to 3T series, available in the same types as the 0B to 5B series.

The standard Series (S, 00)
The characteristic feature of these connector series is the hermaphroditic insulator in the multipole version. They include principally the 0S to 6S series, as well as the 00 unipole series.

The watertight Series (E)
These series are watertight when mated and assembled to an appropriate cable. They include the 0E to 6E series and are available in the same types as the S series.



Series	00 multipole B	K	T	00 unipole S	E
Environment	indoor	outdoor or harsh environment		indoor	outdoor or harsh environment
Ingress protection [1]	IP50	IP66 to IP68		IP50	IP66 to IP68
Ingress protection [2]	IP50 to IP68 vacuumtight	IP66 to IP68 vacuumtight		IP50 to IP68 vacuumtight	IP66 to IP68 vacuumtight
Temperature range	- 55 to 250°C	- 55 to 200°C		- 55 to 250°C	- 55 to 200°C
Latching	Push-Pull self-latching				
Shell sizes	8 metal and 4 plastic	6 metal	5 metal	8 metal and 5 plastic	7 metal
Insulator type	Multipole			Unipole or multipole hermaphroditic	
Contact type	Solder, crimp or print			Solder, crimp or print	
Features	13 keyways	9 keyways	4 keyways	Stepped insert	
Page	11 to 36	37 to 50	51 to 56	73 to 92	93 to 102

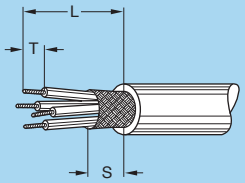
Note:
[1] Mated connector. See ingress protection code p. 5. [2] Your device. For selection of connectors for watertight and vacuumtight devices, see p. 5.

Cable stripping lengths (K series)

M1 **straight plugs and sockets with cable collet, clamping type C (solder or crimp contacts)**

M3 **elbow plug (90°) with cable collet, clamping type C (solder or crimp contacts)**

	Type	ø contact A (mm)	Cable stripping lengths (mm)											
			M1						M3					
			Solder			Crimp			Solder			Crimp		
			L	S	T	L	S	T	L	S	T	L	S	T
0K	302/303	0.9	9.5	6	3.5	12.0	6	4.0	22.5	6	3.5	25.0	6	4.0
	304/305	0.7	9.5	6	3.5	12.0	6	4.0	22.5	6	3.5	25.0	6	4.0
	306/307/309[1)]	0.5	9.0	6	2.5	13.0	6	4.0	22.0	6	2.5	26.0	6	4.0
	312	0.35	9.0	6	2.5	–	–	–	22.0	6	2.5	–	–	–
1K	302/303	1.3	11.0	7	3.5	14.5	7	4.0	27.5	7	3.5	31.0	7	4.0
	304/305	0.9	11.0	7	3.0	14.5	7	4.0	27.5	7	3.0	31.0	7	4.0
	306/307/308	0.7	11.0	7	3.0	14.5	7	4.0	27.5	7	3.0	31.0	7	4.0
	310/314/316	0.5	13.0	7	2.5	14.0	7	3.0	29.5	7	2.5	–	–	–
2K	302	2.0	16.5	8	4.0	19.5	8	5.5	36.0	8	4.0	39.0	8	5.5
	303	1.6	16.5	8	3.5	19.5	8	5.5	36.0	8	3.5	39.0	8	5.5
	304/305/306/307	1.3	15.5	8	3.5	17.5	8	4.0	35.0	8	3.5	37.0	8	4.0
	308/310	0.9	14.5	8	3.0	17.5	8	4.0	34.0	8	3.0	37.0	8	4.0
	312/314/316/318/319	0.7	14.5	8	3.0	17.5	8	4.0	34.0	8	3.0	37.0	8	4.0
	326/332	0.5	14.5	8	2.5	–	–	–	34.0	8	2.5	–	–	–
3K	302	3.0	19.0	10	4.5	23.0	10	5.5	48.0	10	4.5	53.0	10	5.5
	303/304	2.0	18.0	10	4.0	22.0	10	5.5	48.0	10	4.0	52.0	10	5.5
	305/306/307	1.6	18.0	10	3.5	22.0	10	5.5	48.0	10	3.5	52.0	10	5.5
	308/310	1.3	17.0	10	3.5	20.0	10	4.0	47.0	10	3.5	50.0	10	4.0
	309	1.3 2.0	17.0	10	3.5 4.0	20.0	10	4.0 5.5	47.0	10	3.5 4.0	50.0	10	4.0 5.5
	312/314/316/318	0.9	16.0	10	3.0	20.0	10	4.0	46.0	10	3.0	50.0	10	4.0
	320/322/324/326/330	0.7	16.0	10	3.0	20.0	10	4.0	46.0	10	3.0	50.0	10	4.0
4K	304	3.0	22.0	11	4.5	25.0	11	5.5	52.0	11	4.5	55.0	11	5.5
	306/307	2.0	21.0	11	4.0	25.0	11	5.5	51.0	11	4.0	55.0	11	5.5
	310	1.6	21.0	11	3.5	25.0	11	5.5	51.0	11	3.5	55.0	11	5.5
	312	1.3	21.0	11	3.5	25.0	11	4.0	51.0	11	3.5	55.0	11	4.0
	316/320/324/330	0.9	21.0	11	3.0	23.0	11	4.0	51.0	11	3.0	53.0	11	4.0
	340/348	0.7	21.0	11	3.0	23.0	11	4.0	51.0	11	3.0	53.0	11	4.0
5K	302	6.0	24.0	14	7.5	–	–	–	–	–	–	–	–	–
	304	4.0	29.0	14	5.5	32.0	14	7.0	–	–	–	–	–	–
	310	3.0	29.0	14	4.5	32.0	14	7.0	–	–	–	–	–	–
	314/316	2.0	28.0	14	4.0	31.0	14	5.5	–	–	–	–	–	–
	320	1.6	28.0	14	3.5	31.0	14	5.5	–	–	–	–	–	–
	330/340/348	1.3	27.0	14	3.5	30.0	14	4.0	–	–	–	–	–	–
	350/354/364	0.9	27.0	14	3.0	30.0	14	4.0	–	–	–	–	–	–

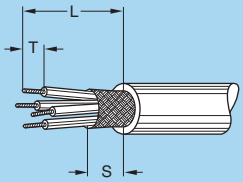


Note: [1)] crimp contacts are available only for connectors fitted with male contacts. The tolerances on these dim. are: L: ± 0.5 mm; S: ± 0.5 mm; T: ± 0.2 mm.

Cable stripping lengths (K series)

M2 **straight plug and socket with oversize cable collet, clamping type K (solder or crimp contacts)**

	Type	ø contact A (mm)	Cable stripping lengths (mm) M2 Solder L	Solder S	Solder T	Crimp L	Crimp S	Crimp T
1K	302/303	1.3	23.5	8	3.5	27.5	8	4.0
	304/305	0.9	23.5	8	3.0	27.5	8	4.0
	306/307/308	0.7	23.5	8	3.0	27.5	8	4.0
	310/314/316	0.5	24.5	8	2.5	–	–	–
2K	302	2.0	29.5	10	4.0	32.5	10	5.5
	303	1.6	29.5	10	3.5	32.5	10	5.5
	304/305/306/307	1.3	28.5	10	3.5	30.5	10	4.0
	308/310	0.9	27.5	10	3.0	30.5	10	4.0
	312/314/316/318/319	0.7	27.5	10	3.0	30.5	10	4.0
	326/332	0.5	27.5	10	2.5	–	–	–
3K	302	3.0	37.0	11	4.5	41.0	11	5.5
	303/304	2.0	36.0	11	4.0	40.0	11	5.5
	305/306/307	1.6	36.0	11	3.5	40.0	11	5.5
	308/310	1.3	35.0	11	3.5	38.0	11	4.0
	309	1.3 2.0	35.0	11	3.5 4.0	38.0	11	4.0 5.5
	312/314/316/318	0.9	34.0	11	3.0	38.0	11	4.0
	320/322/324/326/330	0.7	34.0	11	3.0	38.0	11	4.0
4K	304	3.0	45.0	14	4.5	48.0	14	5.5
	306/307	2.0	44.0	14	4.0	48.0	14	5.5
	310	1.6	44.0	14	3.5	48.0	14	5.5
	312	1.3	44.0	14	3.5	48.0	14	4.0
	316/320/324/330	0.9	44.0	14	3.0	46.0	14	4.0
	340/348	0.7	44.0	14	3.0	46.0	14	4.0



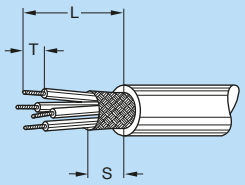
Note: the tolerances on these dim. are: L: ± 0.5 mm; S: ± 0.5 mm; T: ± 0.2 mm.

Cable stripping lengths (T series)

M1 **straight plugs and sockets with cable collet, clamping type C (solder or crimp contacts)**

M2 **straight plugs and sockets with cable collet, clamping type K (solder or crimp contacts)**

	Type	ø contact A (mm)	Cable stripping lengths (mm)											
			M1						M2					
			Solder			Crimp			Solder			Crimp		
			L	S	T	L	S	T	L	S	T	L	S	T
TT	302/303/304	0.5	10.0	4.5	2.5	13.5	4.5	3.0	–	–	–	–	–	–
	305	0.35	10.0	4.5	2.5	–	–	–	–	–	–	–	–	–
	306	0.35	11.0	4.5	2.5	–	–	–	–	–	–	–	–	–
0T	302/303	0.9	11.5	6.0	3.0	13.5	6.0	4.0	22.0	7.0	3.0	24.0	7.0	4.0
	304/305	0.7	11.5	6.0	3.0	13.5	6.0	4.0	22.0	7.0	3.0	24.0	7.0	4.0
	306/307/309[1)]	0.5	10.5	6.0	2.5	14.0	6.0	3.0	21.0	7.0	2.5	24.5	7.0	3.0
	312	0.35	10.5	6.0	2.5	–	–	–	21.0	7.0	2.5	–	–	–
1T	302/303	1.3	12.0	8.0	3.5	14.0	8.0	4.0	26.0	8.5	3.5	28.0	8.5	4.0
	304/305	0.9	11.5	8.0	3.0	14.0	8.0	4.0	26.0	8.5	3.0	28.5	8.5	4.0
	306/307/308	0.7	11.5	8.0	3.0	14.0	8.0	4.0	26.0	8.5	3.0	28.5	8.5	4.0
	310/314/316	0.5	11.5	8.0	2.5	15.0	8.0	3.0	25.5	8.5	2.5	29.0	8.5	3.0
2T	302	2.0	16.0	9.5	4.0	19.0	9.5	5.5	30.0	9.0	4.0	33.0	9.0	5.5
	303	1.6	16.0	9.5	3.5	19.0	9.5	5.5	30.0	9.0	3.5	33.0	9.0	5.5
	304/305/306/307	1.3	16.0	9.5	3.5	19.0	9.5	4.0	30.0	9.0	3.5	33.0	9.0	4.0
	308/310	0.9	16.0	9.5	3.0	19.0	9.5	4.0	30.0	9.0	3.0	33.0	9.0	4.0
	312/314/316/318/319	0.7	16.0	9.5	3.0	19.0	9.5	4.0	30.0	9.0	3.0	33.0	9.0	4.0
	326/332	0.5	16.0	9.5	2.5	–	–	–	30.0	9.0	2.5	–	–	–
3T	302	3.0	20.5	11.0	4.5	23.5	11.0	7.0	40.5	13.0	4.5	43.5	13.0	7.0
	303/304	2.0	20.5	11.0	4.0	23.5	11.0	5.5	40.5	13.0	4.0	43.5	13.0	5.5
	305/306/307	1.6	20.5	11.0	3.5	23.5	11.0	5.5	40.5	13.0	3.5	43.5	13.0	5.5
	308/310	1.3	20.5	11.0	3.5	23.5	11.0	4.0	40.5	13.0	3.5	43.5	13.0	4.0
	309	1.3 2.0	20.5	11.0	3.5 4.0	23.5	11.0	4.0 5.5	40.5	13.0	3.5 4.0	43.5	13.0	4.0 5.5
	312/314/316/318	0.9	20.5	11.0	3.0	23.5	11.0	4.0	40.5	13.0	3.0	43.5	13.0	4.0
	320/322/324/326/330/332	0.7	20.5	11.0	3.0	23.5	11.0	4.0	40.5	13.0	3.0	43.5	13.0	4.0



Note:
[1)] crimp contacts are available only for connectors fitted with male contacts. The tolerances on these dim. are: L: ± 0.5 mm; S: ± 0.5 mm; T: ± 0.2 mm.

