BENDER
The Power in Electrical Safety©

Bender UK

Turnkey healthcare solutions

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The **Power** in **Electrical Safety**

CONTENTS

About Us 1

Standards 3

Turnkey Healthcare Solutions 5

Medical IT Systems (IPS) 7

Automatic Changeover Device (ATICS) 9

Uninterruptible Power Supplies (UPS) 11

Total Healthcare Solutions 13

Theatre Control Solutions 15

Pendants 18

Merivaara Surgical Lighting 19

Merivaara AV Systems 21

Service and Technical Support 23

Residual Current & Power Monitoring 25

Powerscout 27

About Us

Pioneer of Electrical Safety Solutions

In business for more than seven decades, Bender is global pioneer of electrical safety solutions. A market leader in the design, manufacture and supply of healthcare power and surgical solutions the company is a chosen partner of NHS Trusts, private medical groups, design consultants and facilities management companies, and is recognised for its ability to deliver safe, resilient turnkey solutions for critical care hospitals.

Bender UK is part of the family owned company Bender GmbH & Co. KG, which is represented in more than 70 countries around the world, employing over 700 people.

The Power of Bender

Bender UK is exclusively responsible for the sales, project management, service and through-life support of Bender technology in the United Kingdom and the Republic of Ireland. Established for over two decades Bender UK is widely acknowledged as an expert in the design of HTM compliant solutions and has played a key role in the development of UK healthcare power standards.

Based in Ulverston, South Cumbria in a new state of the art facility, Bender UK has a growing team of over 45 office and field based personnel who are dedicated to delivering a superior level of service to its customers.

Over five hundred hospitals and private clinics are equipped with Bender technology. Patients and medical staff can rely on Bender to provide a round the clock call-out facility and rapid response service, ensuring that our vital healthcare service is delivered 365 days of the year.

For high quality, patient safe, resilient solutions – you can rely on Bender UK.

Healthcare Overview

Protection

The principles for electrical safety management within healthcare facilities are simple:

- Insulation faults must not lead to power failures
- Fault currents within an electrical system must not offer a critical threat to patients
- Permanent monitoring of the power supply serving medical locations must be guaranteed
- Faults or critical errors must be detected early – to avoid a potentially catastrophic loss of power

Loss of power to an operating theatre or critical care facility can result in shut down until the problem is resolved. Remedial costs and lost revenues along with penalties can run into tens of thousands of pounds each day. Added to that are the consequences counted in adverse publicity and loss of goodwill due to cancelled procedures.

Bender can ensure protection of your patients, your staff and your facility against this eventuality.

Resilience

Alongside expertise in IT power systems (IPS), Bender UK has developed huge experience and resources in the provision of Uninterruptible Power Supply (UPS) systems for healthcare facilities, designing, installing and supporting through-life the systems which ensure power is maintained to critical areas.

Bender has also pioneered the ATICS® automatic switching device that sets a new standard for resilience, overcoming the single point of failure which exists in many parallel power systems. Combining an insulation monitor, transformer monitor and a signal generator, ATICS® is the only changeover solution that incorporates permanent self-testing across all essential components to ensure availability for automatic split second switching. It is the only emergency changeover solution independently certified to SIL Level 2 by TÜV SÜD, and designed specifically for healthcare.

Experience

Bender pioneered the development of the insulation monitor and is the market leader in design and manufacture of IT Power systems for the UK healthcare sector. Bender UK also contributed to the development of the standards for today's critical care power systems for Group 2 medical locations. Most leading acute hospitals have Bender technology installed, with over half of these supported with a Bender service contract.

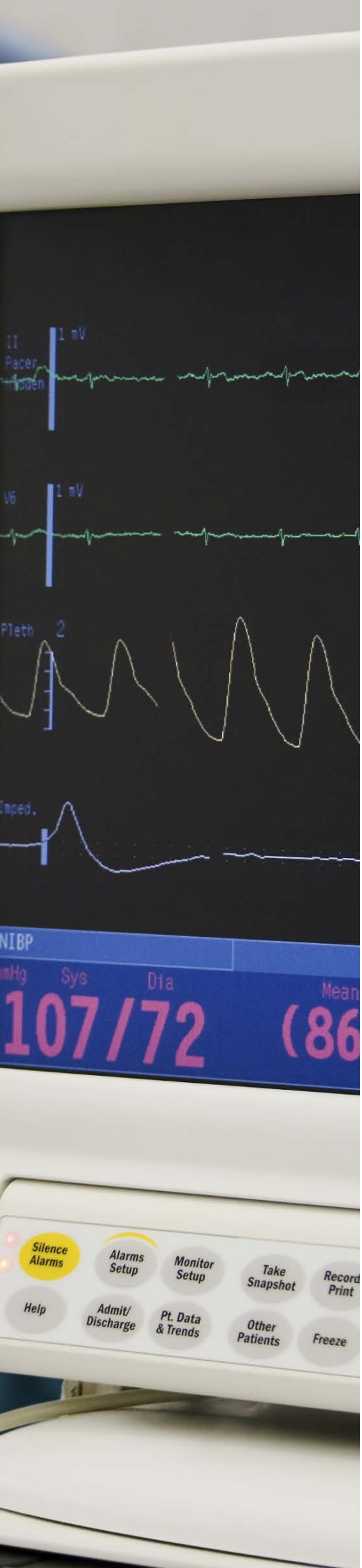
Bender's expertise has continued to expand along with demands of the healthcare market, and we are now regularly involved in the design and supply of turnkey operating theatre solutions.

