HERMAPHRODITIC PUSH-PULL CONNECTORS SH-MH SERIES

LEMO

Precision modular connectors to suit your application

Since it's 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.

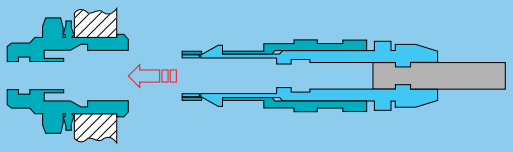
Over 50'000 connectors

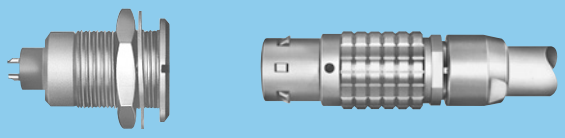
The modular design of the LEMO range provides over 50'000 connectors from miniature ø 3 mm to ø 50 mm, capable of handling cable diameters up to 30 mm and for up to 106 contacts.

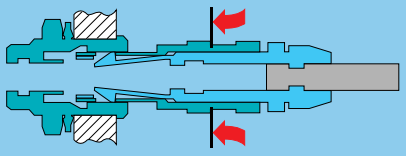
This vast portfolio enables you to select the ideal connector configuration to suit almost any specific requirement in most markets, including medical devices, test and measurement instruments, machinery, audio video broadcast, telecommunications and military.

LEMO's Push-Pull Self-Latching Connection System

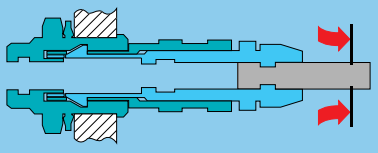
This self-latching system is renowned worldwide for its easy and quick mating and unmating features. It provides absolute security against vibration, shock or pull on the cable, and facilitates operation in a very limited space.



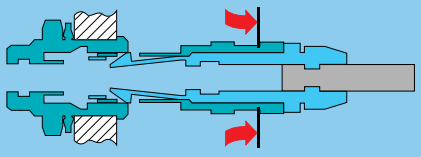




The LEMO self-latching system allows the connector to be mated by simply pushing the plug axially into the socket.



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 approved.

CE marking

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

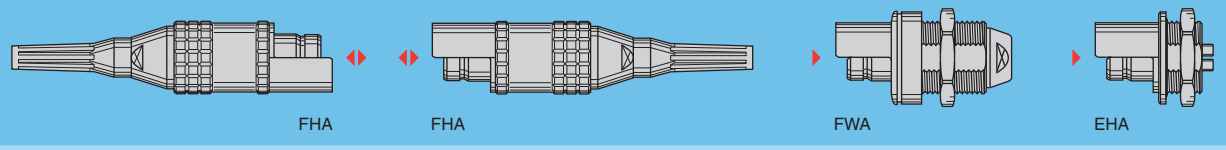
RoHS

LEMO connectors are in compliance with the RoHS directives (2002/95/EC) of the European Parliament. This directive specifies the restrictions of the use of hazardous substances in electrical and electronic equipment marketed in Europe. LEMO guarantees that its connectors are free of mercury, cadmium, lead, hexavalent chromium and polybromide biphenyl (PBB) or polybromide diphenyl ether (PBDE).