Cable stripping lengths for unipole connectors (S series)

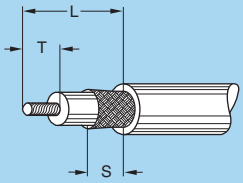
M1 **straight plugs and sockets with cable collet, clamping type C (solder contacts)**

M3 **elbow plugs (90°) with cable collet, clamping type C (solder contacts)**

M5 **straight plugs and sockets with cable crimping type E (crimp contacts)**

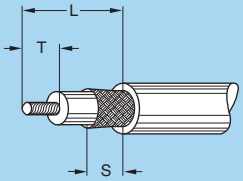
M6 **elbow plugs (90°) with cable crimping type E (crimp contacts)**

	Type	ø contact A (mm)	Cable stripping lengths (mm)											
			M1			M5			M3			M6		
			Solder			Crimp			Solder			Crimp		
			L	S	T	L	S	T	L	S	T	L	S	T
00	113	1.3	9	4	4	19	5	7	7	4	2	17	5	7
0S	116	1.6	11	5	4	–	–	–	8	5	2	–	–	–
1S	120	2.0	13	8	5	–	–	–	13	8	2	–	–	–
	130	3.0	13	8	5	–	–	–	13	8	2	–	–	–
2S	130	3.0	18	9	6	–	–	–	15	9	2	–	–	–
	140	4.0	18	9	6	–	–	–	15	9	2	–	–	–
3S	140	4.0	21	9	7	–	–	–	19	9	2	–	–	–
	160	6.0	21	9	9	–	–	–	19	9	2	–	–	–
4S	140	4.0	25	9	7	–	–	–	23	9	2	–	–	–
	160	6.0	25	9	9	–	–	–	23	9	2	–	–	–
5S	112	12.0	12	15	12	–	–	–	–	–	–	–	–	–



M2 **straight plugs and sockets with oversize cable collet, clamping type K (solder contacts)**

	Type	ø contact A (mm)	Cable stripping lengths (mm)		
			M2		
			Solder		
			L	S	T
00	113	1.3	16	4	4
0S	116	1.6	19	5	4
1S	120	2.0	25	8	5
	130	3.0	25	8	5
2S	130	3.0	34	9	6
	140	4.0	34	9	6
3S	140	4.0	39	9	7
	160	6.0	39	9	9
4S	140	4.0	50	9	7
	160	6.0	50	9	9

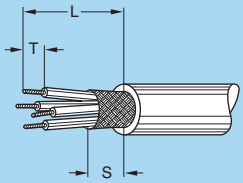


Cable stripping lengths for multipole connectors (S series)

M1 **straight plugs and sockets with cable collet, clamping type C (solder or crimp contacts)**

M3 **elbow plugs (90°) with cable collet, clamping type C (solder or crimp contacts)**

	Type	ø contact A (mm)	Cable stripping lengths (mm)											
			M1						M3					
			Solder			Crimp			Solder			Crimp		
			L	S	T	L	S	T	L	S	T	L	S	T
0S	302	0.9	10.0	5	3.5	15	5	4.0	10.0	5	3.5	15	5	4.0
	303/304	0.7	10.0	5	3.5	15	5	4.0	10.0	5	3.5	15	5	4.0
1S	302	1.3	12.5	8	3.5	17	8	4.0	14.5	8	3.5	17	8	4.0
	303/304	0.9	12.0	8	3.0	17	8	4.0	14.0	8	3.0	17	8	4.0
	305	0.9 0.7	12.0	8	3.0	17	8	4.0	14.0	8	3.0	17	8	4.0
	306	0.7	12.5	8	3.0	17	8	4.0	14.5	8	3.0	17	8	4.0
2S	302	1.6	17.0	9	3.5	22	9	5.5	17.0	9	3.5	22	9	5.5
	303/304/305/306	1.3	17.5	9	3.5	22	9	4.0	17.5	9	3.5	22	9	4.0
	307	1.3 0.9	17.5	9	3.5 3.0	22	9	4.0	17.5	9	3.5 3.0	22	9	4.0
	308/310	0.9	17.0	9	3.0	22	9	4.0	17.0	9	3.0	22	9	4.0
3S	302/303/304	2.0	20.0	9	4.0	–	–	–	–	–	–	–	–	–
	305	2.0 1.3	20.0	9	4.0 3.5	–	–	–	–	–	–	–	–	–
	306/307/308/310	1.3	20.5	9	3.5	–	–	–	–	–	–	–	–	–
	312/313/314/316/318	0.9	20.0	9	3.0	–	–	–	–	–	–	–	–	–
4S	302	4.0	25.0	9	7.0	–	–	–	–	–	–	–	–	–
	303/304	3.0	23.5	9	4.5	–	–	–	–	–	–	–	–	–
	305	3.0 2.0	23.5	9	4.5 4.0	–	–	–	–	–	–	–	–	–
	306	2.0	21.0	9	4.0	–	–	–	–	–	–	–	–	–
	307	2.0 1.3	21.0	9	4.0 3.5	–	–	–	–	–	–	–	–	–
	308/309/310/312/313/314	1.3	24.5	9	3.5	–	–	–	–	–	–	–	–	–
	316/318/320/322/324	0.9	24.5	9	3.5	–	–	–	–	–	–	–	–	–

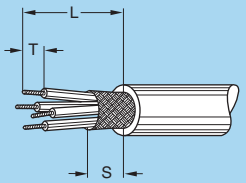


Cable stripping lengths for multipole connectors (S series)

M1 **straight plugs and sockets with cable collet, clamping type C (solder contacts)**

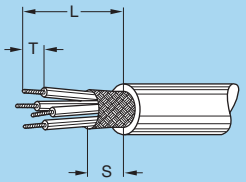
M3 **elbow plugs (90°) with cable collet, clamping type C (solder contacts)**

	Type	ø contact A (mm)	Cable stripping lengths (mm)					
			M1			M3		
			Solder			Solder		
			L	S	T	L	S	T
5S	302	6.0	33.5	22	7.5	33.5	22	7.5
	303	6.0 4.0	33.5	22	7.5 5.5	33.5	22	7.5 5.5
	304	4.0	33.5	22	5.5	33.5	22	5.5
	305	4.0 3.0	33.5	22	5.5 4.5	33.5	22	5.5 4.5
	306/308	3.0	33.5	22	4.5	33.5	22	4.5
	310/312/316	2.0	32.0	22	4.0	32.0	22	4.0
	314	3.0 2.0	33.5	22	4.5 4.0	33.5	22	4.5 4.0
	318/322	3.0 1.6	33.5	22	4.5 3.5	33.5	22	4.5 3.5
	320/324	1.6	34.0	22	3.5	34.0	22	3.5
	330/336/340/344/348	1.3	34.5	22	3.5	34.5	22	3.5
6S	304	8.0	37.0	15	10.0	37.0	15	10.0
	312/318	4.0	37.0	15	7.0	37.0	15	7.0
	320/324	3.0	37.0	15	6.0	37.0	15	6.0
	330/336/348	2.0	37.0	15	7.0	37.0	15	7.0
	360	1.6	37.0	15	4.5	37.0	15	4.5
	364/372	1.3	37.0	15	4.0	37.0	15	4.0
	106	0.9	37.0	15	4.0	37.0	15	4.0



M4 **straight plug with cable collet, clamping type D or M (solder or crimp contacts)**

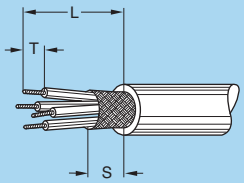
	Type	ø contact A (mm)	Cable stripping lengths (mm)					
			M4					
			Solder			Crimp		
			L	S	T	L	S	T
2S	302	1.6	47.0	9	3.5	52	9	5.5
	303/304/305/306	1.3	47.5	9	3.5	52	9	4.0
	307	1.3 0.9	47.5	9	3.5 3.0	52	9	4.0
	308/310	0.7	47.0	9	3.0	52	9	4.0



Cable stripping lengths for multipole connectors (S series)

M2 **straight plugs and sockets with oversize cable collet, clamping type K (solder or crimp contacts)**

	Type	ø contact A (mm)	Cable stripping lengths (mm) M2 Solder L	Solder S	Solder T	Crimp L	Crimp S	Crimp T
0S	302	0.9	19.5	5	3.5	23	5	4.0
	303/304	0.7	20.0	5	3.5	23	5	4.0
1S	302	1.3	24.5	8	3.5	28	8	4.0
	303/304	0.9	24.0	8	3.0	28	8	4.0
	305	0.9 0.7	24.0	8	3.0	28	8	4.0
	306	0.7	24.5	8	3.0	28	8	4.0
2S	302	1.6	33.0	9	3.5	38	9	5.5
	303/304/305/306	1.3	33.5	9	3.5	38	9	4.0
	307	1.3 0.9	33.5	9	3.5 3.0	38	9	4.0
	308/310	0.9	33.0	9	3.0	38	9	4.0
3S	302/303/304	2.0	38.0	9	4.0	–	–	–
	305	2.0 1.3	38.0	9	4.0 3.5	–	–	–
	306/307/308/310	1.3	38.5	9	3.5	–	–	–
	312/313/314/316/318	0.9	38.0	9	3.0	–	–	–
4S	302	4.0	50.0	9	7.0	–	–	–
	303/304	3.0	48.5	9	4.5	–	–	–
	305	3.0 2.0	48.5	9	4.5 4.0	–	–	–
	306	2.0	49.0	9	4.0	–	–	–
	307	2.0 1.3	49.0	9	4.0 3.5	–	–	–
	308/309/310/312/313/314	1.3	49.5	9	3.5	–	–	–
	316/318/320/322/324	0.9	49.0	9	3.0	–	–	–
5S	302	6.0	68.5	22	7.5	–	–	–
	303	6.0 4.0	68.5	22	7.5 5.5	–	–	–
	304	4.0	68.5	22	5.5	–	–	–
	305	4.0 3.0	68.5	22	5.5 4.5	–	–	–
	306/308	3.0	68.5	22	4.5	–	–	–
	310/312/316	2.0	67.0	22	4.0	–	–	–
	314	3.0 2.0	68.5	22	4.5 4.0	–	–	–
	318/322	3.0 1.6	68.5	22	4.5 3.5	–	–	–
	320/324	1.6	69.0	22	3.5	–	–	–
	330/336/340/344/348	1.3	69.5	22	3.5	–	–	–

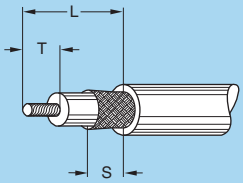


Cable stripping lengths for unipole connectors (E series)

M1 **straight plugs and sockets with cable collet, clamping type C (solder contacts)**

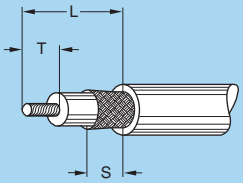
M3 **elbow plugs (90°) with cable collet, clamping type C (solder contacts)**

