EMO Systems GmbH

Frequently Asked Questions (FAQ)

EMOSAFE Network Isolators

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Contents

1. What is a network isolator?

A network isolator is an electrically insulating separation device for Ethernet-based networks. It disconnects all the electrically conductive connections between the connected network peripherals and the connected device, and typically provides protection against DC and AC voltages of 4 kV and greater. At the same time, it makes possible an almost loss-free transmission of high frequency AC signals with frequencies greater than 1 MHz, which are used in the Ethernet protocol for signal transmission.

EMOSAFE Network Isolators are suited to use in the medical field for the standard-compliant isolation of Ethernet-based signal interfaces (Signal Input/Output Parts, or SIP/SOP) in accordance with the requirements of IEC 60601-1.

2. How can dangerous voltages be caused in the network?

For copper-based network cabling, it is possible that the signal lines or the cable shield unintentionally come into contact with other electrical parts through installation or design errors, aging, or humidity. It is therefore assumed that the local supply voltage is present on the network cabling. For this reason, network isolators are usually designed to be permanently exposed to a voltage of 250 VAC. However, high voltage spikes and transients can appear on supply networks, and are caused, for example, by switching operations. Since these overvoltages can be much greater than the mains voltage, network isolators possess high voltage withstand strengths.
Furthermore, network isolators prevent the flowing of current between connected devices, which would otherwise result when electric potential differences exist between the connection points.

3. Where are network isolators typically used?

Network isolators are commonly used in copper-based network connections in private, public, and commercial sectors.
Typical applications include:

- **Medical electrical devices** whose operation is permitted only when existing signal interfaces present a standards-compliant means of separation. Hence the frequently used term “medical network isolator”.

- Sensitive **measuring and monitoring devices** in electrical testing laboratories, which are connected through an Ethernet network to a control centre, and need to be protected from transients and potential differences.

- **Computer systems** which are electrically connected over long distances via Ethernet cabling, where potential equalising currents need to be prevented.

- **Audio applications**, where the transmission of low frequency alternating currents (AC hum) over the network connection is to be reduced.

- Applications where **valuable** or especially **vulnerable devices** need to be protected from overvoltage and line noise from peripheral network equipment.

4. When should network isolators not be used?

A network isolator is designed for data transmission over the frequency range from 0.3 MHz to 100 MHz. Lower frequencies are strongly attenuated. For this reason it is not usually possible to transmit the signals of nurse call systems, telephone systems, or analog audio and video signals through a network isolator. Higher frequencies of up to 500 MHz can be transmitted through a network isolator; however the signal quality in this frequency range will, in many cases, not meet the application requirements. The supply of electrical power to Power over Ethernet (PoE) devices is not possible via cable paths fitted with network isolators. See question 23.

5. I am a manufacturer of medical devices which have network interfaces. Do I need network isolators?

If the housing of the medical device is located in the patient's environment and the housing contains accessible, electrically conductive parts which are able to come into contact with the patient via the person performing the treatment, the manufacturer of the medical device must ensure that no discharge currents which exceed the IEC 60601-1 specifications for touch currents are able to flow through the patient's body. The source for such currents may be any electrically conductive connections from the device to its environment, which includes the network connection. (Please also see question 11.)

As part of the prescribed type examination of the ME device, the network (signal lines and shield) interface are connected to a 250 VAC source. A measuring device with a test probe is then placed in contact with all accessible parts of the housing. If, under normal conditions (NC), a current exceeding 100 µA is discharged through the test probe from any part of the device, it will not receive approval. Please note that approval may still be refused if the device passes the type examination, but the measures taken do not meet the requirements of IEC 60601-1. (Please also see question 25.)

Network isolators create a galvanic separation point directly at the network interface, in accordance with the design requirements of IEC 60601-1, hence cutting off the current sources responsible for the touch currents.

The measures taken by the manufacturer must also fulfil single fault safety requirements; i.e. they must also offer sufficient protection even when a second safety measure for patient protection which the same purpose fails, e.g. the protective earth connection. This is tested separately. The touch currents under single fault conditions (SFC) may not exceed 500 µA.

It must also be taken into consideration that the interface and non-isolated parts of the connector may also be accessible. This problem can be solved with the use of suitable covers or by designing the layout such that a network isolator is located in the supply line outside the patient's environment (Please also see question 17).