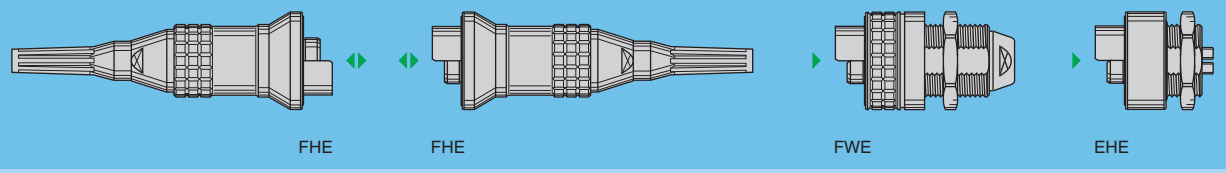
SH-MH Series

The LEMO Hermaphroditic series provide a rugged high performance patented push-pull hermaphroditic interconnection system. These «genderless» connectors combine LEMO's well proven push-pull latching technology and the use of our standard high quality optical and electrical contacts.
The main features of these series are as follow:
– security of a new patented push-pull hermaphroditic self-latching system
– 2 shell sizes, SH and MH series
– compact unsealed version for general purpose applications
– rugged waterproof (IP 68) version for all outdoor applications
– a choice of multifibre or electrical contacts configurations
– lightweight design with shell in anthracite nickel-plated aluminium alloy
– low loss ceramic PC technology in multimode and singlemode
– gold plated electrical contacts.
Each series consists of plug and socket which will accept cable diameter ranging from 3.6 mm to 10 mm. Initial program is giving solutions with 2, 4 or 6 fibre optic channel and 6 or 12 electrical contacts.

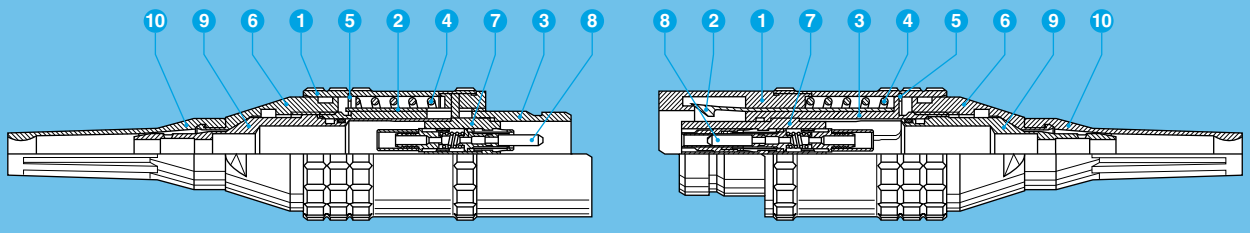
Standard version
(IP 50 when mated)



Sealed version
(IP 68 when mated)



Part Section Showing Internal Components



1. shell
2. latch sleeve
3. inner shell
4. spring
5. circlip
6. collet nut
7. insulator
8. optical contact
9. cable adapter
10. bend relief

Technical Characteristics

Mechanical and Environmental

Characteristic			Value	Standard
Mating durability			2000 cycles	IEC 60512-5 test 9a
Temperature range			-55°C to +125°C[1)]	
Vibration resistance			10-2000 Hz, 15g	IEC 60512-4 test 6d
Shock resistance			100 g, 6 ms	IEC 60512-4 test 6c
Protection index FHE/FHE			IP 68	IEC 60529
Water immersion FHE/FHE			up to 2 meters depth	
Protection index FHA/FHA			IP 50	IEC 60529
Average latching retention	SH series	plug/plug	600 N	IEC 60512-8 test 15f
		plug/socket	300 N	
	MH series	plug/plug	800 N	
		plug/socket	400 N	

Electrical

Characteristic	Value	Standard
Insulation resistance	> 10^{12} Ω	IEC 60512-2 test 3a
Contact resistance	< 3.6 mΩ	IEC 60512-2 test 11f
Shell resistance	< 10 mΩ	IEC 60512-2 test 2f

Notes: 1) with f.o. contacts temperature range -40°C/+80°C

Optical

Characteristic	Value	Standard	Method
Average insertion loss fibre 9/125 µm	0.18 dB	IEC 61300-03-34	Method 2
Average insertion loss fibre 50/125 µm	0.25 dB	IEC 61300-03-34	Method 2
Return loss fibre 9/125 µm (UPC)	≥45 dB	IEC 61300-03-06	Coupler Method
Return loss fibre 9/125 µm (Hand polish)	>25 dB	IEC 61300-03-06	Coupler Method