	Type	ø contact A (mm)	Cable stripping lengths (mm)					
			M1			**M3**		
			Solder			Solder		
			L	S	T	L	S	T
0E	**116**	1.6	9	5	4	20	5	4
1E	**120**	2.0	12	8	5	25	8	5
	130	3.0	13	8	5	25	8	5
2E	**130**	3.0	16	9	6	33	9	6
	140	4.0	15	9	6	33	9	6
3E	**140**	4.0	19	9	7	40	9	7
	160	6.0	20	9	9	40	9	9
4E	**160**	6.0	23	9	9	50	9	9
5E	**112**	12.0	12	15	12	–	–	–



M2 **straight plugs and sockets with oversize cable collet, clamping type K (solder contacts)**

	Type	ø contact A (mm)	Cable stripping lengths (mm)		
			M2		
			Solder		
			L	S	T
1E	**120**	2.0	25	8	5
	130	3.0	26	8	5
2E	**130**	3.0	28	9	6
	140	4.0	27	9	6
3E	**140**	4.0	36	9	7
	160	6.0	37	9	9
4E	**160**	6.0	50	9	9

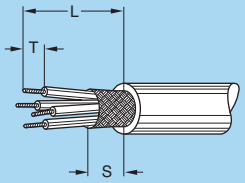


Cable stripping lengths for multipole connectors (E series)

M1 **straight plugs and sockets with cable collet, clamping type C (solder or crimp contacts)**

M3 **elbow plugs (90°) with cable collet, clamping type C (solder or crimp contacts)**

	Type	ø contact A (mm)	Cable stripping lengths (mm)											
			M1						M3					
			Solder			Crimp			Solder			Crimp		
			L	S	T	L	S	T	L	S	T	L	S	T
0E	302	0.9	9.0	4	3.5	12	5	4.0	19.5	5	3.5	23	5	4.0
	303/304	0.7	9.0	4	3.5	12	5	4.0	19.0	5	2.5	23	5	4.0
1E	302	1.3	10.5	6	3.5	15	8	4.0	23.5	8	3.5	28	8	4.0
	303/304	0.9	10.5	6	3.0	15	8	4.0	23.0	8	3.0	28	8	4.0
	305	0.9 0.7	10.5	6	3.0	15	8	4.0	23.0	8	3.0	28	8	4.0
	306	0.7	10.5	6	3.0	15	8	4.0	23.5	8	3.0	28	8	4.0
2E	302	1.6	14.0	9	3.5	19	9	5.5	32.0	9	3.5	37	9	5.5
	303/304/305/306	1.3	14.5	9	3.5	19	9	4.0	32.5	9	3.5	37	9	4.0
	307	1.3 0.9	14.5	9	3.5 3.0	19	9	4.0	32.5	9	3.5 3.0	37	9	4.0
	308/310	0.9	14.0	9	3.0	19	9	4.0	32.0	9	3.0	37	9	4.0
3E	302/303/304	2.0	17.0	9	4.0	–	–	–	38.0	9	4.0	–	–	–
	305	2.0 1.3	17.0	9	4.0 3.5	–	–	–	38.0	9	4.0 3.5	–	–	–
	306/307/308/310	1.3	17.5	9	3.5	–	–	–	38.5	9	3.5	–	–	–
	312/313/314/316/318	0.9	17.0	9	4.0	–	–	–	38.0	9	3.0	–	–	–
4E	302	4.0	23.0	9	7.0	–	–	–	50.0	9	7.0	–	–	–
	303/304	3.0	21.5	9	4.5	–	–	–	48.5	9	4.5	–	–	–
	305	3.0 2.0	21.5	9	4.5 4.0	–	–	–	48.5	9	4.5 4.0	–	–	–
	306	2.0	22.0	9	4.0	–	–	–	49.0	9	4.0	–	–	–
	307	2.0 1.3	22.0	9	4.0 3.5	–	–	–	49.0	9	4.0 3.5	–	–	–
	308/309/310/312/313/314	1.3	22.5	9	3.5	–	–	–	49.5	9	3.5	–	–	–
	316/318/320/322/324	0.9	22.0	9	4.0	–	–	–	49.0	9	3.0	–	–	–
5E	302	6.0	46.5	15	7.5	–	–	–	–	–	–	–	–	–
	303	6.0 4.0	46.5	15	7.5 5.5	–	–	–	–	–	–	–	–	–
	304	4.0	46.5	15	5.5	–	–	–	–	–	–	–	–	–
	305	4.0 3.0	46.5	15	5.5 4.5	–	–	–	–	–	–	–	–	–
	306/308	3.0	46.5	15	4.5	–	–	–	–	–	–	–	–	–
	310/312/316	2.0	45.0	15	4.0	–	–	–	–	–	–	–	–	–
	314	3.0 2.0	45.5	15	4.5 4.0	–	–	–	–	–	–	–	–	–
	318/322	3.0 1.6	45.5	15	4.5 3.5	–	–	–	–	–	–	–	–	–
	320/324	1.6	47.0	15	3.5	–	–	–	–	–	–	–	–	–
	330/336/340/344/348	1.3	47.5	15	3.5	–	–	–	–	–	–	–	–	–

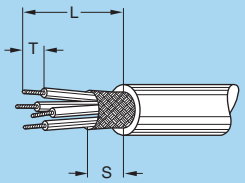


Cable stripping lengths for multipole connectors (E series)

M1 **straight plugs and sockets with cable collet, clamping type C (solder contacts)**

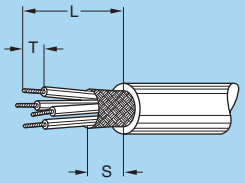
M3 **elbow plugs (90°) with cable collet, clamping type C (solder contacts)**

	Type	ø contact A (mm)	Cable stripping lengths (mm)					
			M1			M3		
			Solder			Solder		
			L	S	T	L	S	T
6E	303	6.0	70	30	9.0	–	–	–
	304	8.0	70	30	10.0	–	–	–
	312	5.0	70	30	8.0	–	–	–
	316/320/324	3.0	70	30	6.0	–	–	–
	330/332/340/348	2.0	70	30	7.0	–	–	–
	336	1.3 5.0	70	30	4.0 8.0	–	–	–
	360/362	1.6	70	30	4.5	–	–	–
	364/372	1.3	70	30	4.0	–	–	–
	106	0.9	70	30	4.0	–	–	–

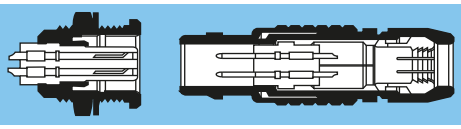


M2 **straight plugs and sockets with oversize cable collet, clamping type K (solder or crimp contacts)**

	Type	ø contact A (mm)	Cable stripping lengths (mm)					
			M2					
			Solder			Crimp		
			L	S	T	L	S	T
1E	302	1.3	23.5	8	3.5	28	8	4.0
	303/304	0.9	23.0	8	3.0	28	8	4.0
	305	0.9 0.7	23.0	8	3.0	28	8	4.0
	306	0.7	23.5	8	3.0	28	8	4.0
2E	302	1.6	26.0	9	3.5	31	9	5.5
	303/304/305/306	1.3	26.5	9	3.5	31	9	4.0
	307	1.3 0.9	26.5	9	3.5 3.0	31	9	4.0
	308/310	0.9	26.0	9	3.0	31	9	4.0
3E	302/303/304	2.0	34.0	9	4.0	–	–	–
	305	2.0 1.3	34.0	9	4.0 3.5	–	–	–
	306/307/308/310	1.3	34.5	9	3.5	–	–	–
	312/313/314/316/318	0.9	34.0	9	3.0	–	–	–
4E	302	4.0	50.0	9	7.0	–	–	–
	303/304	3.0	48.5	9	4.5	–	–	–
	305	3.0 2.0	48.5	9	4.5 4.0	–	–	–
	306	2.0	49.0	9	4.0	–	–	–
	307	2.0 1.3	49.0	9	4.0 3.5	–	–	–
	308/309/310/312/313/314	1.3	49.5	9	3.5	–	–	–
	316/318/320/322/324	0.9	49.0	9	3.0	–	–	–



Technical characteristics



Outer shell

Brass

In most cases, LEMO connectors have a brass outer shell which is suitable for most general purpose applications, including civilian and military. The brass outer shells have a chrome nickel-plated surface which ensures very good protection against industrial atmosphere, salt air and most corrosive agents.

Alternative protective coatings are available to satisfy other specific environmental conditions:
– electrolytic nickel
– nickel-gold
– nickel-black chrome. After the black chrome treatment, the part is coated with non conductive protective organic film.

Stainless steel

For applications where there are severe environmental conditions that may rapidly damage the surface finish, we recommend using stainless steel. The AISI 303 stainless steel is a material for general use adapted to most applications requiring a product made entirely of stainless metal.

For the nuclear industry where elements are subject to radiation and to vaporous nitric acid, we offer AISI 304 stainless steel.

Grade AISI 316L is recommended for medical applications, highly demanding with regard to non-corrosiveness. This material is also used for connector shells soldered by electronic beam onto a device made of the same stainless steel. These parts have no surface treatment.

Aluminium alloy

The aluminium alloy outer shells find numerous applications where light weight is a predominant factor; such as in the aeronautics and space industries, and for portable and mobile equipment.
These materials have high mechanical strength and excellent resistance to corrosion. The shell surface is protected by anodizing which is available in six colours: blue, yellow, black, red, green, and natural.

Plastic materials

Some connector model shells can be made of plastic. This solution offers optimum electrical insulating properties particularly suitable for medical applications. Black Polyoxymethylene (POM) is particularly adapted to products of the 00 or S series.
Grey or white polysulfone (PSU) and beige PEEK offers excellent mechanical properties and is suitable for gas or vapour sterilization.
Some models of the 2B and 3B series are available with an outer shell of cream-coloured polyphenylsulfone (PPSU). We recommend this material particularly for applications where products are to withstand hundreds of vapour sterilization cycles.

Bridge plug or plugs with parallel sockets are made of polyamide (PA.6) available in 9 colours: blue, white, grey, yellow, brown, black, red, orange and green.

Some elbow socket shells for printed circuits are overmoulded in polyphenilene sulfide (PPS).

Other metallic components

In general, most metallic components are manufactured in brass. However, bronze or beryllium copper are used where good elasticity is required (for example: earthing crown). Depending on the application, these parts have electrolytic nickel or nickel-gold plating.
These parts can also be manufactured in stainless steel.

Sealing gasket

In general, sealing gaskets are made of silicone rubber MQ/MVQ. However, for vacuumtight sockets and couplers, gaskets are made of fluorocarbon elastomer (FPM/FKM).

Sealing resin

An epoxy resin is used to seal both watertight and vacuumtight socket and coupler models.