Innovation

Innovation drives progress and Bender UK has consistently demonstrated its ability to add value for health trusts and their facilities. Continuous monitoring of the electrical supply system enables your service team or partner to be aware of issues within the system before they become critical, enabling predictive and preventive maintenance and avoiding the potential for power outages. Employing advanced Residual Current Monitoring (RCM) and Power Energy Monitoring (PEM) technology, Bender ensures your electrical system has effective life support.

Support

Equipment within medical facilities continues to offer optimum service only if it is regularly and expertly maintained. Bender UK has its own network of highly trained service personnel supporting hospitals and clinics across the country with scheduled maintenance and 24/7 emergency response services.



Standards

BS7671 section 710

This categorises medical rooms as either Group 0, 1 or 2 according to the type of contact between applied parts (medical electrical devices) and the patient, the threat to safety of the patient owing to a discontinuity (failure) of the electrical supply, as well as the purpose for which the location is used.

BS7671 section 710 defines Group 2 areas as the most critical in terms of patient risk from power supply failures and rooms within this group demand the highest levels of electrical safety. These include areas such as operating theatres, anaesthetic rooms, recovery, ITU, HDU, angio rooms, catheterization rooms and radiological diagnostic rooms.

The specified electrical requirements for Group 2 areas include the installation of an IPS (Isolated Power Supply) system for final circuits supplying medical electrical (ME) equipment and systems intended for life support, surgical applications and for other electrical equipment located within or that may be moved into the 'patient environment'.

A further requirement for these areas is a power supply source with a changeover equal to or less than 0.5 seconds from a loss of main supply (eg a UPS or battery) for surgical lights, life supporting ME equipment and ME equipment containing light sources being essential for the application of the equipment such as endoscopes/ monitors etc.

Apart from the surgical lights which always have their own dedicated 3-hour battery back-up supply, the other loads detailed above are required to have their alternative supply available for 3-hours duration - when a generator supply is not present - or 60 minutes if a generator supply is available. This is normally achieved through the installation of a UPS (Uninterruptible Power Supply) system suitably sized to support the IPS supplying the final circuits to these loads within the Group 2 area.

In terms of meeting the minimum requirement for BS7671 section 710, the installation of a single IPS and UPS system (with appropriate autonomy) in a Group 2 area could be considered a compliant solution.

However, this approach is increasingly uncommon owing to a drive for greater resilience encouraged in the HTM 06-01 guidance document.

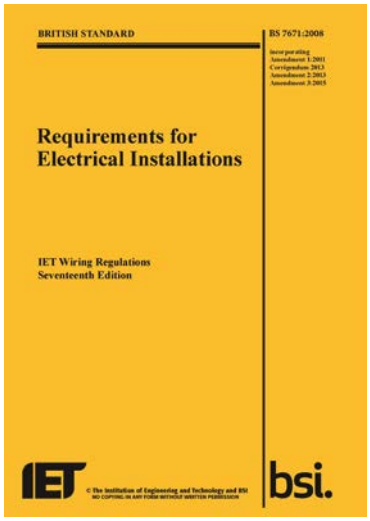


Image courtesy IET

HTM 06-01

Healthcare providers have a duty of care to ensure that appropriate governance arrangements are in place and are managed effectively. The Health Technical Memorandum (HTM) series provides best practice engineering standards and policy to enable management of this duty of care.

The current review and update of HTM 06-01 builds on the previous version by enabling users of the revised guidance to provide safer, more resilient electrical systems within their healthcare premises. In turn, this supports the requirements of regulators and ensures a safe environment for patients and staff.

Overview

Healthcare premises are dependent on electrical power supplies, not only to maintain a safe and comfortable environment for patients and staff, but also to give greater scope for treatment using sophisticated medical equipment at all levels of clinical and surgical care.

Interruptions in electrical power supplies to equipment can seriously disrupt the delivery of healthcare, with serious consequences for patient well-being.

Healthcare organisations should ensure that their electrical installation provides maximum reliability and integrity of supplies. Every effort must be made to reduce the probability of equipment failure due to loss of power.

The previous edition's clinical risk categories 1–5 and the business risk categories 1–4 (both of which are based on the type of services the healthcare facility provides/will provide) have been amended and reclassified into "risk grades" to aid clarity.

The aim of the HTM's risk-grading system is to reinforce the importance of continuity of supply for the whole site and to help to assess the level of consequence of a power failure – that is, an increase in patient risk or business risk needs to have a corresponding increase in the integrity and resilience of the electrical distribution providing that service.