Materials and Treatments

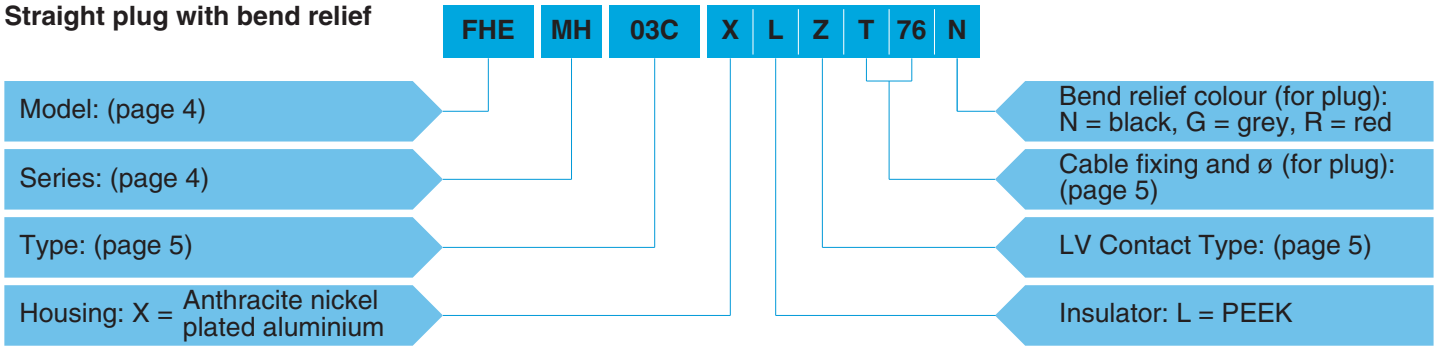
Component	Material (Standard)	Surface treat (µm) nickel Cu	Ni	Au
Outer shell, collet nut[1)]	Alum. (AA 6262A or AA 6023)	–	5	–
Latch sleeve	Special brass	0.5	3	–
Other metallic parts	Alum. (AA 6262A or AA 6023)	–	5	–
Spring	Stainless steel	without treatment		
Insulator	PEEK	without treatment		
Electrical contacts	Brass (male)/Bronze (female)	0.5	3	1
O-ring and gaskets	Silicone MQ / MVQ	without treatment		

Notes: 1) anthracite colour

Part Number Example

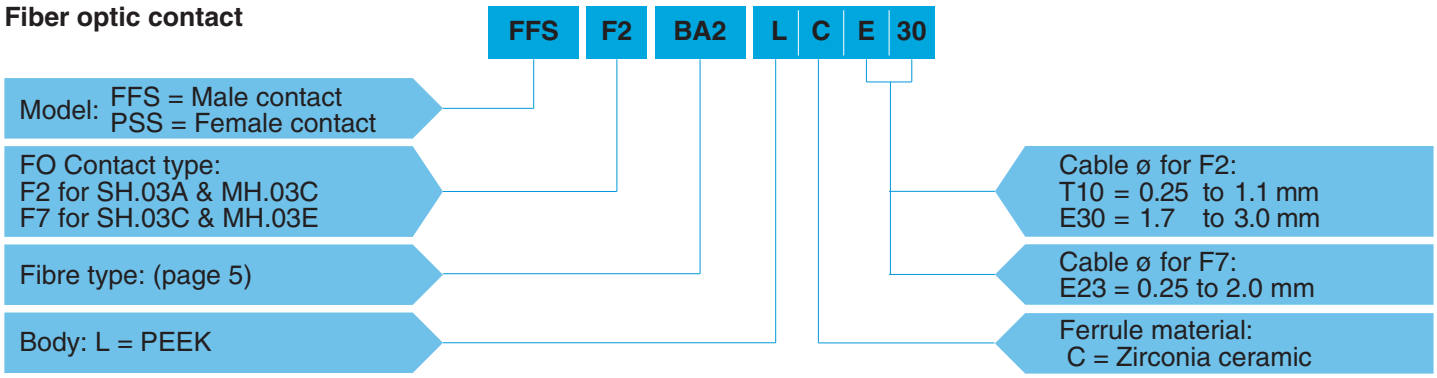
A different part number structure is applicable for each of the following product types:
– Plugs and fixed sockets; fibre optic contacts.
Note: The fibre optic contacts must be ordered separately. An equal number of contacts must be ordered (eg. for MH.03C; 2 x FFS.F2 and 2 x PSS.F2).