Materials and Treatments

Component	Material (Standard)	Surface treatment (μm)										Notes
		chrome			nickel		gold			black chr.		
		Cu	Ni	Cr	Cu	Ni	Cu	Ni	Au	Ni	Cr	
Outer shell, collet nut, conical nut or notched nut and oversized collet	Brass (UNS C 38500)	0.5	3	0.3	0.5	3	0.5	3	0.5	1	2	
	Stainless steel (AISI 303, 304 or 316L)	without treatment										
	Aluminium alloy (AA 6262A or AA 6023)	–	–	–	–	5	–	–	–	–	–	1)
	Aluminium alloy (AA 6262A or AA 6023)	anodized										
	POM (Delrin® or Ertacetal®), Polyoxymethylene, black	–										2)
	PEEK, Polyether ethercetone, beige	–										3)
	PSU (Udel®), Polysulfone, grey or white	–										4)
	PPSU (Radel®), Polyphenylsulfone, cream	–										4)
	PA.6 (Grilon®), Polyamid	–										5)
	PPS (Ryton®), Polyphenilene sulfide, brown	–										6)
Earthing crown	Bronze (UNS C 54400) or special brass	–	–	–	0.5	3	0.5	3	1.0	–	–	7)
	Beryllium Copper (UNS C 17300)	–	–	–	0.5	3	0.5	3	1.0	–	–	8)
	Stainless steel (AISI 416 or 316L)	without treatment										9)
Latch sleeve	Special brass	0.5	3	0.3	0.5	3	0.5	3	0.5	–	–	
	Stainless steel (AISI 416 or 316L)	without treatment										9)
Locking washer	Bronze (UNS C 52100)	–	–	–	0.5	3	0.5	3	0.5	–	–	
Hexagonal or round nut	Brass (UNS C 38500)	–	–	–	0.5	3	0.5	3	0.5	–	–	
	Stainless steel (AISI 303, 304 or 316L)	without treatment										10)
	Aluminium alloy (AA 6262A or AA 6023)	anodized natural										10)
Other metallic components	Brass (UNS C 38500)	–	–	–	0.5	3	0.5	3	0.5	–	–	
	Stainless steel (AISI 303, 304 or 316L)	without treatment										
O-ring and gaskets	Silicone MQ/MVQ or FPM/FKM (Viton®)	–										11)
Sealing resin	Epoxy (Araldite® or Stycast®)	–										

Notes: standards for surface treatment are as follows:
– chrome-plated: SAE AMS 2460
– nickel-plated: SAE AMS QQ N 290, or MIL DTL 32119
– gold-plated: ISO 27874
– black chrome: MIL DTL 14538 with a minimum of 10 μm of lacquer protection
1) anthracite colour (other colours upon request)
2) for FFP, PCP and ERN models of the 0S to 3S series
3) for FFP, PCP and ERN models of the 0S to 3S series and FGG and ENG models of the 1B, 3B and 4B series
4) for the FGY and ENY models of the 2B and 3B series
5) for bridge plugs of the B series
6) for S and B series elbow sockets for printed circuits
7) gold-plating for unipole types
8) used in 00 series free and fixed sockets and couplers
9) AISI 416 steel is used with shells made of AISI 303 or 304
10) delivered with free and fixed sockets with aluminium alloy or stainless steel shell
11) FPM/FKM (Viton®) o-ring and gaskets are installed upon special request. However standard for vacuumtight models.

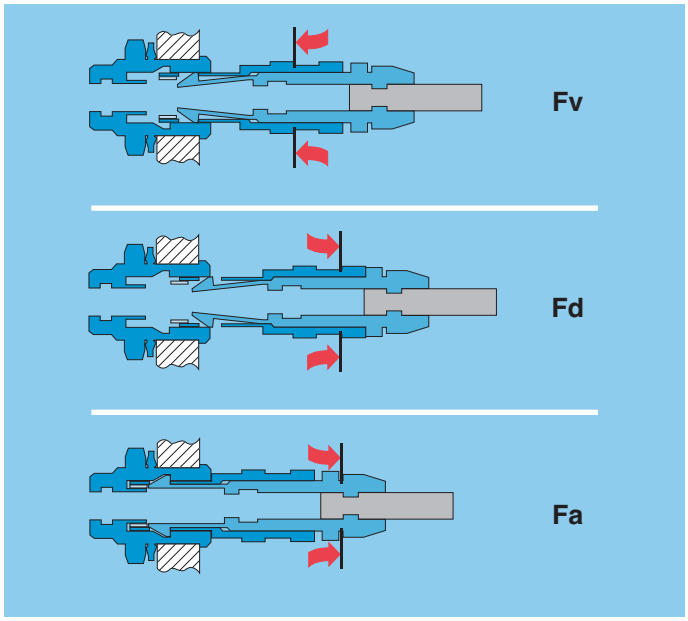
Technical characteristics of plastic materials

Type	Standard	Units	POM	PEEK	PSU	PPSU	PPS	PA.6	Silicone	FPM	Epoxy
Density	ASTM D 792	–	1.4	1.3-1.4	1.24	1.3	1.67	1.14	~1.2	~1.9	1.58
Tensile strength (at 23°C)	ASTM D 638/ ISO R527	MPa	70-80	92-142	70	70	121	55	> 9	> 12	16
Flexurale strength (at 23°C)	ASTM D 790/ ISO R178	MPA	–	170	106	91	179	75	–	–	24
Dielectric strength	ASTM D 149/IEC 60243	kV/mm	60	19-25	17-20	15	17	35	18-30	–	15
Volume resis. at 50% HR and 23°C	ASTM D 257/IEC 60093	Ω • cm	10^{15}	10^{16}	$5x10^{16}$	–	10^{16}	10^{15}	10^{14}	–	10^{14}
Surface resistivity	ASTM D 257	Ω	10^{13}	10^{15}	–	–	–	–	–	–	–
Thermal conductivity	ASTM C 177	W/K • m	0.31	0.25	0.26	–	0.3	–	–	–	0.8
Comparative tracking index	IEC 60112	V	CTI 600	CTI 150	CTI 150	–	CTI 200	CTI 600	–	–	CTI>600
Maxi. continuous service temperature	UL 746	°C	90	250	140	180	220	80	200	200	80
Min. continuous service temperature	UL 746	°C	-50	-55	-60	-50	-60	-40	-50	-20	-20
Max. short-time service temperature	–	°C	140	300	160	200	250	150	> 250	300	120
Water absorption in 24h at 23°C	ASTM D 570/ISO R62A	%	0.85	0.12	0.3	0.37	< 0.05	> 3	–	–	0.25
Radiation resistance	–	Gy[1)]	$8x10^3$	10^7	10^5	–	> 10^7	$5x10^3$	10^5	$8x10^4$	$2x10^6$
Flammability rating	ASTM D 635/UL 94	–	HB	V-0/1.5	V-0/4.4	V-0/1.6	V-0/5V	V-2	–	–	V-0/4
Resistance to steam sterilization	–	–	bad	excel.	good	excel.	excel.	bad	good	good	bad

Notes: [1)] 1 Gy (Gray) = 100 rad.

ASTM = American Society for Testing Material
ISO = International Standards Organisation
UL = Underwriters Laboratories
IEC = International Electrotechnical Commission

Mechanical latching characteristics



F_v: average latching force.

F_d: average unmating force with axial pull on the outer shell.

F_a: average pull force with axial pull on the collet nut

Notes: forces were measured on outer shells **not fitted with contacts**.
Mechanical endurance: 5000 cycles (3000 cycles for T series).
The values were measured according to the standard IEC 60512-7 test 13a.

1N = 0.102 kg.

Standard series

Force (N)	Series							
	00	0S	1S	2S	3S	4S	5S	6S
Fv	9	14	15	17	20	40	60	70
Fd	7	9	10	11	14	25	40	55
Fa	120	140	250	350	500	650	750	900

Watertight series

Force (N)	Series						
	0E	1E	2E	3E	4E	5E	6E
Fv	14	16	20	32	65	85	100
Fd	9	10	13	25	40	60	75
Fa	250	300	400	550	700	800	900

Keyed series

Force (N)	Series						
	00	0B	1B	2B	3B	4B	5B
Fv	9	10	14	15	17	39	48
Fd	7	8	11	12	14	38	38
Fa	100	180	300	300	400	600	800

Keyed watertight series

Force (N)	Series										
	TT	0K	0T	1K	1T	2K	2T	3K	3T	4K	5K
Fv	14	14	15	16	16	20	20	32	28	65	85
Fd	12	9	13	10	14	13	15	25	24	40	60
Fa	80	250	130	300	250	400	250	550	400	700	800

Electromagnetic compatibility (EMC) and shielding efficiency

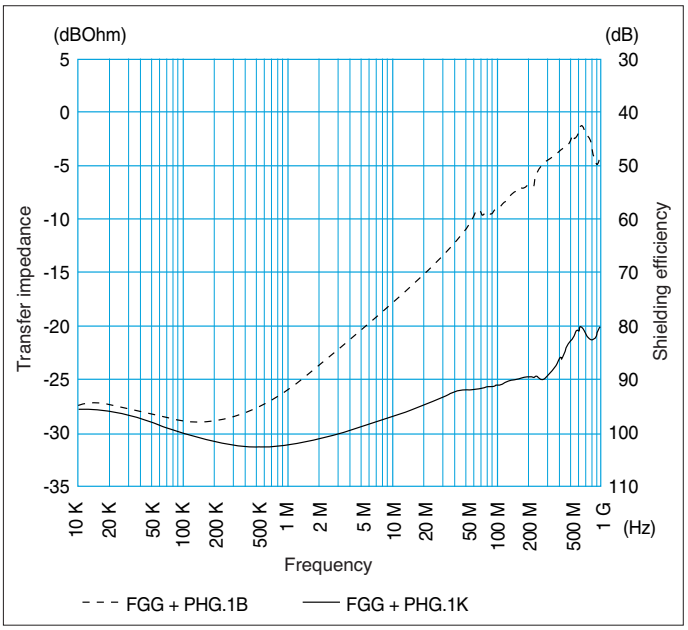
The electromagnetic compatibility of a device can only be ensured by meeting a number of basic rules with the design of the device and by carefully selecting components, cables and connectors.

Electrical and electronic devices are to be designed to ensure the following:

a) reduce the emission of generated electromagnetic disturbance to a level where radios and telecommunication and other devices can properly function;
b) electromagnetic immunity against electromagnetic disturbance so that they can properly function.

When selecting a connector, screen or shielding efficiency and low resistance to electric continuity between the cable and the connector should be considered.

The design of LEMO connectors with metal shell and earthing crown guarantee optimum shielding efficiency in all applications where electromagnetic compatibility (EMC) is critical. The performance of a connector is measured through shielding efficiency, a value that represents the ratio between the electromagnetic field on the outside and the inside of the shell. Our measurements are carried out according to the IEC 60169-1-3 standard.



The performance of S and B series connectors is comparable to the results of measurements carried out on a pair of FGG + PHG.1B connectors.
The performance of E and K series connectors is comparable to the results of measurements carried out on a pair of FGG + PHG.1K connectors.

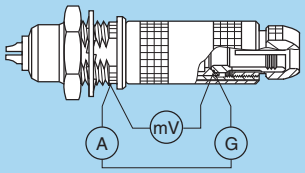
Shell electrical continuity:
(measured according to IEC 60512-2 test 2f)

Test current: 1A
A = Ammeter
mV = Millivoltmeter
G = Generator

R_1 Values with earthing crown and latch sleeve or inner-sleeve nickel-plated.

R_2 Values with gold-plated earthing crown and nickel-plated latch sleeve or inner sleeve.

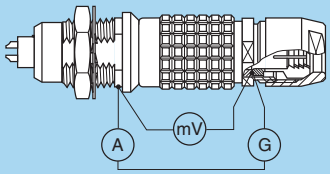
Standard series



Series	R_1 (mΩ)	R_2 (mΩ)
00	3.5	2.8
0S	2.8	1.6
1S	2.2	1.5
2S	1.8	1.2

Series	R_1 (mΩ)	R_2 (mΩ)
3S	1.6	1.2
4S	1.4	1.0
5S	1.4	1.0
6S	1.0	0.5

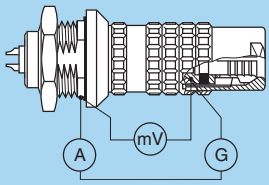
Keyed series



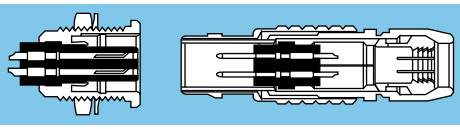
Series	R_1 (mΩ)	R_2 (mΩ)
00	3.5	2.8
0B	3.5	1.3
1B	2.5	1.1
XB	2.5	1.1
2B	2.2	0.9
3B	2.2	0.7
4B	1.5	0.5
5B	1.5	0.3

Series	R_1 (mΩ)
TT	3.5
0T	3.5
1T	2.5
2T	2.2
3T	2.2
4T	1.5
5T	1.5

Watertight series
Keyed watertight series



Series	R_1 (mΩ)	R_2 (mΩ)
0E-0K	2.8	1.6
1E-1K	2.2	1.5
2E-2K	1.8	1.2
3E-3K	1.6	1.2
4E-4K	1.4	1.0
5E-5K	1.4	1.0
6E	1.0	0.5



Insulator

Plastic material used by LEMO for manufacturing insulators is selected according to the electric and thermal properties required for the various connector types.
Characteristics examined for the two connector types are: Dielectric strength, Comparative tracking index, Surface and volume resistivity, Radiation resistance, Continuous service temperature, Water absorption, Flammability rating, Resistance to hydrocarbon.