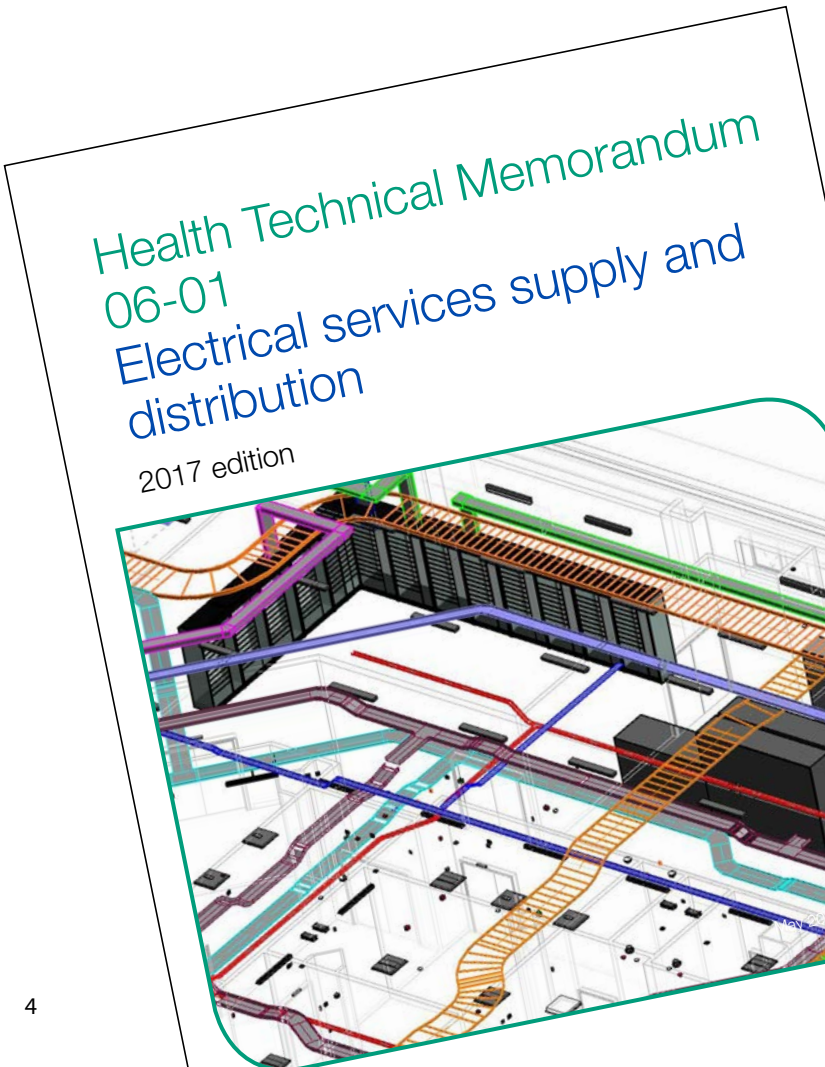
These risk grades can then be used by designers as a basic methodology to select the most cost-effective and proportionate distribution strategy for the whole healthcare facility based on the types of clinical services the healthcare facility provides or intends to provide.

It needs to be emphasised that this strategy may include high voltage (HV) and low voltage (LV) distribution networks depending on the size and complexity of the healthcare site – such is the scope of this HTM.

Furthermore, the clinical risk grades have been reclassified from A (high risk) to E (low risk) and the business risk grades from I (high risk) to IV (low risk) which all in all provide a unique grading system that can be applied to, and provide for, any circumstance in healthcare.

HTM 06-01 guidance is designed to assist hospital managers and engineers when planning new facilities. It is not intended to be absolute and it encourages consultation with the clinical end-users to establish the specific risks within a particular room or ward before deciding on a specific category.

Unlike the BS7671 standard, HTM 06-01 offers further guidance on IPS-UPS resilience in areas where it has been deemed appropriate to install them.



Turnkey Healthcare Solutions

At Bender UK we design, manufacture, commission and supply complete monitored power systems and turnkey surgical solutions for theatres and critical care environments.

In the UK and the Republic of Ireland over 500 hospitals and clinics benefit from Bender UK installations and take advantage of our unrivalled post-installation service and support.

Our range of services and capabilities includes:

- Medical IT Systems (IPS)
- Uninterruptible Power Supplies (UPS)
- Theatre/Surgeon's Control Panels (TCP/SCP)
- LED Surgical Lights and Pendants
- AV Systems
- Ultra-Clean Ventilation (UCV) Canopies
- Residual Current and Power Quality Monitoring
- Design, Installation, Service and Commissioning

Medical IT Systems (IPS)

Bender IPS systems are designed to supply power to high risk Group 2 medical locations such as operating theatres and intensive care units.

Hospitals throughout the world are protecting patients and staff with Bender IPS systems which are configured for the specific application and with the inclusion of ATICS® provide an ultra-resilient solution.

Uninterruptible Power Supply

A UPS system is essential to the electrical infrastructure, ensuring power remains available in the event of power outages. With careful design and planned maintenance, it provides peace of mind and resilience for all critical risk areas.

