

MEDICAL

IEC 60601-1 (3rd Ed.)



LEMO has a distinguished reputation in offering high-quality, push-pull connectors and cable assemblies to the medical industry. We have a wide array of both technical and manufacturing expertise that we bring to our customers to drive future medical device development. A global company with local service and technical support.

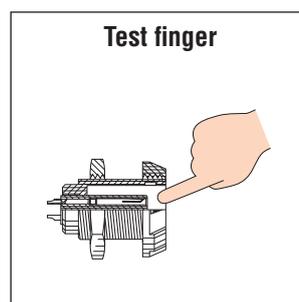
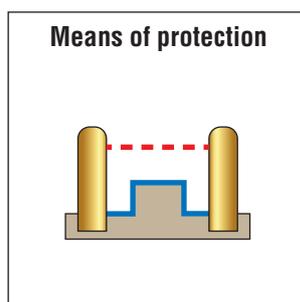
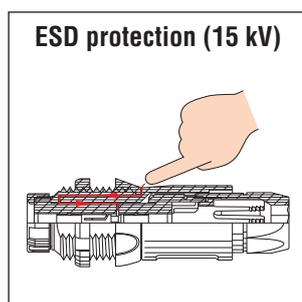
How does the IEC 60601-1 change the design of your Medical Equipment?

Latest release of IEC 60601 (3rd Ed.) brings protection against electrical hazards to higher standards. This impacts medical device interconnections in 3 specific aspects which are summarized below:

1. Increased ESD protection threshold from 8 kV to 15 kV.
2. Increased MOPP / MOOP values and re-definition of clearance and creepage requirements.
3. Application of the above improvements to normalized finger tests.

LEMO can help you with:

- Advising on cable assembly techniques with solutions such as the use of dielectric barriers in the form of heat shrink tubing on contact terminations.
- Sleeved contacts which increase the separation distance during mated and unmated condition.
- Compliant product with insulation barriers to increase the separation distances at the rear of the connector. This is also possible with PCB mounted connectors.
- Compact designs making the most efficient use of the space available.



Local support



Wide range of subsidiaries bringing LEMO close to you. Your local technical support

Medical approved



Certification partner
Medical approved
interconnect solutions

99% integrated



99% vertically integrated for total quality control, long term availability & supply stability

Global partner



Strong supply chain & global distribution network making your products available locally & globally

Long history

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Proven quality and technical reputation in the connector industry since 1946

Product safety notice & disclaimers:

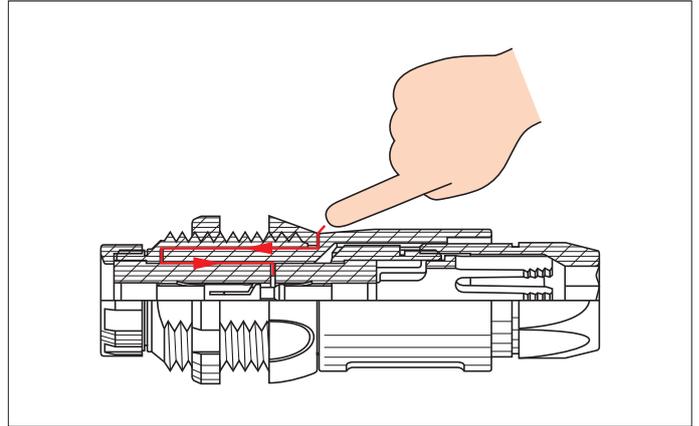
Please read and follow all instructions specified on <https://www.lemo.com/en/about-lemo/product-safety-notice-and-disclaimers>

ESD protection (15 kV)

The purpose of Electrostatic Discharge (ESD) protection is to avoid voltages from medical devices coming into contact with operators. The new IEC60601-1 (3rd ed.) defines an increased value of 15 kV as a minimum insulation voltage between conductors and the operator in a mated condition.

LEMO offers several solutions to achieve this specification:

- On the REDEL P series, we can 1) select a thicker dress nut which can also add IP66 sealing, or 2) utilise high voltage inserts that significantly increase the creepage and clearance distances.
- On the SP series, all models fulfill this requirement due to the design which features the unique and patented inner locking mechanism.