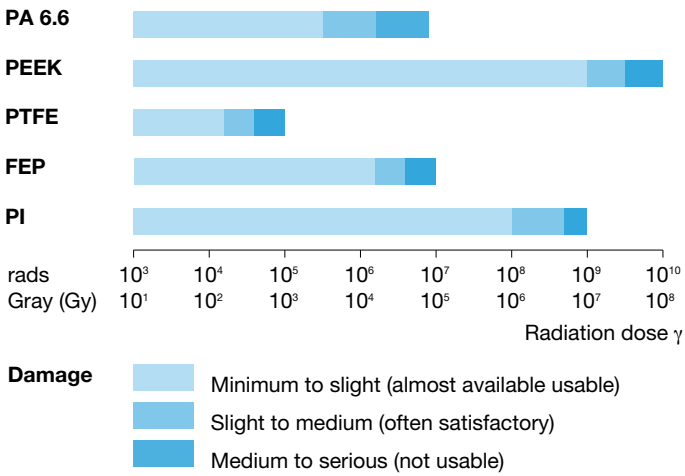
Mechanical and Electrical Properties

Mechanical characteristics of thermoplastics, such as PA 6.6, and PEEK, are improved by the addition of glass fibres. By adding glass fibres in the resin the performance of this material (mechanical strength and radiation resistance) is enhanced and water absorption rate is reduced. From an electric point of view, the addition of glass fibres improves dielectric strength.

Selection of the insulator

A number of thermoplastics have common characteristics, some of them are identical with other insulating materials. In this case, the insulator material is selected according to the specific difference in features to provide all the required parameters for the given type.

Radiation resistance



Note: technical data in this chapter provide general information on plastics used by LEMO as electrical insulators. LEMO reserves the right to propose new materials with better technical characteristics, and to withdraw, without notice, any material mentioned in the present catalogue or any other publications edited by LEMO S.A. and/or its subsidiaries. LEMO SA and its subsidiaries use only plastic granules, powder or bars supplied by specialized companies, and thus cannot in any case take responsibility with regard to this material.

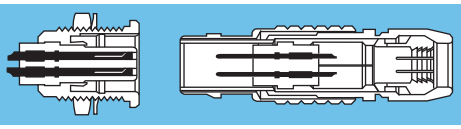
Technical characteristics

Type	Standard	Units	PA6.6	PEEK	PTFE	FEP	PI
Dielectric strength	ASTM D 149 / IEC 60243	kV/mm	15-17	19-25	17.2-24	20	22
Volume resistivity at 50% RH and 23°C	ASTM D 257 / IEC 60093	Ω • cm	$5.8x10^{15}$	10^{16}	10^{18}	> 10^{16}	> 10^{16}
Surface resistivity	ASTM D 257 / IEC 60093	Ω	10^{12}	10^{15}	10^{17}	> 10^{16}	> 10^{15}
Thermal conductivity	ASTM C 177	W/K • m	0.21	0.25	0.23	0.24	0.35
Comparative tracking index	IEC 60112	V	CTI 600	CTI 150	CTI 500	–	–
Dielectric constant (10^6 Hz)	ASTM D 150 / IEC 60250	–	4	3.2-3.5	2-2.1	2.1	3.6
Dissipation factor (10^6 Hz)	ASTM D 150 / IEC 60250	–	–	< 0.005	< 0.0003	< 0.001	< 0.0034
Maximum continuous service temperature	UL 746	°C	120	250	260	200	350
Maximum short-time service temperature	–	°C	150	300	300	260	480
Minimum continuous service temperature	–	°C	–	-55	-200	-200	–
Water absorption in 24h at 23°C	ASTM D 570 / ISO R624	%	< 0.7	< 0.3	< 0.01	< 0.01	0.24
Radiation resistance	–	Gy	$5x10^3$	10^7	$2x10^2$	$2x10^4$	10^6
Flammability rating	ASTM D 635 / UL 94	–	–	V-0/1.5	V-0	V-0	–

Designation		Symbol	Standard	Unipole			Multipole					
chemical	commercial			00	S	E	00	S	E	B	K	T
Polyamide (glass fitted)	Nylatron®	PA 6.6	–					●	●			
Polyether Ethercetone	Peek®	PEEK	–	○	○	○	●	●	●	●	●	●
Polytetrafluorethylene	–	PTFE	ASTM D 1457-83	●	●	●						
Tetrafluorethylene	–	FEP	ASTM D 2116-81					○	○			
Polyimide	Vespel®	PI	–					○	○			

Note: values of insulation resistance between contacts are given on page 189.

● First choice alternative ○ Special order alternative

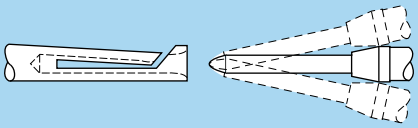


Electrical contact

Technical description

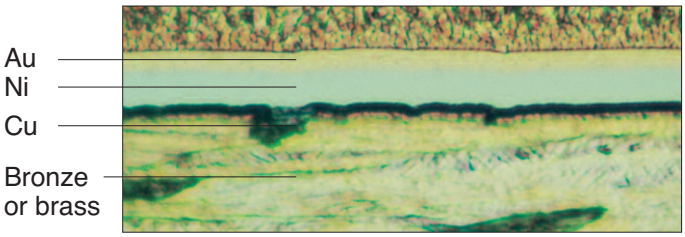
The secure reliable electromechanical connection achieved with LEMO female cylindrical contacts is mainly due to two important design features :

1. *Prod proof entry* on the mating side which ensures perfect concentric mating even with carelessly handled connectors.
2. *The pressure spring*, with good elasticity, maintains a constant even force on the male contact when mated. The leading edge of the pressure spring preserves the surface treatment (gold-plated) and prevents undue wear.



Contact material and treatment

LEMO female contacts are made of bronze beryllium (QQ-C-530) or bronze (UNS C 54400). These materials are chosen because of their high modulus of elasticity, their excellent electrical conductivity and a high mechanical strength.

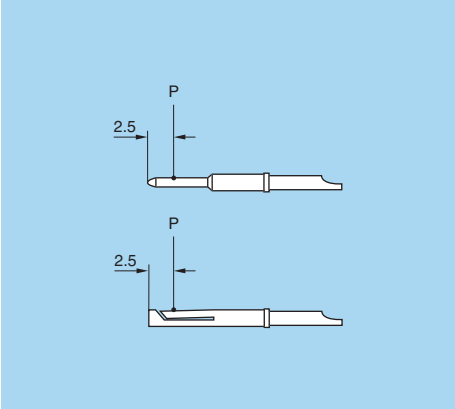


Notes: the standard surface treatment are as follows:
– nickel: SAE AMS QQ N 290 or MIL DTL 32119
– gold: ISO 27874.
1) minimum value
2) for elbow print contacts
3) treatment completed by 6 μm Sn (lead free) tin-plating

LEMO male solder and print contacts are made of brass (UNS C 38500). Male crimp contacts are made of brass (UNS C 34500) or annealed brass (UNS C 38500) with optimum hardness (HV) for crimping onto the wire.

Type	Material (standard)	Surf. treatment (μm)		
		Cu	Ni	Au[1]
Male crimp	Brass (UNS C 34500)	0.5	3	1.0
	Brass (UNS C 38500)	0.5	3	1.0
Male print	Brass (UNS C 38500)	0.5	3	1.0
Female crimp / print	Bronze (UNS C 54400) Cu-Be (FS QQ-C-530)	0.5	3	1.5
Clips	Cu-Be (FS QQ-C-530)	–	–	–
	Stainless steel	–	–	–
Connection wire[2]	Brass	–	3[3]	–

Thickness comparison between the outside and the inside of female contacts



Note: P = inspection point

Contact ø A (mm)	Gold thickness		
	male (μm)	female	
		outside (μm)	inside (%)
0.35	1.0	1.5	65
0.50	1.0	1.5	65
0.70	1.0	1.5	70
0.90	1.0	1.5	75
1.30	1.0	1.5	75
1.60	1.0	1.5	75
2.00	1.0	1.5	75

Contact ø A (mm)	Gold thickness		
	male (μm)	female	
		outside (μm)	inside (%)
3.00	1.0	1.5	75
4.00	1.0	1.5	75
5.00	1.0	1.5	75
6.00	1.0	1.5	75
8.00	1.0	1.5	75
12.00[1]	–	–	–

Notes: 1) contacts are silver plated

Contact resistance with relation to the number of mating cyles
(measured according to IEC 60512-2 test 2a)

Average values measured after the mating cycles and the salt spray test according to IEC 60512-6 test 11f.

A ø (mm)	Contact resistance (mΩ)			A ø (mm)	Contact resistance (mΩ)		
	1000 cycles	3000 cycles	5000 cycles		1000 cycles	3000 cycles	5000 cycles
0.35	8.0	–	–	3.0	2.0	2.2	3.1
0.5	7.5	8.3	8.7	4.0	1.6	2.0	2.8
0.7	5.6	5.7	6.1	5.0	1.4	–	–
0.9	4.1	4.2	4.8	6.0	1.2	–	–
1.3	2.8	2.9	3.6	8.0	0.8	–	–
1.6	2.9	3.1	3.5	12.0	0.7	–	–
2.0	2.6	2.7	3.3				

Insulation resistance between the contacts and contact/shell

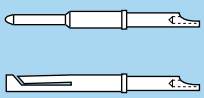
(measured according to IEC 60512-2 test 3a)

Insulating material	Multipole	Unipole
	PEEK	PTFE
new	$> 10^{12}$ Ω	$> 10^{12}$ Ω
after humidity test[1)]	$> 10^{10}$ Ω	$> 10^{10}$ Ω

Note: [1)] 21 days at 95% RH according to IEC 60068-2-3.

Solder contacts

The conductor bucket of these contacts is machined at an angle to form a cup into which the solder can flow.
See page 8 for the range of cable dimensions that can be soldered.



Crimp contacts

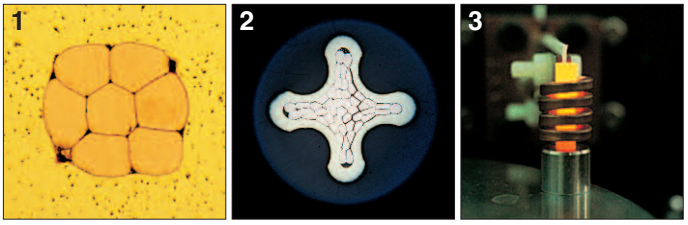
The square form crimp method is used (MIL-C-22520F, class I, type 2) photo 1 for unipole contacts.

For multipole contacts the standard four identer crimp method is used, MIL-C-22520F, class I, type 1), photo 2.
The crimp method requires a controlled compression to obtain a symmetrical deformation of the conductor strand and of the contact material. The radial hole in the side of the contact makes it possible to check whether the conductor is correctly positioned within the contact. A good crimping is characterized by only slightly reduced conductor section and practically no gap.
For optimum crimping of bronze or brass contacts they are annealed to relieve internal stress and reduce material hardening during the crimping process.
Only the crimping zone is annealed with the help of an induction heating machine designed by the LEMO Research and Development Department (see photo 3).

Advantages of crimping

- practical, quick contact fixing outside the insulator
- possible use at high temperature
- no risk of heating the insulator during the conductor-contact fixing
- high tensile strength

Crimp contacts are available in standard version (form 1) for mounting maximum size conductors.
For some dimensions, these crimp contacts can be produced with reduced crimp barrels (form 2) for mounting reduced size conductors.