Manufacturers may also obtain approval for the network interface of their medical device solely for connection with other medical devices, and identify the interface correspondingly. In this case, the test described at the beginning is no longer necessary, and the network interface no longer needs to be galvanically separated. However, this is

only a viable solution when the interface is not intended for connecting to a clinic network, otherwise such a connection could be made by medical personnel within the scope of reasonably foreseeable misuse.

On the other hand, as a manufacturer, you do not necessarily need to install or provide a network isolator. It is sufficient when the accompanying documents prescribe their use in cases where your device is to be connected to a non-medical device or a clinic network. By doing so, you transfer the responsibility for ensuring that the device has a safe electrical connection to the operator.

As long as your device is installed in an irremovable manner and possesses a permanently installed protective earth connection which satisfies the requirements laid out in IEC 60601-1, you do not require any network isolators.

6. I operate medical electrical devices. Do I need network isolators?

Operators of medical electrical (ME) devices, according to the German Medical Device Directive (MPBetreibV), are responsible for ensuring that the standards for proper installation, operation and applications are adhered to. This includes ensuring the electrical safety of patients and staff. With regards to the Ethernet interface of an ME device, an electrical isolation is required in accordance with the requirements of IEC 60601-1 and its national counterparts.
For example, in Germany this is DIN EN 60601-1.

Network isolators are required when such a galvanic separation device is not already present on the device side, or when this separation cannot be assumed to be provided. Ethernet interfaces present on ME devices may be intended only for connection to other ME devices, and in this case do not require any further galvanic separation. Should, however, these devices be connected to non-ME devices (for example, a printer), a network isolator must form part of the electrical connection. (See also section 5)

7. There are network isolators for device installation, for wall mounting, and as standalone devices. Which type is right for me?

Basically, it is necessary to provide a network isolator in medical applications as close as possible to the device to be protected, in order to reduce the chances of cable damage or installation errors between the network isolator and the device to be protected, thus ensuring the protection efficacy of the system. In this respect, a protected network interface at the device is a sensible option. However, this is only true when the electrically conductive parts of the inserted plug (specifically the exposed shield metal) cannot be inadvertently touched during handling. (See also section 5)

We recommend **equipment manufacturers** to choose network isolators for device installation – if necessary with contact prevention and cable securing options. Such network isolators relieve the customer of the task of having to themselves take care of the galvanic separation of the network interface.

As the **operator** of a medical facility, you have the responsibility for the electrical safety of a multitude of devices. Here you have two possibilities:

1. Evaluate all the medical devices with network interfaces operated within your area of responsibility, as to whether or not they may be connected with non-ME devices (e.g. computers, printers) or to the (unsecured) network, in terms of the intended purposes and the obvious possible misuses (→ risk analysis) of the system.
   If this is the case, review the equipment documentation or contact the device manufacturer as to what additional requirements are put on the electrical isolation of the network interface.
   To save space and cost, device manufacturers often permit only the normally uncritical combination with other ME devices, or recommend an external galvanic isolation. Should a device manufacturer fail to detail requirements regarding galvanic separation in the accompanying device documentation, this is often a sign of a lack of knowledge of the requirements for electrical safety of the network interface, as well as an indication of a lack of electrical isolation.
   Depending upon the ascertained requirements, acquire a network isolator for each affected network interface, and connect it securely to the device. Following that, train your staff so as to prevent the accidental connection of ME devices with non-ME devices over unsecured network connections.

2. Identify all accessible network interfaces on cable channels and wall outlets in rooms where ME devices are operated within the patient environment, and equip these with network isolators which meet the requirements for electrical isolation. Staff are then trained in such a manner that all network connections between these devices must only be made through the isolated interfaces, and never directly connected.
   Especially in large medical facilities, this opportunity significantly reduces the administrative burden, and is therefore often the most cost-effective solution. This also prevents dangerous voltages from being brought into the patient's environment, so that contact protection measures may be omitted where appropriate.

Manufacturers of **medical supply units** (**MSU**) for walls, ceilings, or floors, as well as manufacturers of ME device carts are faced with a particular situation. Network connections will often be simply routed straight through the units, and the features and designs are heavily based upon the specifications of their customers. At the same time, MSUs are themselves ME devices in the scope of EN 60601-1, and as such, users can expect that the available interfaces of the MSU conform to the requirements of Signal Input/Output Parts (SIP/SOP) in accordance with EN 60601-1.
As it is often debatable whether the operator or the manufacturer is responsible for this, EMO Systems has commissioned the German Association for Electrical, Electronic & Information Technologies (VDE) to provide their expert opinion on the matter. This is available from us upon request. Accordingly, the operator will be responsible for the safe operation of the equipment; however the manufacturer must allow for this through the design and construction, or by providing appropriate operating instructions. EMO Systems offers network isolators that are specifically for the use in medical supply units. For further information please contact our sales department.