ATICS®

ATICS® is the only automatic changeover and monitoring device designed specifically for medical locations. This device has been independently verified (TUV) as fully compliant with Safety Integrity Level 2 BS EN 61508, parts 1,2 & 3.

In category 4 & 5 medical locations a secondary supply must be available within half a second of primary supply failure.

Fully monitored and with wrap around bypass the compact modular ATICS® system provides enhanced levels of resilience that only Bender can offer.

Theatre Control Panels

Bender pioneered the development of hygienic touchscreen operating theatre control panels which now incorporate a lifetime infection control membrane. Designed to specific user requirements and available in a range of sizes, wall mounted TCPs (Theatre Control Panels) can be integrated with DICOM-compliant PACS screen displays and offer easy control of elements including medical gas alarms, surgical lights, laser controls, operating tables, and UCV canopies.

LED Surgical Lights

Bender UK offers a complete range of cutting-edge LED lighting for surgical environments. Partnering with Merivaara of Finland, we provide state-of-the-art theatre lighting solutions delivering advanced performance that eliminates shadows and provides true colour rendering so vital in determining the condition of patients. LED lighting eliminates the heat that is both uncomfortable for the staff and a threat to the patient safety, and offers low-maintenance and high energy efficiency to ensure competitive thru-life costs.

Clinical Pendants

Bender UK supplies standard, customised or bespoke pendants for operating theatres, anaesthetic rooms, intensive care units, critical care units, high dependency units, accident/emergency and other medical facilities. Services on a typical pendant may include medial gases, power sockets, intercom, nurse call, telephone/data, audio-visuals, and spotlights.

AV Systems

Bender can provide AV systems according to the needs of the clinical environment. Merivaara OpenOR™ systems are designed to integrate operating room devices, data and image management in a digital theatre solution.

Ultra-Clean Ventilation Canopies

Recognition of the threat posed by airborne bacteria within an operating room has accelerated the installation of Ultra-Clean Ventilation systems. Bender UK offers a range of fully integrated options from leading manufacturers as part of its turnkey operating theatre refurbishment or new build solutions.

Service and Verification

Bender UK is the only service provider with authorisation to maintain and repair Bender systems in the UK and Republic of Ireland.

Bender provides a free 5-year warranty with Bender parts if we maintain your IPS systems within 12 months of the commissioned date. We can also maintain and service third party equipment and systems – providing a solus solution for all of your IPS requirements.

Every customer has a dedicated service coordinator to handle PPM schedules, callout and remedial actions, with a team of engineers on hand to support you 24/7 365 days a year.

Residual Current Monitoring (RCM)

Bender RCM technology is suitable for the monitoring of healthcare estates electrical infrastructure. An installed system will monitor, detect and evaluate fault and operating currents to forewarn of issues such as installation degradation before they become serious. This enables estates teams to locate and address faults quickly and easily before a failure becomes critical. RCM technology can prevent downtime in critical hospital areas and save a considerable amount of lost revenue and wasted resource.

> *"We are extremely satisfied with the equipment and service that we received from Bender UK and wouldn't hesitate to work with them again on future projects."*
>
> **P. Childs** - Director, Tangent Electrical

Good Hope Hospital turnkey theatre project

Medical IT Systems (IPS)

Why IT/IPS?

The Medical IT System, or IPS, is the backbone of a reliable power system in medical locations. IT System is the standard compliant term for unearthed systems – an isolated power supply or IPS.

The IPS is a fundamental element in providing a safe and secure power supply within the theatre environment. In particular it reduces the inherent risk of medical electrical devices that are connected to the patient - either externally or internally - from presenting a shock hazard should a device develop an electrical earth fault. This must be in conjunction with a fully compliant, robust earthing installation within the patient environment.

Without an IPS, a patient undergoing invasive surgery is more vulnerable to micro-shock hazards because their natural resistance to an electrical current - the skin – is not in place to protect them. Moreover the effects of anaesthesia means a patient is unable to react when suffering micro-shocks and the hazard can be prolonged and more damaging.

How IT/IPS works

In an IT System the first fault does not cause the system to shutdown. There is no conductive connection between active conductors and the protective earthing conductor within the IT system.

When a fault occurs in an earthed system (TN System), the fuse blows and the supply is automatically disconnected. High electrical energy can occur at the point of the fault creating a potential fire risk.

An IT (or IPS) system therefore meets four essential demands:

- When a first insulation fault occurs the power supply is not interrupted by the tripping of a protective device.
- Medical equipment continues to function
- Fault currents are reduced to an uncritical level for patients and staff
- There is no panic in the operating theatre or ICU because there is no power failure

The Medical IT system consists of an isolating transformer, a monitoring device to monitor the insulation resistance, transformer load and temperature, and a remote alarm indicator and test combination, installed in the operating theatre or at a manned nurse station nearby.

Continuous insulation monitoring ensures that a deterioration in insulation resistance is immediately detected and signalled. But the power supply is not interrupted and continuity of operation is guaranteed.