Crimp contacts

The crimp contacts can be with two forms: a standard crimp barrel for large conductors (see fig. 1) or with a reduced crimp barrel for smaller conductors (see fig. 2).

The range of cable dimensions that can be crimped into our contacts are indicated on the table on page 8.

Fig. 1

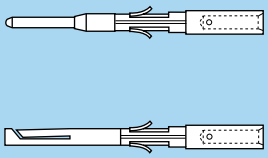
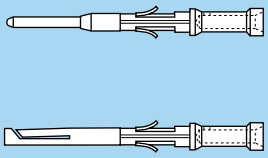


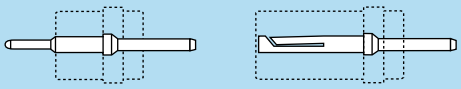
Fig. 2



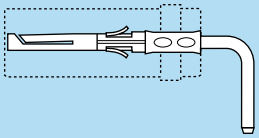
Print contacts

Print contacts are available in straight or elbow versions for certain connector types, mostly for straight and elbow socket models. Connection is made on flexible or rigid printed circuits by soldering.
Straight print contacts are gold-plated which guarantees optimum soldering, even after long-term storage. However for wave soldering, we recommend removal the gold-plating from the contact end on the printed circuit side before soldering according to the assembly procedures.
Print elbow contacts include a tinned lead free brass wire crimped into a crimp contact.

straight



elbow



Test voltage

Test voltage (Ue) :
(measured according to the IEC 60512-2 test 4a standard)

It corresponds to 75% of the mean breakdown voltage.
Test voltage is applied at 500 V/s and the test duration is 1 minute.

This test has been carried out with a mated plug and socket, with power supply only on the plug end.

The operating voltage value definition is at the entire responsibility of the customer who defines this value according to the safety factors that they apply to their equipment and system.

Caution:
For a number of applications, safety requirements for electrical appliances are more severe with regard to operating voltage.
In such cases operating voltage is defined according to creepage distance and air clearance) between live parts.
Please consult us for the choice of a connector by indicating the safety standard to be met by the product.

Voltage values are given in the table on insulator types for each series.
They correspond with values measured at sea level. They are adapted to all applications up to an altitude of 2000 m.

In case a device is used at a higher altitude, air clearance between live parts has to be multiplied by the following coefficients.
It means also that test voltage has to be divided by this coefficient.

altitude (m)	coefficient
2000	1.00
3000	1.14
4000	1.29
5000	1.48

Rated current

(measured according to IEC 60512-3 test 5a)

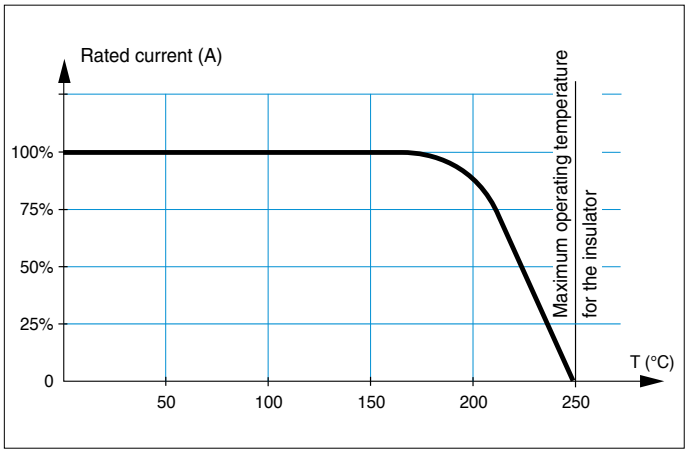
The specified rated current can be applied simultaneously to all the contacts.
It corresponds with an average temperature rise of 40°C of the connector.

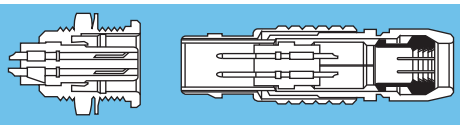
The current values are indicated in the table of insulator types in each series.
For use at higher temperatures acceptable rated current will be lower. It tends towards zero as the material is used at the maximum operating temperature accepted for the insulator.

In most case the current depend on the conductor dimension (see table on page 196) or on the printed circuit dimension.

Caution:
In general, connectors should not be unmated while live.

For connectors with PEEK insulator, maximum admissible current will follow the curve below depending on the operating temperature T.





Cable fixing

Cables are fixed into LEMO connectors with cable collet systems. These collets with latches have a design which is very similar to those used for tool machines. This solution guarantees excellent cable retention and ensures perfectly symmetrical deformation of the cable.
The 00 multipole series is also available with hexagonal crimping (MIL-C-22520F).

Material and treatment

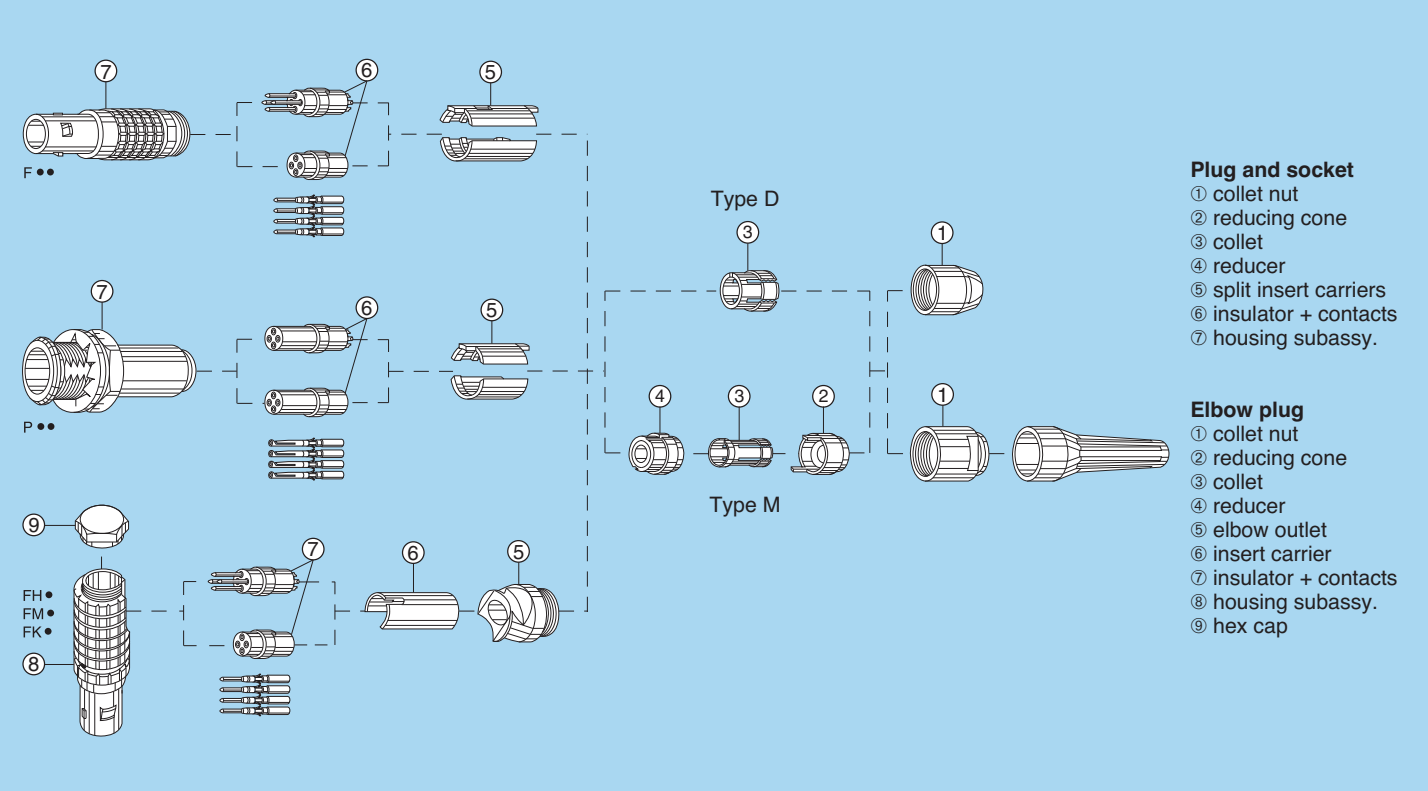
Component	Material (standard)	Surface treatment (µm)				
		Nickel[1]		Gold		
		Cu	Ni	Cu	Ni	Au
Center piece	Brass (UNS C 38500)	0.5	3	–	–	–
Collet	Brass (UNS C 38500)	0.5	3	–	–	–
Crimp ferrule	Copper (UNS C 18700)	0.5	3	0.5	3	0.5
Reducer	Brass (UNS C 38500)	0.5	3	–	–	–
Reducing cone	Brass (UNS C 38500)	0.5	3	–	–	–
Earthing cone	Brass (UNS C 38500)	0.5	3	–	–	–
Metal washer	Brass (UNS C 38500)	0.5	3	–	–	–
Gasket	Silicone MQ/MVQ	–				
	FPM (Viton®)[2]	–				

Notes:
1) standards for surface treatment are as follows:
– nickel-plated: SAE AMS QQ N 290.
2) available upon special request.

Cable clamping system

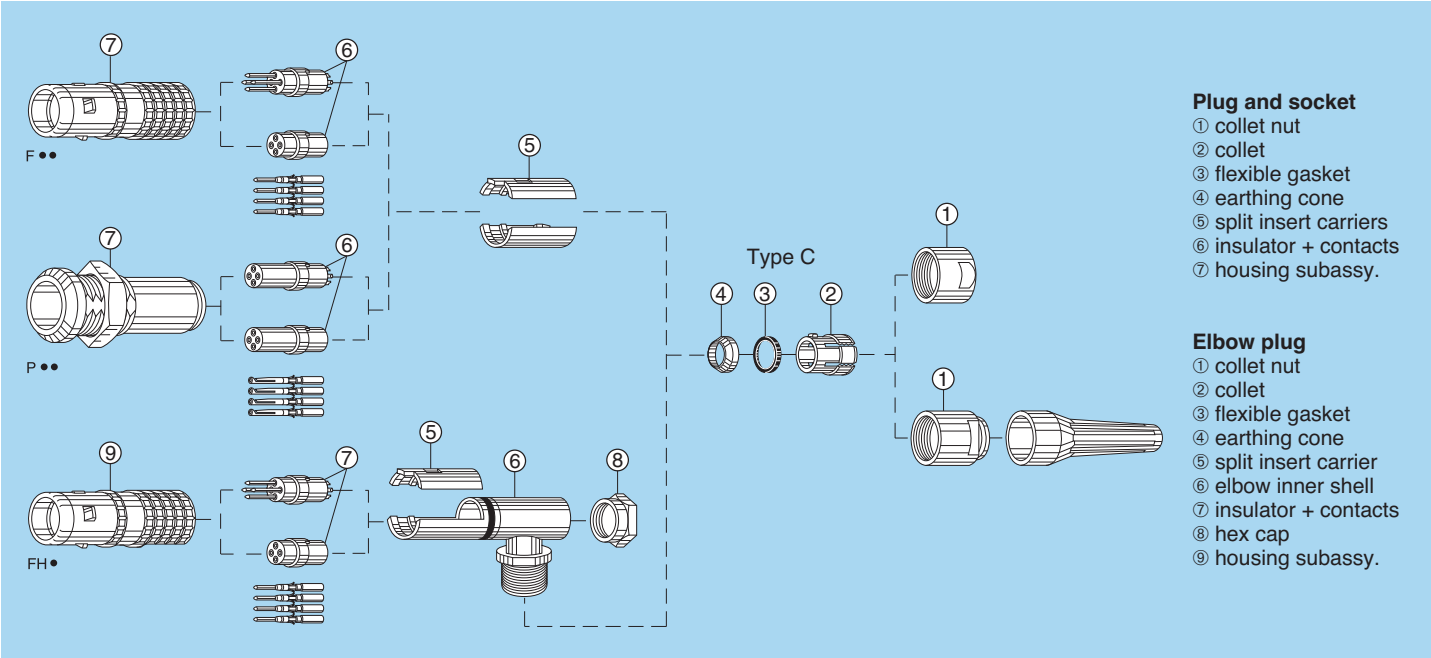
B series (D and M cable clamping)