8. Some network isolators have contact guards and accidental removal protection for the plug. Why would I need this?

When both the ME device to be protected and the Ethernet network interface are located within the patient environment, it is conceivable that during the treatment of the patient, the network cable could unintentionally come into human contact. When this happens, the protection effect of an inbuilt network isolator is bypassed, creating the situation in which dangerous voltages are transferred through the body of the operator into the patient.
To prevent this from happening, some models of EMOSAFE Network Isolators are available with the option of equipping the network interface with a contact guard.
This can be combined with accidental removal prevention, which prevents a patch cord from being inadvertently disconnected from the ME device during patient treatment. A special tool is required to remove the patch cable from the device. This is to ensure that the patch cord is an inseparable part of the ME device, and that the physical connecting and disconnecting always occurs at the wall outlet.

9. What does compliance with IEC 60601-1 and their national counterparts mean in terms of the network interface?

IEC 60601-1 is an international standard which stipulates the requirements for electrical safety of so medical electrical (ME) devices and ME systems. Some supplementary standards are provided along with this main standard. In the context of network isolators, the supplement IEC 60601-1-1 has been of particular importance, since it described in the past the requirements for electrical separation devices.
In the current third edition of the main standard eliminated the need for the supplementary standard IEC 60601-1-1, whose contents have been absorbed into the main standard.
IEC 60601-1 is legally binding only through the nationalised versions. For example, in Germany, the legally binding versions are DIN EN 60601-1 and VDE 0750-1.
To achieve compliance with the standards, devices and systems which are connected to other devices or networks via signal interfaces such as Ethernet, RS232, and USB, must have electrical separation devices in the power and data lines.
In a similar manner, this also applies to the power supply. For this, standard-compliant medical power supplies are utilised either inside or outside of the patient environment, or otherwise an external isolation transformer may be used, often providing for the safe connection of multiple devices.

10. What exactly is a medical electrical (ME) device, and what is a ME system?

An ME device is a device that is intended for the diagnosis, treatment, care, or supervision of patients, and is intentionally or potentially in contact with the patient.
An ME system is a union of several electrical devices, of which at least one is an ME device.

11. Why do I need special electrical isolation for medical equipment?

The electrically conductive parts of medical electrical (ME) devices often come into physical contact with the patient, either when used as intended, or through unavoidable

accidental contact. The patient needs to be protected from the danger that an electrical circuit is formed through the patient, and current from the medical device travels through the patient, putting him or her at risk. Because a patient may be weakened, unable to move, unconscious, or anesthetized while ME devices are connected to his or her body, stringent safety requirements are imposed on the construction and operation of electrical equipment which are operated within the patient environment.
In Germany for example, these requirements are detailed in the standard DIN EN 60601-1 (VDE 0750-1). These requirements state that all live conductors (except special equipotential bonding connections) leading from an electrically non-secure area may only be connected to such ME devices via isolating devices. According to DIN EN 60601-1 (Section 3.112), a separation device is defined as a component or an assembly of components with input and output parts, which prevent the transmission of unwanted voltages and currents between components of an ME system. Separation devices are available for both the power supply (in the form of isolating transformers) as well as for all types of signal interconnections, such as Ethernet networks.
EMOSAFE Network Isolators are such a separation device for Ethernet network connections.

12. What is a patient environment, and how are they defined?

The third edition of IEC 60601-1 defines the patient environment as "*any volume in which intentional or unintentional contact can occur between a patient and parts of the ME equipment or ME system or between a patient and other persons touching parts of the ME equipment or ME system.*"
A patient is defined as a "*living being (person or animal) undergoing a medical, surgical or dental procedure*".

All electrical devices, even those with no (or originally no) intended medical purpose, which are either located, or connected to devices within the patient environment, must meet the electrical safety requirements of IEC 60601-1.
Where the patient environment (i.e. the aforementioned volume in which hazards may present themselves) exactly begins and ends depends upon the individual case, and this must be established and administered either by the facility manufacturer or operator in the context of a risk analysis.

It is generally assumed, however, that devices which are fully or partly located within a radius of 1.5 m around the patient are defined as being in the patient environment.