The insulation monitoring device is a vital element of the IT system that ensures power remains available. Connected between system and earth it continuously monitors the insulation resistance, precisely recording and indicating any faults. It also monitors the load current and temperature of the transformer – to maintain a constant check on the health of your critical electrical supply.

The load of an IT system transformer is not infinite. Therefore, any overload of the transformer and indicative change in temperature must be monitored. That means an overload of the system can be signalled and staff informed via the alarm panel, enabling them to respond to the fault by switching off unnecessary equipment – thus reducing the load.

The transformer will only shut down to protect against short circuits. An overload does not lead to power failure, and does not threaten the continued operation of vital medical equipment.

Remote Alarm and Test Indicator Panel – MK Series.

Continuous information about the status of the electrical installation ensures continuity of supply.

Bender's MK series panels meet the requirements for information and communication systems within hospitals (IEC 60364-7-710: 2002 – 11, SECTION 413. 1.5). Installed in appropriate locations manned by nursing and medical staff, the MK series units provide audible and visual signals to immediately inform them about any issues with the IT power system.

Importantly the LC text display of the MK2430 (pictured) displays only the important information required in the current situation, avoiding confusion amongst the staff.

Individual alarm text messages can also be programmed and there are eight other digital inputs available for other electrical equipment (such as medical gases, etc.)

AVAILABLE IN BIM FORMAT

Bender UK Medical IPS drawings are available to download in BIM (Building Information Modelling) format.

> *"Thanks for the speedy response to site and the remedial action taken to return the IPS into service. The Bender engineer that arrived on site was excellent."*
>
> **I. Hawthorn** - Estates Operational Manager, Sandwell Hospital

ATICS® Automatic Changeover Device

In critical healthcare environments the failure of life support services due to unexpected power loss can have potentially catastrophic consequences for patients, staff and hospitals.

Bender has developed the unique ATICS® changeover device which opens up opportunities for more resilient critical care power solutions. It raises the bar for power systems in terms of performance and enhanced patient safety.

ATICS® is the only integrated automatic power changeover solution incorporating permanent self-testing. It is independently certified by TÜV SÜD to Safety Integrity Level (SIL) Level 2 and BS EN 61508 Parts 1-3, which states where automatic transfer systems are used, they should be assessed for their safety integrity level.

Purpose-designed for medical applications, it combines an insulation monitor, a transformer and a signal generator for advance earth fault location, with a rotary cam changeover device. Together they create an integrated compact system that can be incorporated into a Bender medical IT system without taking up extra space.

The ATICS® device allows individual IPS systems to be supplied from two diverse sources and removes the single point of failure associated with the traditional single supply cable. In the event of primary supply power loss, the ATICS® switches over within 0.5 seconds to the secondary supply, maintaining power to the critical medical sockets.

ATICS® - a step-change in power system safety and resilience.

“Bender showed that they could increase the resilience and safety of the operating theatres electrical supply through the installation of their unique ATICS medical auto changeover device.

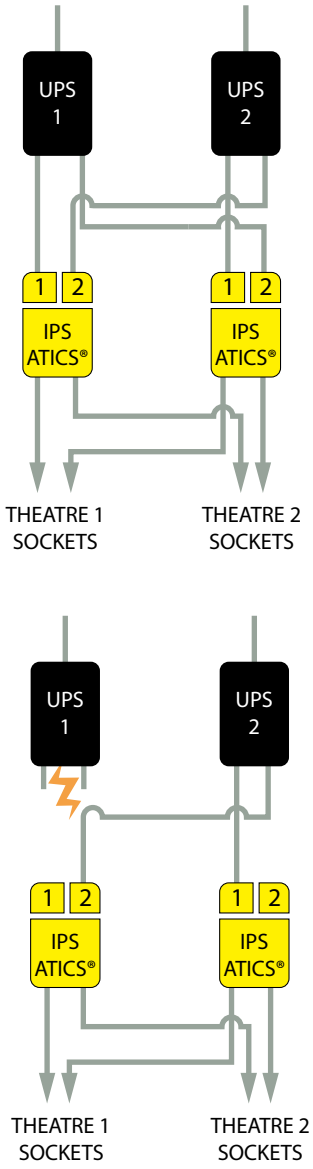
This allowed a second electrical supply to be made immediately available in the event of a loss of the primary supply, thus protecting the patient from hazards associated with a complete loss of power during surgery.”

N. Lee - Managing Director, Colne Valley Building Services Ltd

Eliminate Single Points of Failure

Where parallel N+1 UPS systems are combined with single supply IPS systems, there remains a single point of failure on the common output of the UPS. The failure of this output cable would result in the loss of all connected IPS circuits.

The diagrams below illustrate how the incorporation of an ATICS® within individual IPS units in combination with N +1 stand-alone UPS provides increased resilience over traditional parallel N +1 UPS and IPS arrangements.



Key Questions

Why is permanent self-testing important in an emergency changeover solution?

The permanent self-testing of the ATICS® changeover solution ensures that the system is always available, and provides early warning of any issues while the system is on standby, and before the system is actually required.

Won't Mean Time Between Failure (MTBF) guarantee performance?