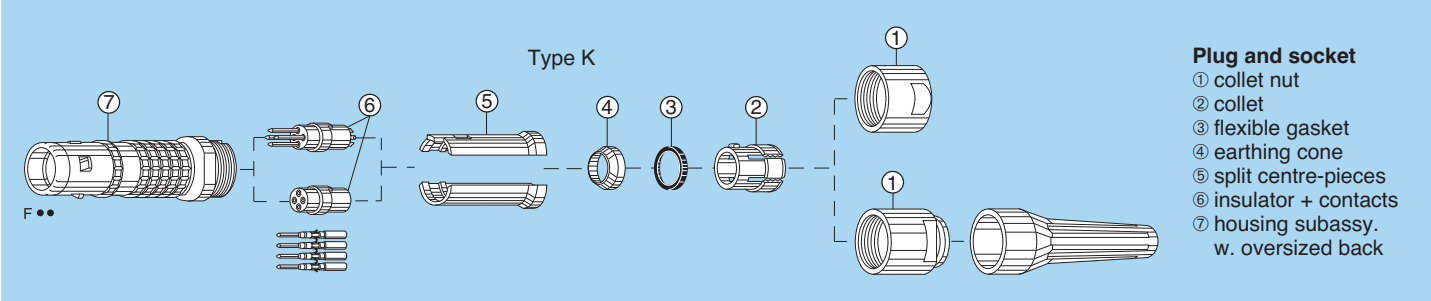
See assembly instructions under www.lemo.com.



K series (C and K cable clamping)

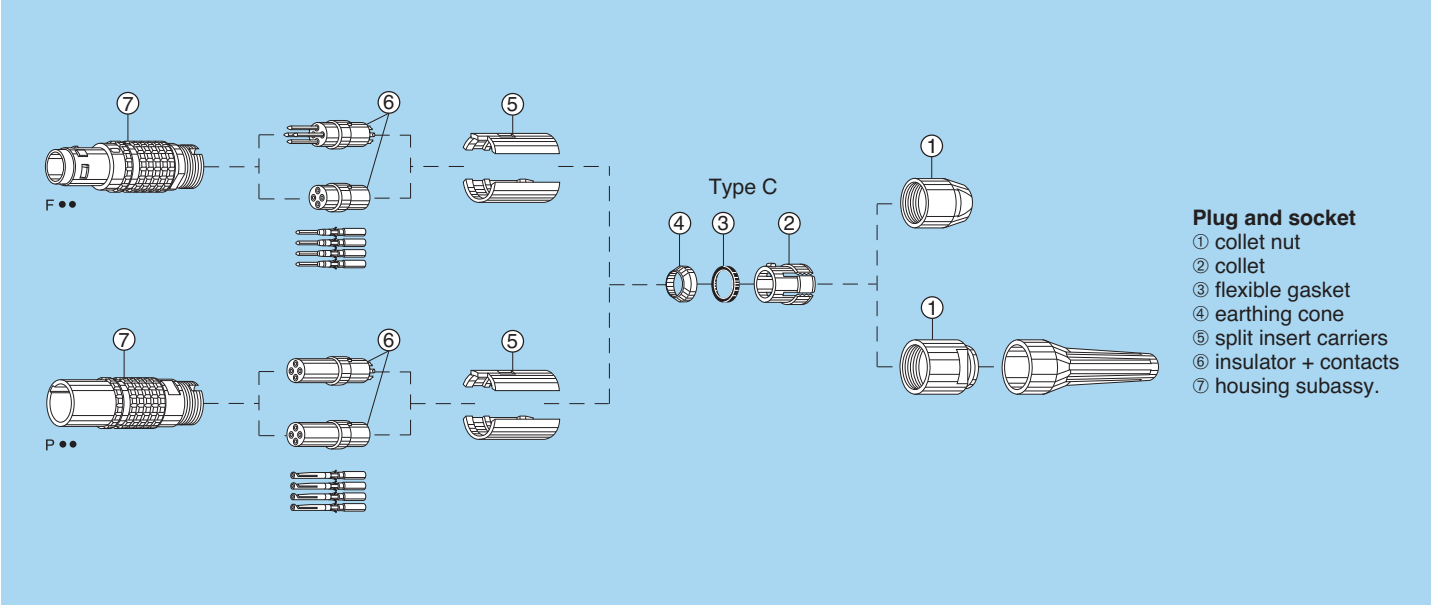
See assembly instructions under www.lemo.com.





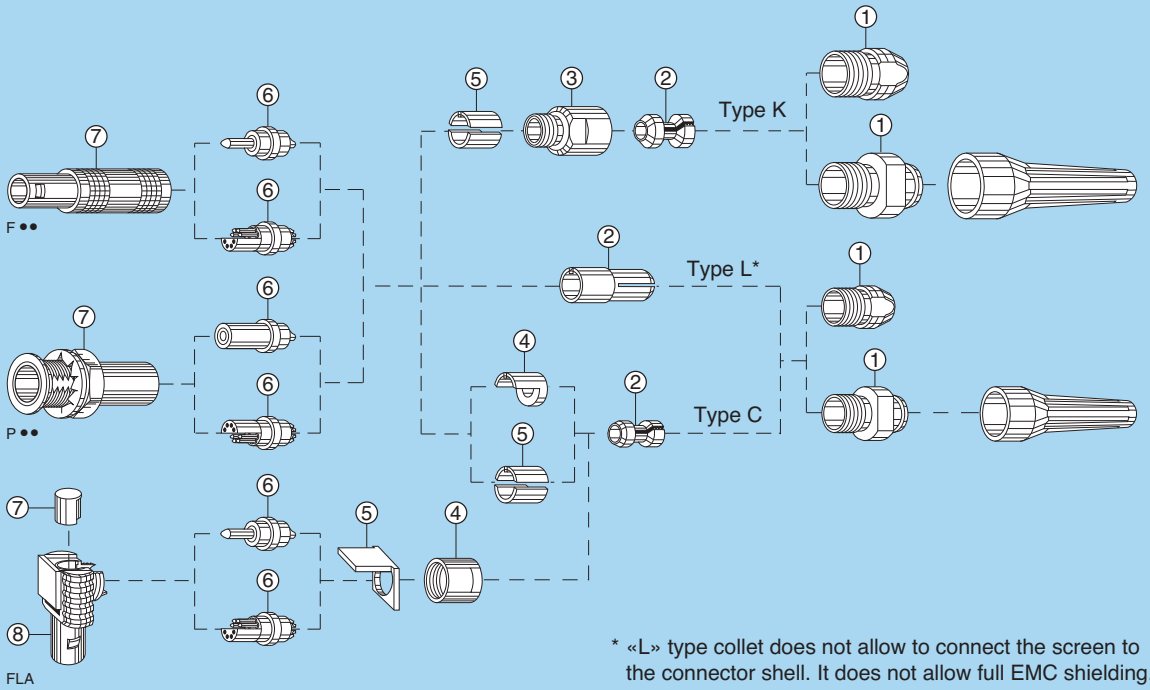
T series (C cable clamping)

See assembly instructions under www.lemo.com.



S series (C, L and K cable clamping)

See assembly instructions under www.lemo.com.



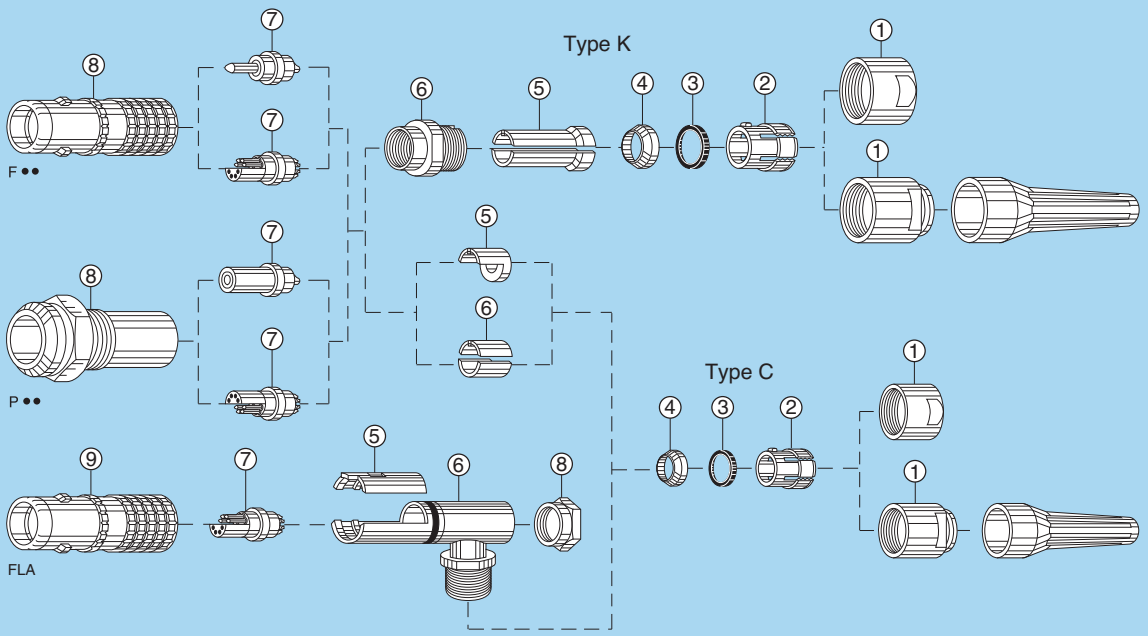
Plug and socket
① collet nut
② collet
③ oversize collet housing (type K)
④ earthing centre-piece (type C)
⑤ split centre-pieces (type K and C)
⑥ insulator + contacts
⑦ housing subassy.

Elbow plug
① collet nut
② collet
④ threaded sleeve
⑤ bracket
⑥ insulator + contacts
⑦ insulating sleeve
⑧ housing subassy.

* «L» type collet does not allow to connect the screen to the connector shell. It does not allow full EMC shielding.

E series (C and K cable clamping)

See assembly instructions under www.lemo.com.



Plug and socket
① collet nut
② collet
③ flexible gasket
④ earthing cone
⑤ split centre-pieces (type K)
⑤ earthing centre-piece (type C)
⑥ oversize collet housing (type K)
⑥ earthing centre-piece (type C)
⑦ insulator + contacts
⑧ housing subassy.

Elbow plug
① collet nut
② collet
③ flexible gasket
④ earthing cone
⑤ split insert carrier
⑥ elbow inner shell
⑦ insulator + contacts
⑧ hex cap
⑨ housing subassy.

Maximum metal collet nut tightening torque

Standard series

	Series							
	00	0S	1S	2S	3S	4S	5S	6S
Torque (Nm)	0.25	0.5	1.5	2.5	3	8	10	12

Watertight series

	Series						
	0E	1E	2E	3E	4E	5E	6E
Torque (Nm)	0.7	0.8	2	3	5	8	12

Keyed series

	Series							
	00	0B	1B	XB	2B	3B	4B	5B
Torque (Nm)	0.25	0.5	1.5	2.0	2.5	4	7	10

Watertight keyed series

	Series										
	TT	0K	0T	1K	1T	2K	2T	3K	3T	4K	5K
Torque (Nm)	0.25	0.7	0.7	0.8	0.8	2	2	3	3	5	8

Maximum elbow plug hex cap tightening torque

Keyed series

	Series						
	00	0B	1B	2B	3B	4B	5B
Torque (Nm)	0.2	0.25	0.5	0.5	1.5	3	5

Watertight series

	Series					
	0E	1E	2E	3E	4E	5E
Torque (Nm)	0.8	1	1.2	1.5	3	5

Watertight keyed series

	Series					
	0K	1K	2K	3K	4K	5K
Torque (Nm)	0.8	1	1.2	1.5	3	5

1N = 0.102 kg

Maximum plastic collet nut tightening torque [1)]

	Series								
	00	0S	1S	2S	3S	1B	2B	3B	4B
Torque (Nm)	0.15	0.45	0.50	0.50	1.00	0.50	0.50	1.00	1.50

Note:
[1)] For applications subject to strong vibration, we recommend fixing the collet nut with epoxy resin. We recommend to tight to the maximum value. Optimal torque may depend on cable jacket design.