13. The technical documentation for the EMOSAFE Network Isolators often refers to "MOPP". What does this mean?

MOPP is an acronym of **M**eans **O**f **P**atient **P**rotection. This term is defined in IEC 60601-1 as a "*means of protection for reducing the risk due to electric shock to the patient*".
Medical devices must always be equipped with two independent means of patient protection in order to be "single fault safe". This means that one of the two protective measures can fail without compromising the patient's safety.

Here several protection systems usually work side by side or with one another, confronting various different potential hazards:

- A high **dielectric strength** will protect the electrical equipment from frequent impulse voltages, which can be caused by switching operations.
- A suitable **insulation construction** will reduce the probability of inadequate or failing insulation due to manufacturing defects or product aging.
- Compliance with **creepage and clearance distances** will provide protection from electrical shock in humid or dusty environments.
- Reducing **leakage currents** through protection devices to levels below the device-dependent maximum leakage currents prescribed in the standard will ensure that the patient is protected from permanently acting leakage currents.
- **Protective earth** (PE) connections need to be in place to divert hazardous currents to earth before they reach the patient.

The number of protective measures a network isolator provides in a specific scenario depends not only upon its technical features, but also on the medical application; a blood pressure meter has different requirements than a cardiac pacemaker in the operating room. Furthermore, a network isolator must form both protection measures only when the protected medical device is not already equipped with a protective measure.

14. What voltage withstand strength does a network isolator require?

This depends on the intended purpose and can only be determined by the operator or the responsible organisation. For medical applications, there are clear rules. Depending upon the required number of Means Of Patient Protection (MOPP) and the operating voltage of the connected devices, the following matrix indicates the required dielectric (voltage withstand) strengths:

		125 V_{AC}	250 V_{AC}	400 V_{AC}
1 MOPP	**Dielectric Strength**	**1.5 kV**	**1.5 kV**	**1.8 kV**
	Clearance Distance	1.6 mm	2.5 mm	3.5 mm
	Creepage Distance	3.0 mm	4.0 mm	6.0 mm
	Isolation System	Basic Insulation		
2 MOPP	**Voltage Withstand Strength**	**3.0 kV**	**4.0 kV**	**4.6 kV**
	Clearance Distance	3.2 mm	5.0 mm	7.0 mm
	Creepage Distance	6.0 mm	8.0 mm	12.0mm
	Isolation System	Reinforced insulation		

From this matrix it is clear that dielectric strength is only one of several requirements that a network isolator must comply with in order to form sufficient means of protection within a specific use case. The isolation system and realised creepage and clearance distances here represent further important protection criteria. Thus high nominal dielectric strengths do not automatically mean that a network isolator delivers sufficient protection.

15. What does leakage current mean, and what are its permissible limits?

Galvanic isolation devices are never 100% perfect isolators. This means that whenever a voltage is present on one side of the device, a very small amount of current will still flow (or “leak” through), and this is referred to as leakage current.
It is assumed that the largest voltage that a network isolator will be permanently exposed to is the rated root mean square (RMS) AC voltage of the supply network, with an extra 10% safety margin. Because most network isolators are designed for a rated voltage of 250 VAC RMS, this results in a test voltage of 275 VAC RMS.
The permitted leakage current for the protected network interface is derived from the requirements of IEC 60601-1. This allowable leakage current for a particular device is dependent upon several factors, and can only be determined by the manufacturer.
Only in exceptional cases are network interfaces within the medical field required to have leakage currents of 50 µA or less. EMOSAFE Network Isolators typically have leakage currents significantly lower than this limit.

16. Must network isolators be subjected to regular safety checks?

Safety checks are not required for network isolators in medical applications, because network isolators in themselves provide no diagnostic or therapeutic purpose, and are therefore not classified as medical devices. However, together with connected medical devices, network isolators form medical electrical systems, which may to be subject to control. Therefore, safety checks on network isolators within such systems are meaningful when the risk of a patient forming part of an electrical circuit with the Ethernet connection is to be reliably prevented.

Recommended safety checks:

1. visual inspection for external damage;
2. inspection for the ingress of substances, especially liquids;
3. function test;
4. insulation test;
5. availability and completeness of the accompanying documentation.

A suitable test instrument is required for conducting the electrical safety tests in accordance with the appropriate standards. The EMOSAFE Network Isolator is to be connected to at both ends by means of a suitable test adapter. Such a test adapter connects the cable shield and all the signal wires to the test instrument. Suitable test fixtures are available from EMO Systems upon request.