Straight plug with bend relief



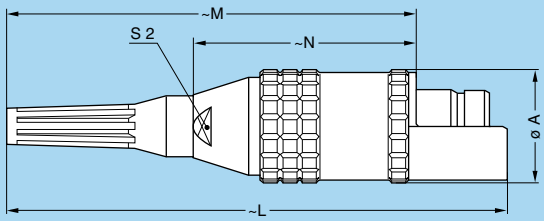
FHE.MH.03C.XLZT76N = Straight plug (IP 68 when mated), MH series, multifibre to accept 4 F2 type fibre optic contacts, anthracite nickel plated aluminium shell, PEEK insulator, with cable fixing type T for 7.5 to 6.6 mm cable and black bend relief.

Fiber optic contact



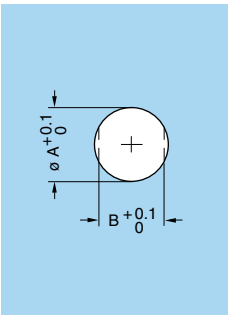
FFS.F2.BA2.LCE30 = Male F2 type fibre optic contact, ferrule bore diameter of 125 µm, PEEK body, Zirconia ceramic ferrule, crimp cable fixing, for tight jacket cable with a diameter between 1.7 to 3.0 mm.

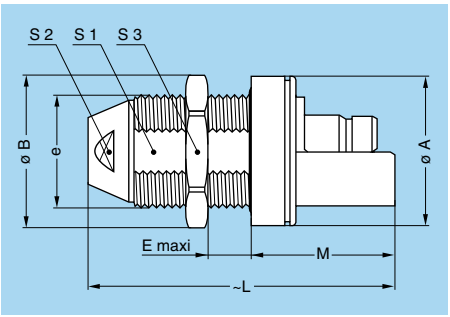
Models - Series



FHA Straight plug with cable adapter or collet and nut with bend relief

Reference		Dimensions (mm)				
Model	Series	A	L	M	N	S2
FHA	SH	21.8	98.4	82.2	46.2	13
FHA	MH	25.4	109.3	89.1	47.1	15



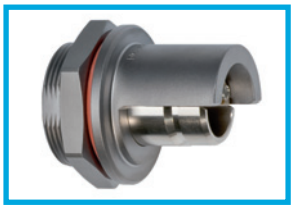


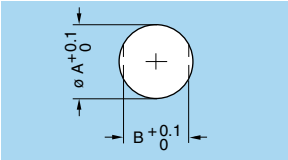
FWA Fixed plug, nut fixing

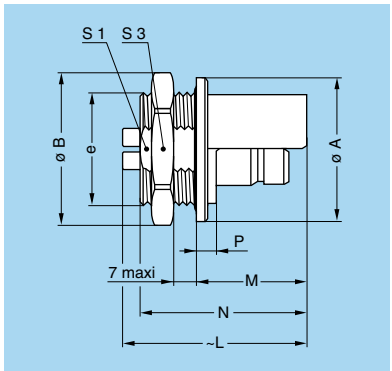
Reference		Dimensions (mm)								
Model	Series	A	B	e	E	L	M	S1	S2	S3
FWA	SH	28.5	28.5	M22x1	14	55.0	26.5	20.5	14	25
FWA	MH	34.0	34.0	M25x1	17	64.5	31.5	23.5	17	30

Panel cut-outs

Series	Dim. (mm)	
	ø A	B
SH	22.2	20.6
MH	25.2	23.6





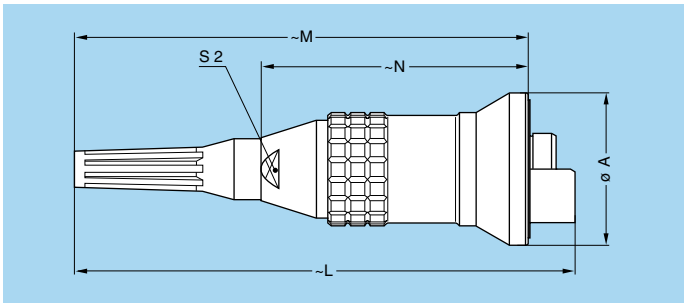


EHA Fixed socket, nut fixing

Reference		Dimensions (mm)									
Model	Series	A	B	e	L optic	L elect.	M	N	P	S1	S3
EHA	SH	27	28.5	M22x1	38.8	30.5	19.5	30.5	3.3	20.5	25
EHA	MH	32	34.0	M25x1	40.8	37.0	24.5	37.0	4.3	23.5	30