Impressive figures for Mean Time Between Failure on even simple components such as a switch may be used as an indicator of reliability – but if that failure occurs when the system is required, then it means nothing.

ATICS® provides end-users with fully detailed, real-time information on the status, providing the reassurance that the changeover system will operate when it is most needed.

What is SIL Level 2?

The Safety Integrity Level (SIL) Level 2 is an international standard to verify the process through which a product has been developed. It is an integral element within the BS EN 61508 standard.

Why is independent certification to SIL Level 2 important?

Self-certification is an option for companies employing the Safety Integrity Level standard to prove the performance of their products, but self-certification does not carry the same assurance as certification by an industry leader. TÜV SÜD certification marks are synonymous with quality and safety, and underpin the development process and performance of ATICS®.

ATICS® has the unique distinction of having been certified to the Safety Integrity Level (SIL) Level 2 standard by TÜV SÜD one of the world's leading technical service organisations.

There are 8 parts to SIL Level 2 – which ones are the most important?

Each of the 8 parts in SIL Level 2 has a different purpose, but the most crucial elements of SIL Level 2 are parts 1, 2 & 3 which concern the process through which a product has been developed. They are based on an empirical approach to calculating probability of failure to define the reliability of a product.

How important are SIL Level 2 Parts 4, 5, 6, 7 & 8?

Parts 4-8 primarily relate to information and guidance on how SIL Level 2 can be achieved. But if a product does not comply with sections 1, 2 & 3, it cannot be described as complying with SIL Level 2. In competition medal terms – SIL Level 2 parts 1, 2 & 3 are gold, silver and bronze – numbers 4-8 show someone has engaged with the process but without 1, 2 & 3 they simply have not made the grade.

Bender GmbH & Co. KG, Germany
Winner of the 2012 DEKRA Award
in the category of Safety Concepts

ATICS is independently verified (TUV) as fully compliant with Safety Integrity Level 2 BS EN 61508, parts 1, 2 & 3

Uninterruptible Power Supply (UPS)

A secondary power supply is critical to ensuring that patient safety is maintained in the event of a power failure.

The majority of hospitals and medical facilities have back-up generators on site, but in critical medical locations - Group 2, Category 4&5 - that simply is not enough.

Those areas require a UPS unit (Uninterruptible Power Supply) to provide critical cover with an immediate changeover to an alternative power source when required.

At Bender UK, we have identified, tested and now aligned our services with leading and reliable UPS suppliers, and can now offer the Bender Medical UPS from 500kVA up to 800kVA.

What is a UPS?

A UPS provides an emergency power supply to specified loads in the event of mains power failure. UPS differs from an auxiliary or emergency power system or standby generator because it provides near-instantaneous protection from input power interruptions, immediately restoring the power with energy stored in batteries.

The level of protection depends on specific requirements; Bender UK offers battery systems to maintain power over periods from 5 minutes to 3 hours.

Regulations

Guidance on the use of UPS for medical locations is provided by:

- British Standards BS7671:2008 (2011)
- HTM 06-01 2017
- ETCI ET101:2008

UPS Battery Systems for Medical Locations

The regulations and guidance documents state that for Group 2, Category 4&5 medical locations, in the event of a failure the battery system for tertiary power supplies should be able to provide an autonomous supply for a period of at least 3 hours.

If there is a secondary power source available with a 25-second change-over time, this autonomy can be reduced to 1 hour.

The guidance document HTM 06-01 2017, states that the battery system must have a 10 years' design life, thread insert connections, fire retardant case, and provide 60-minute autonomy.

UPS Configuration

There are many ways to configure a UPS system, to ensure the highest level of resilience and protection is achieved. Bender UK has the experience and expertise to advise clients on the optimum format and configuration to meet their requirements and conform to regulations and industry standards.

The most common configuration is two UPS systems in a parallel configuration; this is referred to as a N+1 system and would be in-line with the main supply. The N+1 configuration allows maintenance to be completed without disruption to the load.

However, using the Bender ATICS® Isolated Power Supply system, with a N+1 UPS system ensures that your medical location will benefit from the highest possible level of resilience.

UPS Ranges

10-30kVA UPS

- Large power size selection 10, 12, 15, 20 kVA
- Available in multiple configurations. 1:1, 3:3, 3:1
- Small footprint - Zero impact source - Flexibility of use - Advanced communications

30kVA-200kVA UPS

- Complete 30kVA -200kVA
- Small Footprint - High Efficiency, up 96.5% - Advanced communications - Low Running costs
- Bender UK also offers systems that provide protection for non-medical locations, such as communications rooms or servers.

Modular UPS

With the ever-changing needs for power protection, it is impossible to predict the future requirements so Bender UK has developed a comprehensive range of modular UPS solutions that ensure the full level of power protection you need today, and the flexibility to increase the protection without having to re-design or substantially change the infrastructure.

Modular UPS units allow you to scale and grow protection as the demand on your requirement grows:

- Simply scalable - grow as you grow
- Flexible with multiple configurations, bespoke to your operational needs
- Highly efficient
- Space saving
- Less downtime

AVAILABLE IN BIM FORMAT

Bender UK Medical UPS drawings are available to download in BIM (Building Information Modelling) format.