17. How far away from the equipment to be protected can I install the network isolator?

In principle, a network isolator should be located as close as possible to the equipment to be protected. For this reason, many ME device manufacturers construct galvanically isolated network interfaces directly into their equipment. However, there is a risk that the unprotected incoming cable enters the patient environment, and that the patient, the

attending physician, or a member of staff can come into electrical contact upon cable connection or disconnection. The various products from our EMOSAFE Network Isolator family allow this risk to be countered as appropriate. The most common method is to utilise an EMOSAFE Network Isolator housed in an external enclosure, for example the EN-30, which is then located outside of the patient environment. This design offers the advantage that devices without network isolators can easily be retrofitted with the necessary protection. EMOSAFE Network Isolators for device installation are intended for device manufacturers. They have optional contact touch guards, and accidental removal protection.

18. Must an ME system also be galvanically isolated when it is not operated in the patient environment?

When a manufacturer develops a device by applying the IEC 60601-1 standard, this device must always be operated in accordance with these requirements, even when used outside of the patient environment. This holds true, provided that no other operational mode is available for the device.

19. How do you judge the quality of a cable route when a network isolator is part of the route?

Testing cable routes equipped with network isolators proves difficult for various test devices, since the absence of a direct electrical connection is often interpreted as a lack of cabling. When this happens, the result is always a fail. Cable routes equipped with EMOSAFE Network Isolators can be tested with cable certification devices which are suitable for testing isolated cable sections. This may need to be specified in the device's operational configuration. For example, for the DTX CableAnalyzer™ series of test devices from Fluke Networks, the twisted-pair option *AC-Wiremap* needs to be enabled. Testing of the shield and the measuring of the resistance of the signal lines is no longer possible. Should this testing be required, or the quality of the cabling route need to be evaluated without the influence of the isolator, the testing must be repeated, bypassing the network isolator.

Alternatively, qualification devices can be utilised, which measure the achievable data transfer rates, for example, the SIGNALTEK™ Cable Performance Tester from IDEAL. Due to the extremely low likelihood that an EMO Systems Network Isolator reduces the data transfer rate of the cable route, the network isolator can be removed for the duration of the test.

20. According to TIA 568, into which quality category do EMOSAFE Network Isolators fall into?

The commonly used quality categories (for example EIA/TIA-568 Cat.5e or ISO11801 Class D) for network components cannot be applied to network isolators, because a network isolator is not a component which appears in a "normal" cable path. For this reason there are no criteria in the standards for the quality classification of network isolators. A network isolator can be assessed only in conjunction with the wiring route in

which it was installed. When so assessed, ISO/IEC 11801 Class E_A as well as -TIA/EIA-568 Cat 6A Ethernet Performance in Channel Links are attainable.

Due to its transmission principle, a passive network isolator slightly reduces the quality of the transmitted signal. Transmissible frequency spectrums of state-of-the-art isolators lie around 500 MHz, so that data transfer rates with up to 10 Gbit/s are easily attainable.

21. How long are cable routes equipped with network isolators permitted to be?

A widespread assumption is that network isolators reduce the maximum length of cabling. In fact they do so, but in practice only very rarely.

Explanation: the maximum cable length for Ethernet connections is firstly limited by the signal propagation velocity required for a specific data transfer rate, secondly by the minimum allowable signal strength received at the far end of the cable, providing a satisfactory signal-to-noise ratio.
A network isolator has no influence over the signal propagation velocity.
The insertion loss of EMOSAFE Network Isolators is approximately equivalent to that for a cable of length between three and ten metres. This effect only begins to limit the maximum cable length when the insertion loss of the cable itself is borderline. In practice this occurs very rarely, as commercially available cable and connector components usually have much lower insertion losses than that required by the standards.
When in doubt, a cable certification device can help by providing a measurement of the insertion loss for the affected cable route. If the values are borderline, consider alternatives to shortening the cable, such as using a better quality cable, or fitting better quality terminal connections.

22. Is it possible to arrange multiple network isolators in a row?

In especially critical environments such as operating rooms, it may be appropriate to have both the ME device and the wall outlet fitted with separation devices, in order to reliably rule out any risk of unwanted voltages and currents reaching the patient. In other cases, a duplication occurs coincidently when already-isolated ME devices are connected to isolated wall outlets.
Such duplication is generally uncritical, because neither the signal strength nor the signal quality is significantly reduced by a network isolator. However, for cable routes already operating on the edge of their specifications, or for devices with older network interfaces, this can lead to losses, which is why we strongly recommend testing such a situation before the patient is subjected to such an ME system.