Technical tables

Table of American Wire Gauge

AWG	Construction		ø wire max		Wire section	
	Strand nb	AWG/ strand	(mm)	(in)	(mm^2)	(sq in)
0	259	24	11.277	0.444	52.90	0.0820
1	817	30	9.702	0.382	41.40	0.0641
2	259	26	8.89	0.35	33.20	0.0514
4	133	25	6.9596	0.274	21.5925	0.0335
6	133	27	5.5118	0.217	13.5885	0.0211
8	168	30	4.4450	0.175	8.5127	0.0132
8	133	29	4.3942	0.173	8.6053	0.0133
10	105	30	3.3020	0.13	5.3204	0.0082
10	37	26	2.9210	0.115	4.7397	0.0073
10	1	10	2.6162	0.103	5.2614	0.0082
12	37	28	2.3114	0.091	2.9765	0.0046
12	19	25	2.3622	0.093	3.0847	0.0048
12 [1)]	7	20	2.5400	0.10	3.6321	0.0056
12	1	12	2.0828	0.082	3.3081	0.0051
14	41	30	2.0574	0.081	2.0775	0.0032
14	19	27	1.8542	0.073	1.9413	0.0030
14 [1)]	7	22	2.0828	0.082	2.2704	0.0035
14	1	14	1.6510	0.065	2.0820	0.0032
16 [1)]	65	34	1.5748	0.062	1.3072	0.0020
16	26	30	1.5748	0.062	1.3174	0.0020
16	19	29	1.4986	0.059	1.2293	0.0019
16 [1)]	7	24	1.5494	0.061	1.4330	0.0022
16	1	16	1.3208	0.052	1.3076	0.0020
18 [1)]	65	36	1.2700	0.05	0.8234	0.0013
18 [1)]	42	34	1.2700	0.05	0.8447	0.0013
18	19	30	1.3208	0.052	0.9627	0.0015
18	16	30	1.2954	0.051	0.8107	0.0013
18	7	26	1.2700	0.05	0.8967	0.0014
18	1	18	1.0414	0.041	0.8229	0.0013

AWG	Construction		ø wire max		Wire section	
	Strand nb	AWG/ strand	(mm)	(in)	(mm^2)	(sq in)
20 [1)]	42	36	1.0160	0.04	0.5320	$8.2x10^{-4}$
20	19	32	1.0414	0.041	0.6162	0.0010
20	10	30	1.0160	0.04	0.5067	$7.9x10^{-4}$
20	7	28	0.9906	0.039	0.5631	$8.7x10^{-4}$
20	1	20	0.8382	0.033	0.5189	$8.0x10^{-4}$
22	19	34	0.8382	0.033	0.3821	$5.9x10^{-4}$
22	7	30	0.7874	0.031	0.3547	$5.5x10^{-4}$
22	1	22	0.6604	0.026	0.3243	$5.0x10^{-4}$
24 [1)]	42	40	0.6604	0.026	0.2045	$3.2x10^{-4}$
24	19	36	0.6858	0.027	0.2407	$3.7x10^{-4}$
24	7	32	0.6350	0.025	0.2270	$3.5x10^{-4}$
24	1	24	0.5588	0.022	0.2047	$3.2x10^{-4}$
26	19	38	0.5588	0.022	0.1540	$2.4x10^{-4}$
26	7	34	0.5080	0.02	0.1408	$2.2x10^{-4}$
26	1	26	0.4318	0.017	0.1281	$2.0x10^{-4}$
28 [1)]	19	40	0.4318	0.017	0.0925	$1.4x10^{-4}$
28	7	36	0.4064	0.016	0.0887	$1.4x10^{-4}$
28	1	28	0.3302	0.013	0.0804	$1.2x10^{-4}$
30	7	38	0.3302	0.013	0.0568	$8.8x10^{-5}$
30	1	30	0.2794	0.011	0.0507	$7.9x10^{-5}$
32	7	40	0.2794	0.011	0.0341	$5.3x10^{-5}$
32	1	32	0.2286	0.009	0.0324	$5.0x10^{-5}$
34	1	34	0.1693	0.007	0.0201	$3.1x10^{-5}$
36	1	36	0.127	0.005	0.0127	$2.0x10^{-5}$
38	1	38	0.1016	0.004	0.0081	$1.3x10^{-5}$
40	1	40	0.078	0.003	0.0049	$7.5x10^{-6}$

Note: [1)] not included in the standard

Table of wire gauges according to IEC-60228 standard

Conductor no x Ø (mm)	Max Ø (mm)	Max Ø (in)	Section (mm^2)	Section (sq in)
196x0.40	7.50	0.295	25.00	0.0387
7x2.14	6.10	0.240	25.00	0.0387
125x0.40	6.00	0.236	16.00	0.0248
7x1.72	4.90	0.192	16.00	0.0248
1x4.50	4.50	0.177	16.00	0.0248
80x0.40	4.70	0.155	10.00	0.0155
7x1.38	3.95	0.155	10.00	0.0155
1x3.60	3.60	0.141	10.00	0.0155
84x0.30	3.70	0.145	6.00	0.0093
7x1.50	3.15	0.124	6.00	0.0093
1x2.76	2.76	0.108	6.00	0.0093
56x0.30	2.80	0.110	4.00	0.0062
7x0.86	2.58	0.098	4.00	0.0062
1x2.25	2.25	0.082	4.00	0.0062
50x0.25	2.15	0.084	2.50	0.0038
7x0.68	2.04	0.080	2.50	0.0038
1x1.78	1.78	0.070	2.50	0.0038
30x0.25	1.60	0.062	1.50	0.0023
7x0.52	1.56	0.061	1.50	0.0023

Conductor no x Ø (mm)	Max Ø (mm)	Max Ø (in)	Section (mm^2)	Section (sq in)
1x1.40	1.40	0.055	1.50	0.0023
32x0.20	1.35	0.053	1.00	0.0015
7x0.43	1.29	0.050	1.00	0.0015
1x1.15	1.15	0.045	1.00	0.0015
42x0.15	1.20	0.047	0.75	0.0011
28x0.20	1.15	0.045	0.75	0.0011
1x1.00	1.00	0.039	0.75	0.0011
28x0.15	0.95	0.037	0.50	$7.7x10^{-4}$
16x0.20	0.90	0.035	0.50	$7.7x10^{-4}$
1x0.80	0.80	0.031	0.50	$7.7x10^{-4}$
7x0.25	0.75	0.029	0.34	$5.2x10^{-4}$
1x0.60	0.60	0.023	0.28	$4.3x10^{-4}$
14x0.15	0.75	0.029	0.25	$3.8x10^{-4}$
7x0.20	0.65	0.023	0.22	$3.4x10^{-4}$
18x0.10	0.50	0.019	0.14	$2.1x10^{-4}$
14x0.10	0.40	0.015	0.11	$1.7x10^{-4}$
21x0.07	0.40	0.015	0.09	$1.3x10^{-4}$
14x0.10	0.40	0.015	0.09	$1.3x10^{-4}$

Maximum current rating for conductor

Maximum current on insulated conductors up to an ambiant temperature of 30° C (from VDE 0100, parts 430 and 532 as well as other VDE regulations).

Nominal section mm^2	Group 2 Intens. max. A	Group 3 Intens. max. A
0.08	1.0	1.5
0.14	2.0	3.0
0.25	4.0	5.0
0.34	6.0	8.0
0.50	9.0	12.0
0.75	12.0	15.0
1.00	15.0	19.0
1.50	18.0	24.0
2.50	26.0	32.0

Group 2 Multi-conductor, e. g. solid cable under sheath, shielded cable, lead-sheath cables, …
Group 3 Single conductor and single conductor cable laid on open air in a way to leave at least a space between them equal to their diameter

Some formulae

Resistance R of a conductor: $R = \rho \bullet \frac{l}{A}$ [Ω]

Where: ρ = conductor resistivity
l = conductor length
A = conductor cross-section

Impedance of coaxial line: $Z = \frac{138}{\sqrt{\varepsilon_r}} \bullet \log \frac{D}{d}$ [Ω]

ε_r = dielectric constant
D = dielectric outer diameter
d = center conductor outer diameter

Signal attenuation: Attenuation $= 20 \bullet \log \frac{U_1}{U_2}$ [dB]

U_1 = input signal voltage
U_2 = output signal voltage

Conversion of some units:

millimeters into inches:	1 mm	= 0.0394 in
inches into millimeters:	1 in	= 25.4 mm
centimeters into feet:	1 cm	= 0.0328 ft
feet (12 in) into centimeters:	1 ft	= 30.48 cm
square centimeters into square inches:	1 cm^2	= 0.155 sq in
square inches into square centimeters:	1 sq in	= 6.4516 cm^2
bar into pounds per square inch:	1 bar	= 14.51 psi
bar into Pascal:	1 bar	= 10^5 Pa
°C into °F:	°F	= °C•1.8 + 32
newtonmeter (Nm) into inch pound (in•lb)	1 Nm	= 8.85 in•lb
mbar•l•s^{-1} into Torr•l•s^{-1}	1 mbar•l•s^{-1}	= 1.33 Torr•l•s^{-1}

Product safety notice

PLEASE READ AND FOLLOW ALL INSTRUCTIONS CAREFULLY AND CONSULT ALL RELEVENT NATIONAL AND INTERNATIONAL SAFETY REGULATIONS FOR YOUR APPLICATION.
IMPROPER HANDLING, CABLE ASSEMBLY, OR WRONG USE OF CONNECTORS CAN RESULT IN HAZARDOUS SITUATIONS.

1. **SHOCK AND FIRE HAZARD**
   Incorrect wiring, the use of damaged components, presence of foreign objects (such as metal debris), and / or residue (such as cleaning fluids), can result in short circuits, overheating, and / or risk of electric shock.
   Mated components should never be disconnected while live as this may result in an exposed electric arc and local overheating, resulting in possible damage to components.

2. **HANDLING**
   Connectors and their components should be visually inspected for damage prior to installation and assembly. Suspect components should be rejected or returned to the factory for verification.
   Connector assembly and installation should only be carried out by properly trained personnel. Proper tools must be used during installation and / or assembly in order to obtain safe and reliable performance.

3. **USE**
   Connectors with exposed contacts should never be live (or on the current supply side of a circuit). Under general conditions voltages above 30 VAC and 42 VDC are considered hazardous and proper measures should be taken to eliminate all risk of transmission of such voltages to any exposed metal part of the connector.

4. **TEST AND OPERATING VOLTAGES**
   The maximum admissible operating voltage depends upon the national or international standards in force for the application in question. Air and creepage distances impact the operating voltage; reference values are indicated in the catalogue however these may be influenced by PC board design and / or wiring harnesses.
   The test voltage indicated in the catalogue is 75% of the mean breakdown voltage; the test is applied at 500 V/s and the test duration is 1 minute.

5. **CE MARKING CE**
   CE marking CE means that the appliance or equipment bearing it complies with the protection requirements of one or several European safety directives.
   CE marking CE applies to complete products or equipment, **but not to electromechanical components, such as connectors**.

6. **PRODUCT IMPROVEMENTS**
   The LEMO Group reserves the right to modify and improve to our products or specifications without providing prior notification.

7. **⚠ WARNING (Prop 65 State of California)**
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