Photos courtesy of Constant Power Services

1
TCP
Operating theatre panel Touchscreen Control Panel

2
PACS
TCP with integrated PACS

3
EBB
Equipotential Bonding Busbar

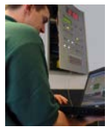
4 5
Technical control room
MK2430 Alarm indicator and test combination

6 12
Powerscout
Analysis and monitoring web-based software

7
Medical sockets

8 9 10 11
IPS/ATICS®
Isolated Power Supply with optional EDS and ATICS®

Automatic transfer switching device ATICS®



13
Service
Verification, repair and technical support 24/7

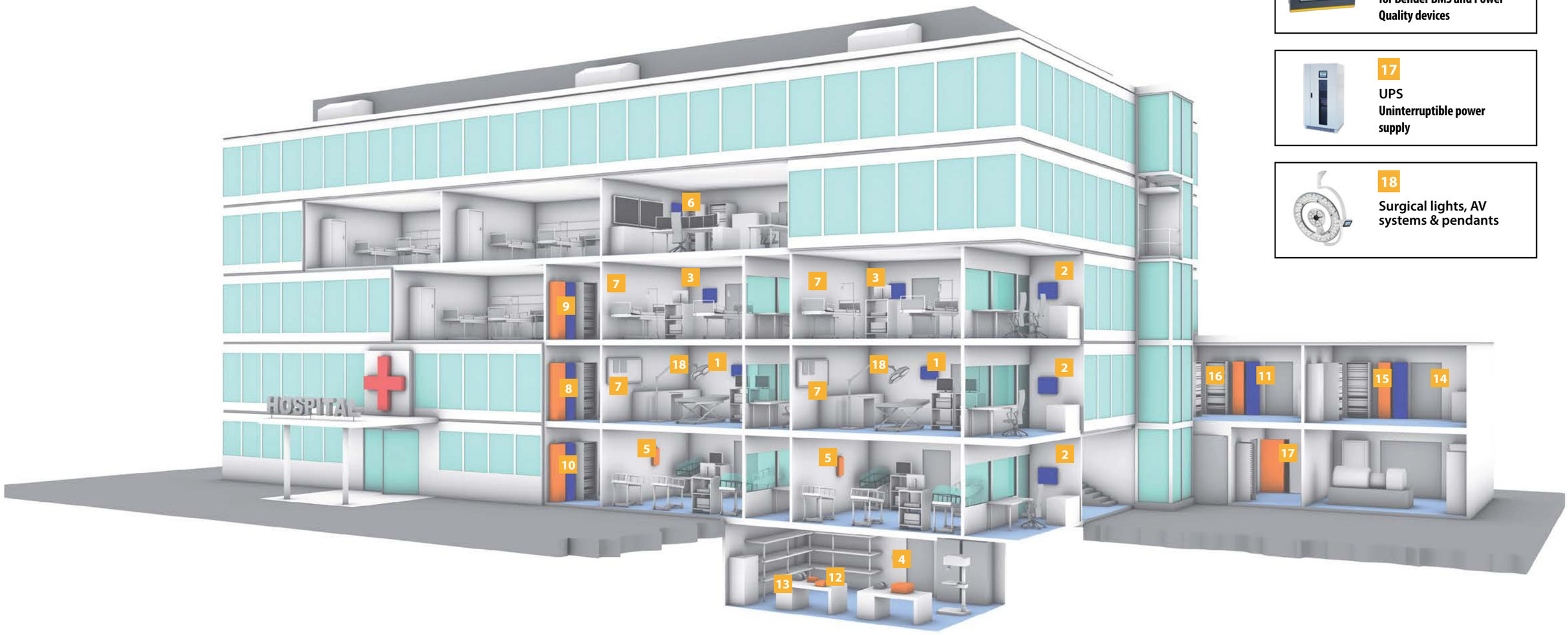
14
RCMS
Residual current monitoring of estates electrical infrastructure

15
PEM
Power quality and energy monitoring

16
CP700 Condition Monitor for Bender BMS and Power Quality devices

17
UPS
Uninterruptible power supply

18
Surgical lights, AV systems & pendants



Theatre Control Panels (TCP)

Bender Theatre Control Panels (TCP) provide a single intuitive interface with theatre technology. TCPs integrate equipment functions, providing theatre staff with a technical monitoring and control centre, operated with hygienic fingertip control.

Bespoke and Future Proof

Critical medical locations such as operating theatres and intensive care units incorporate an array of advanced technology and the operation of that technology should be as intuitive and simple as possible – to allow medical personnel to focus on the care of the patients and their wellbeing.

The touchscreen technology allows the panel to be programmed and configured to the exact needs of the customer rather than a 'one size fits all' design.

The TCP is future-proof and can be re-programmed following installation to accommodate future changes in theatre practice or equipment upgrades, ensuring the panel does not become obsolete after a few years of operation.

A range of screen sizes is available but typically clients choose either 15 or 22 inch options.