23. I want to operate a Power over Ethernet (PoE) device on a cable route equipped with a network isolator. Is that possible?

A network isolator can be used in a PoE network without the network isolator being damaged or impaired in its effect. However, because of its intrinsic electrical separation, PoE devices cannot be powered via a network isolator.

Should PoE devices nevertheless need to be operated, either the network isolator must be removed from the cable routing, or the device must be supplied with power by a separate power supply, being a medical power supply if necessary.

24. Network isolators interrupt the cable shield. What effect does this have?

The ***total shielding*** or outer shield of network cables serves primarily to prevent the cable interacting electromagnetically with neighbouring cables and equipment. Such interacting (or interference) affects the signal quality and the reliability of signal transmission. This can be especially important for installations where many cables are in a common cable duct or conduit. The extra ***wire pair shielding*** supports the effect of the total shielding, and additionally it reduces the electromagnetic interactions between adjacent pairs inside a cable.
The interruption of the cable shield over a short distance is generally negligible, as the protective effect is maintained over the entire screened portion. However, it can be entirely appropriate to continue cable shielding right up to the network isolator.
Twisted pair configurations in network cables provide effective protection against electromagnetic interactions. In the United States of America, for example, it is rare to find shielded Ethernet cables, as unshielded cables compete better in the cost-sensitive market.
Cable shields are almost indispensable, however, when used in 10-gigabit Ethernet applications (i.e. 10GBASE-T), due to the extremely high demands imposed on crosstalk performance. Furthermore, a shield may be required when the network wiring is used for other forms of data transmission, for example analog audio and video signals. The transmission of such signals is not supported by network isolators, which makes their shielding also irrelevant.

For some applications, electrically connected screening will be required to form a connection between the potential voltage differences of spatially distributed network components. For this reason, some members of our family of network isolators provide the means of connecting shield connections to ground. The EN-50 series offers plug connections for this purpose, allowing incoming cable shields to be electrically connected to the chassis ground of the devices.

In the context of EMC testing, it may be necessary to capacitively couple the shield connections across network isolators which are built into devices and equipment. This is possible with capacitors which have especially high dielectric withstand strengths. Such a connection can assist in controlling the electro-magnetic emissions. The EN-50 series of EMOSAFE Network Isolators offers such capacitively coupled connections.

Sometimes it is desired that a device, which is earthed via an Ethernet network cable, has a potential voltage matching that of its surroundings. To ensure this, the incoming and outgoing shield connections of some of our network isolators are equipped with special high-resistance, high-voltage-rated resistors. These resistors allow equipotential bonding through the shield conductors, but do not permit significant current flow.

25. In my Ethernet network, I only have unshielded cables. Do I still need a network isolator?

In the transmission and reception units of Ethernet network components, the signal conductors are electrically isolated with the help of transformers.
Therefore, it is often assumed that an additional separation of the cable screen (e.g. the use of unshielded cables) would be sufficient to comply with the isolation requirements specified by the standards.
However, the transformers commonly used in Ethernet network components only provide a functional isolation. The IEC 60601-1 requirements on the technical implementation of electrical isolation devices cannot be met by these transformers.

Specifically, these requirements are those of dielectric withstand strength, creepage and clearance distances, and the insulation construction. Enamelled wire, for example, which is commonly used in the construction of transformers, is explicitly stated in the standards as inadequate – even if the design attains the required dielectric withstand rating.

26. How does EMO Systems guarantee the quality of their EMOSAFE Network Isolators?

EMO Systems is certified to DIN EN ISO 9001 and DIN EN ISO 13485.
Before leaving our assembly line, every single one of our network isolators is subjected to a single test, in which all relevant safety properties are checked.
In order to guarantee optimal transmission quality, we additionally test our network isolators to our high quality requirements regarding important parameters for the transmission characteristics.

27. What does OTAR mean for some EMO products?

It is the abbreviation for **O**ver **T**ension **A**utomatic **R**elease and is not a parameter of network isolators, but the special property of the RJ45 socket of the EMOSAFE EN-85e to release the plug when the tension on the cable exceeds a certain value. This is to prevent the wall socket from being torn out of damage to the circuit board on the side of the device. This product was created for customers looking for a OTAR connector but with the added protection of having an inline network isolator.

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