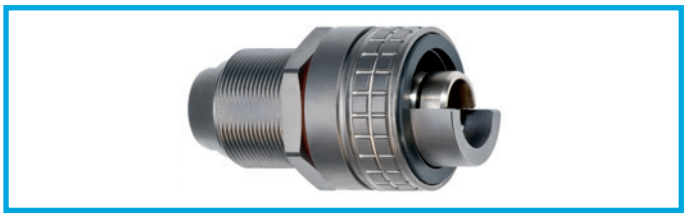
Panel cut-outs

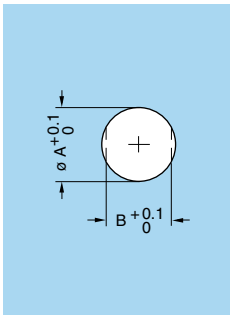
Series	Dim. (mm)	
	ø A	B
SH	22.2	20.6
MH	25.2	23.6

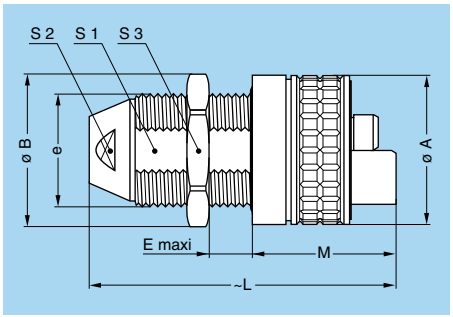


FHE Straight plug with cable adapter or collet and nut with bend relief (IP 68 when mated)

Reference		Dimensions (mm)				
Model	Series	A	L	M	N	S2
FHE	SH	28.5	98.4	90.0	54.0	13
FHE	MH	34.0	109.3	98.9	56.9	15





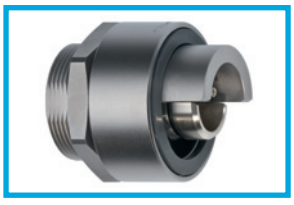


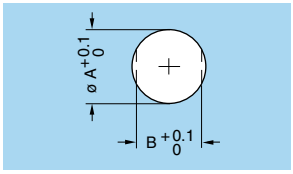
FWE Fixed socket, nut fixing (IP 68 when mated)

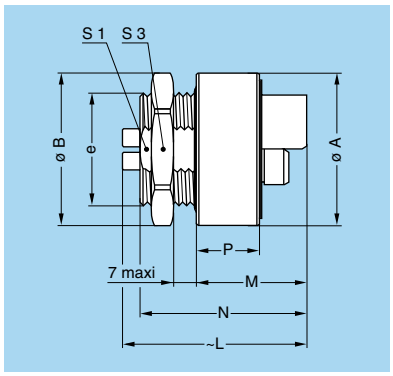
Reference		Dimensions (mm)								
Model	Series	A	B	e	E	L	M	S1	S2	S3
FWE	SH	28.5	28.5	M22x1	14	55.0	26.5	20.5	14	25
FWE	MH	34.0	34.0	M25x1	17	64.5	31.5	23.5	17	30