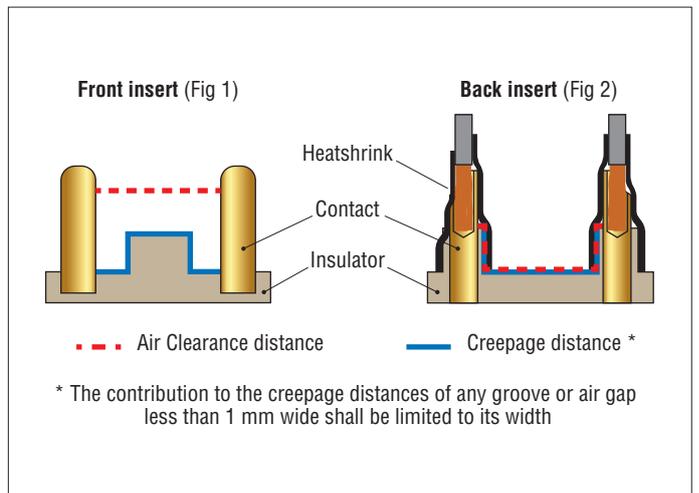


Means of protection

Medical devices must incorporate two Means of Protection (MOP) to isolate patients and operators from the risks of electrocution. A MOP can be safety insulation, a protective earth, a defined creepage distance, or an air gap (clearance). These can be used in various combinations.

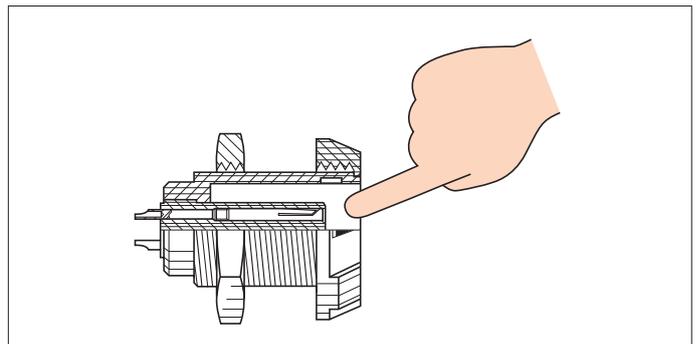
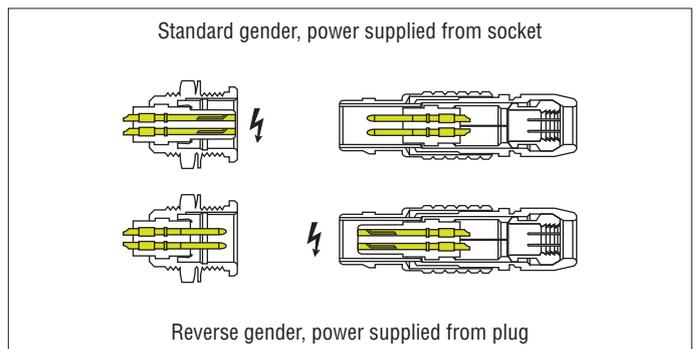
The IEC 60601-1 (3rd ed.) differentiates between the risk to patients and the risk to operators. A MOP can therefore be classified as **Means of Patient Protection (MOPP)** or a **Means of Operator Protection (MOOP)**.

When applied to connectors the typical values to consider for MOOP / MOPP compliance are pin to pin creepage and clearances distances defined for several voltage classes in the IEC 60601 (3rd ed.) standard. LEMO offers several models with specially qualified inserts in both REDEL 1P or 2P series.



Test finger

Finger test conformity is the 3rd aspect of operator and patient protection as the design guarantees that no access is possible to the electrical contacts. This geometrical barrier prevents the risk of electrical shock when unmated. The test is performed using the normalized test finger according to IEC 61032. Although our compliant inserts offer protection, care should be taken in designing the system with consideration given to the direction of current or voltage. For example, supplying the power through the less accessible side or socket style contacts. LEMO offers most of its configurations in both standard and reverse gender allowing customers maximum flexibility in their design.



REDEL 1P



Part number example	Test finger	ESD value	Nb of contacts	MOPP @ 50V	MOOP @ 50V	MOOP ¹⁾ @ 240V	Clearance / Creepage ²⁾ (mm)
PKG.N0.3GL.LR	✓	> 15 kV	3	2 MOPP	2 MOOP	1 MOOP	4.66 / 4.66
PKG.N0.4GL.LR	✓	> 15 kV	4	1 MOPP	2 MOOP	1 MOOP	3.50 / 3.50

Other options available, contact your local LEMO partner for details. ¹⁾ Primary circuit. ²⁾ Mated condition.

REDEL 2P



Part number example	Test finger	ESD value	Nb of contacts	MOPP @ 50V	MOOP @ 50V	MOOP ¹⁾ @ 240V	Clearance / Creepage ²⁾ (mm)
CKB.H02.GLLR	✓	> 15 kV	2	2 MOPP	2 MOOP	2 MOOP	8.90 / 8.90
CKB.H05.GLLR	✓	> 15 kV	5	2 MOPP	2 MOOP	2 MOOP	7.96 / 7.96
CKB.H08.GLLR	✓	> 15 kV	8	2 MOPP	2 MOOP	2 MOOP	7.42 / 7.42

Other options available, contact your local LEMO partner for details. ¹⁾ Primary circuit. ²⁾ Mated condition.