Panel cut-outs

Series	Dim. (mm)	
	ø A	B
SH	22.2	20.6
MH	25.2	23.6







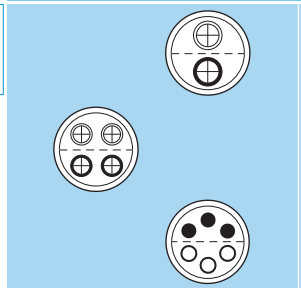
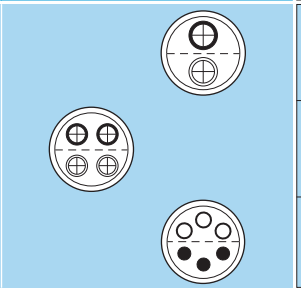
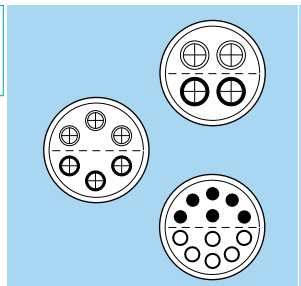
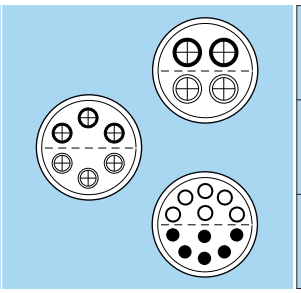
EHE Fixed socket, nut fixing (IP 68 when mated)

Reference		Dimensions (mm)									
Model	Series	A	B	e	L		M	N	P	S1	S3
					optic	elect.					
EHE	SH	28.5	28.5	M22x1	38.8	30.5	19.5	30.5	11.1	20.5	25
EHE	MH	34.0	34.0	M25x1	40.8	37.0	24.5	37.0	14.1	23.5	30

Panel cut-outs

Series	Dim. (mm)	
	ø A	B
SH	22.2	20.6
MH	25.2	23.6

Insert configuration

	Plug	Socket	Reference	FO contact		Low Voltage contact						
				F2 Nb	F7 Nb	Contact Nb	ø A (mm)	Contact type: AWG max Solder	Contact type: AWG Crimp	Test voltage (kV rms)	Test voltage (kV dc)	Rated current (A)
SH			03A	2	–	–	–	–	–	–	–	–
			03C	–	4	–	–	–	–	–	–	–
			306	–	–	6	1.3	20	18-20	1.5	2.1	12
MH			03C	4	–	–	–	–	–	–	–	–
			03E	–	6	–	–	–	–	–	–	–
			312	–	–	12	1.3	20	18-20	1.0	1.5	8

Note: Other arrangement, optical, electrical or mixed optical-electrical can be made available upon request.
WARNING: There is no contact number on the insulator. When wiring one hermaphroditic connector, one should terminate each contact to its mirror image number of the other connector.

Electrical contact

Reference	Contact type
A	solder for plug
C	crimp for plug
L	solder for socket

Reference	Contact type
M	crimp for socket
Z	no contact

Fibre type

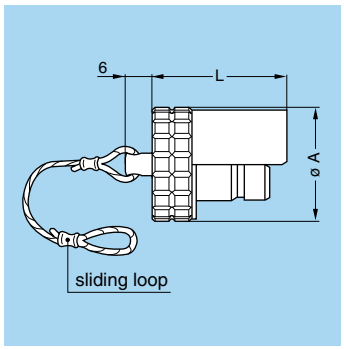
Reference for F2 contact	Reference for F7 contact	ø Core/Cladding (µm)	Ferrule hole ø (µm)	Note
BA2	125	9/125 50/125 62.5/125	125	●
BB2	126		126	●
BD2	128		128	○

● First choice alternative ○ Special order alternative

Cable diameter

	Adapter «T» for fibre optic connectors			Collet «C» for electrical connectors		
	Ref.	Cable ø max	Cable ø min	Ref.	Cable ø max	Cable ø min
SH	T46	4.5	3.6	C52	5.0	4.1
	T56	5.5	4.6	C62	6.0	5.1
	T66	6.5	5.6	C72	7.0	6.1
	T76	7.5	6.6	C82	8.0	7.1
MH	T56	5.5	4.6	C62	6.0	5.1
	T66	6.5	5.6	C72	7.0	6.1
	T76	7.5	6.6	C82	8.0	7.1
	T86	8.5	7.6	C92	9.0	8.1
	T91	9.0	8.6	C10	10.0	9.1

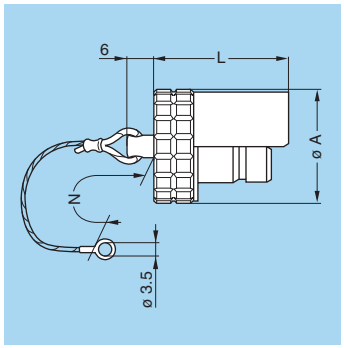
Accessories



BFA Cap (for FHA and FWA plugs)