REDEL SP



Part number example	Test finger	ESD value	Nb of contacts	MOPP @ 50V	MOOP @ 50V	MOOP ¹⁾ @ 240V	Clearance / Creepage ²⁾ (mm)
SAN.M10.GLA.6A	✓	> 15 kV	10	–	–	–	0.76 / 0.76
SRN.M10.GLL.6A	✓	> 15 kV	10	–	–	–	0.76 / 0.76
SLN.M22.GLLG	✓	> 15 kV	22	–	–	–	0.48 / 0.48

Other options available, contact your local LEMO partner for details. ¹⁾ Primary circuit. ²⁾ Mated condition.

2B series



Part number example	Test finger	ESD value	Nb of contacts	MOPP @ 50V	MOOP @ 50V	MOOP ¹⁾ @ 240V	Clearance / Creepage ²⁾ (mm)
EGG.2B.434.CJA	✓	–	4	2 MOPP	2 MOOP	1 MOOP	4.95 / 4.95
EGG.2B.435.CJA	✓	–	5	2 MOPP	2 MOOP	1 MOOP	4.85 / 4.85

Other options available, contact your local LEMO partner for details. ¹⁾ Primary circuit. ²⁾ Mated condition.

R series



Part number example	Test finger	ESD value	Nb of contacts	MOPP @ 50V	MOOP @ 50V	MOOP ¹⁾ @ 240V	Clearance / Creepage ²⁾ (mm)
EBG.0R.713.GLM	✓	–	2HV + 13LV	1 MOPP	2 MOOP	1 MOOP	4.13 / 4.13
EBG.0R.704.GLM	✓	–	4HV + 4LV	2 MOPP	2 MOOP	2 MOOP	6.35 / 6.35
EBG.1R.703.GLM	✓	–	8HV + 3LV	2 MOPP	2 MOOP	2 MOOP	6.93 / 6.93

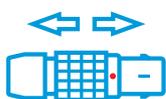
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NORTHWIRE



NORTHWIRE cable & LEMO cable assembly services

- Complete range of specialized medical cables by NORTHWIRE (BioCompatic, PTFE, etc.)
- One stop shop for cabled solution
- Certified interconnection quality and performances



Ergonomic and intuitive
Push-pull locking



Failsafe protection
with mechanical
and color coding



Product modularity
Any contact configuration



Sterilization certified,
clean & biocompatible
materials

Cable assembly

The cable assembly depends essentially on the application. Typical applications related questions could be:

- Will the connector and its associated cable be manipulated over and over again by an operator?
- Does the assembly need to be watertight?
- Is there a specific standard that the assembly needs to meet or conform to?
- Are there operations or conditions that the assembly will encounter that could affect the design such as the flexibility or the way the cable lies within the environment?
- And more.

LEMO's skilled technicians will consider all these questions and propose assemblies to be manufactured to customer specifications.

LEMO is renowned for the quality of the connector solutions and this is matched by the cable assemblies supplied. Commitment to quality is supported by 100% testing of all assemblies. Capabilities include potting and overmold to support rapid prototype and development through to high volume series production.

LEMO subsidiaries are equipped with modern equipment, much of it custom built specifically for customer needs. These include cut and strip machinery, robotic assembly and automatic test equipment to ensure maximum reliability and confidence in LEMO cable assemblies.

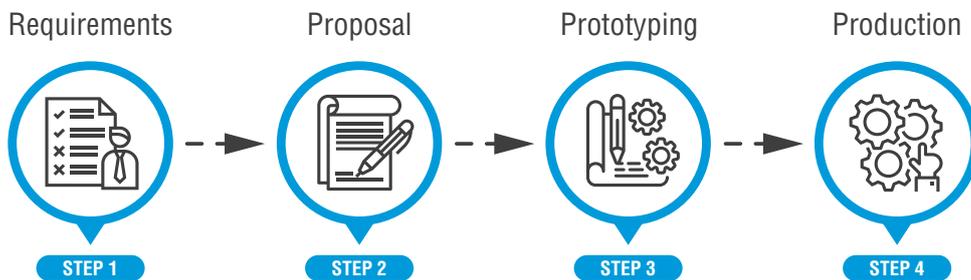


Custom solutions

Contacts, connectors and integrated cable assembly solutions meeting the most demanding technical market requirements. LEMO's connector solutions and value-added services are characterized by their exclusive focus on meeting the customer's needs.

- Precise implementation of application-specific requirements regarding design, functionality, cost and exclusivity
- Custom connector solutions derived from standard products
- One-to-one local expertise
- Quick prototyping and production turn around

Custom interconnect solutions based on your requirements



Contact us
for more information
www.lemo.com