Part number	Dim. (mm)	
	A	L
BFA.SH.100.XAZ	21.8	23.5
BFA.MH.100.XAZ	25.4	30.0

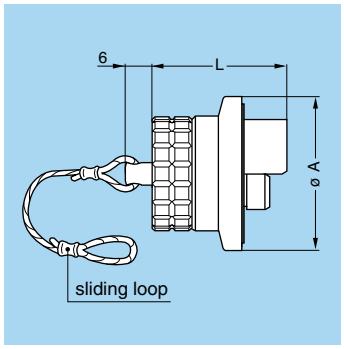
- Body material: Anthracite nickel plated aluminium alloy
- Lanyard material: Stainless steel
- Crimp ferrule material: Nickel-plated brass + polyolefin
- Maximum operating temperature: 125°C
- Watertightness: IP50 according to IEC 60529



BHA Cap (for FHA and FWA plugs)

Part number	Dim. (mm)		
	A	L	N
BHA.SH.100.XAZ	21.8	23.5	120
BHA.MH.100.XAZ	25.4	30.0	120

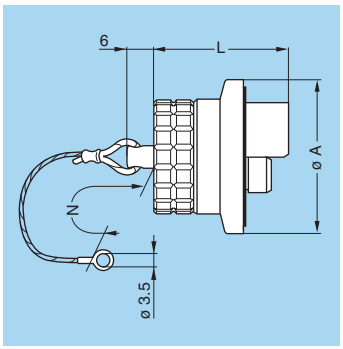
- Body material: Anthracite nickel plated aluminium alloy
- Lanyard material: Stainless steel
- Crimp ferrule material: Nickel-plated brass + polyolefin
- Maximum operating temperature: 125°C
- Watertightness: IP50 according to IEC 60529



BFE Cap (for FHE and FWE plugs)

Part number	Dim. (mm)	
	A	L
BFE.SH.100.XAS	28.5	23.5
BFE.MH.100.XAS	34.0	30.0

- Body material: Anthracite nickel plated aluminium alloy
- Lanyard material: Stainless steel
- Crimp ferrule material: Nickel-plated brass + polyolefin
- O-ring material: Silicone rubber
- Maximum operating temperature: 125°C
- Watertightness: IP68 according to IEC 60529



BHE **Cap** (for FHE and FWE plugs)

Part number	Dim. (mm)		
	A	L	N
BHE.SH.100.XAS	28.5	23.5	120
BHE.MH.100.XAS	34.0	30.0	120

- Body material: Anthracite nickel plated aluminium alloy
- Lanyard material: Stainless steel
- Crimp ferrule material: Nickel-plated brass + polyolefin
- O-ring material: Silicone rubber
- Maximum operating temperature: 125°C
- Watertightness: IP68 according to IEC 60529

Tooling

WST.KI.125.34 Cleaning kit for F2 fibre optic contact

Description
Fibre optic cleaning kit of 2 cotton buds, 1 dry and 1 being soaked in IPA (Isopropyl Alcohol) used for cleaning the fibre optic contacts.

DCC.91.312.5LA Extraction/Installation tool for F2 fibre optic contact

DCS Contact alignment device tool for F2 or F7 fibre optic contact

Description
Simple tool with two threaded end for installation/extraction of the F7 contact alignment device.

Part number	Contact type
DCS.F2.035.PN	F2
DCS.F7.035.PN [1)]	F7

Note: [1)] Included in the LEMO F7 workstation.

DCC Extractor for F7 fibre optic contact

Description
Manual tool for the extraction of the F7 contact.

Part number
DCC.91.307.5LA [1)]

Note: [1)] Included in the LEMO F7 workstation.

Product safety notice

PLEASE READ AND FOLLOW ALL INSTUCTIONS 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 catalog however these may be influenced by PC board design and / or wiring harnesses.
   The test voltage indicated in the catalog 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 Marking is applied to a complete product or device, and implies that the device complies with one or several European safety directives.
   CE Marking can not be applied 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.

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