Bender TCPs are designed to specific user requirements and are individually manufactured to order. This may include incorporating functions specific to certain medical specialist applications, services controls, IT screens and bespoke interlocks.

The TCP may display, control and operate:

- Equipment for supplying medical gases
- Air conditioning and ventilation systems
- Theatre lighting
- Communications equipment
- Operating theatre tables
- IT systems
- Safe Uninterruptible Power Supplies (UPS)
- Input from digital music devices

Other uses include:

- Displaying and visualizing system status, warning and alarm messages
- Setting equipment controls and parameters from a central location
- Output of visible and audible warnings
- Displaying measured values and setting limit values for measured value monitoring

The touch-sensitive monitor enables fingertip control and monitoring of technical equipment and services in medical locations.

The menu structure is programmed to make it simple for the users with just one sub-menu for the functions, and permanently displayed controls for easy navigation.

AVAILABLE IN BIM FORMAT

Bender UK Medical TCP drawings are available to download in BIM (Building Information Modelling) format.

Bespoke design

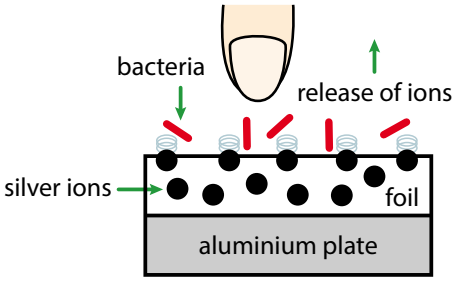
The integrated I/O system provides numerous options for integrating digital and analogue I/O's with different voltage ratings, power ratings, measuring signals and special functions in the same alarm indicator and operator panel. The end result is a system that is both modular and flexible, enabling it to be adapted or expanded to suit user preferences and to accommodate new technologies.

Not only the functions of the panel but also the alarm messages of the various subsections can be displayed on a single panel, individually adjustable. They can be specifically configured according to the given circumstances. Therefore, they become easier to understand and the reaction to them is more reliable: patients as well as personnel benefit from this.

Hygienic control

Bender TCPs incorporate a wipe clean, anti-microbial membrane over the control section fascia. The anti-microbial property remains active for the life of the product and ensures that the panel surface will not promote the growth of yeasts and pathogens.

This improves infection control and reduces the risk of contaminants being transferred from the panel to the surgical wound site.



Traditionally made of stainless steel, Bender introduced the contemporary membrane approach to the UK market over 15 years ago. The technology is approved for use in UK and European Hospitals, where its popularity and high performance have made it the standard.

The following standards apply:

- IEC 60364, DIN/VDE 0100 Erecting of power installations with nominal voltages up to 1000V
- DIN/EN 60439-1, (VDE 0660 Part 500) Low voltage switchgear and control gear assemblies
- DIN/EN 50081-2, (VDE 839 Part 81-2) EMC Generic emission standard
- DIN/EN 50082-2, (VDE 839 Part 82-2) EMC Immunity standard

Picture Archiving & Communications System (PACS)

PACS come in various sizes and configurations. All can be supplied to bespoke specifications. The combination of the latest technology and design means they can fit into any operating room or medical location and be fit for purpose.

PACS viewing stations destined for operating rooms must meet special requirements, including being easy to operate, compact in size and hygienic.

Wall mounted PACS, with twin screens allows comparison of two images or patient histories and clinical notes. Its clinical grade membrane keyboard operation means the whole unit is wipe clean. The slim-line design reduces its space requirement, thus maximising possible mounting locations.

Bender has developed a PACS that mounts into existing Theatre Control Panels. All cabling is handled through the control panel, rather than trailing across the floor.

Bender can design and manufacture bespoke PACS solutions according to the wishes of our clients and the budget for the project.

"We engaged Bender Ireland to provide our new theatre with a surgeon's control panel and 55" PACS ... by using Bender we were able to complete our project on time and budget over the busy Christmas period."

L. Mackey - Commercial Director, Hermitage Medical Clinic, Dublin

Pendants

Bender UK offers a full range of ceiling-mounted medical gas supply pendants for clinical areas, such as operating theatres, endoscopy suites, critical care, high dependency units and emergency departments.

All pendants comply with current requirements including HTM 02-01, HBN26, and HBN57 and are individually configurable for the users' exact requirements. User preferences on gas outlet type are also catered for.

All pendants supplied incorporate medical gas, power and data services.

Fixed Pendants

A static pendant offering medical services at a fixed location. The fixed pendants can be supplied in two designs:

Rigid: Set at an industry standard fixed height from the floor.

Retractable: Set at an industry standard fixed height from the floor. It has a wired controller that allows 300mm of vertical height adjustment of the service column for ease of access.

Multimovement Pendants

These offer complete flexibility to the users by providing medical services in any location. The suspension arms deliver 330° of rotation. There are two different designs, and for each design the pendant column can either be supported by suspension arm(s) at a fixed height (only horizontal movement) or by the suspension arm which can provide up to 500mm of vertical adjustment in addition to the horizontal movement.

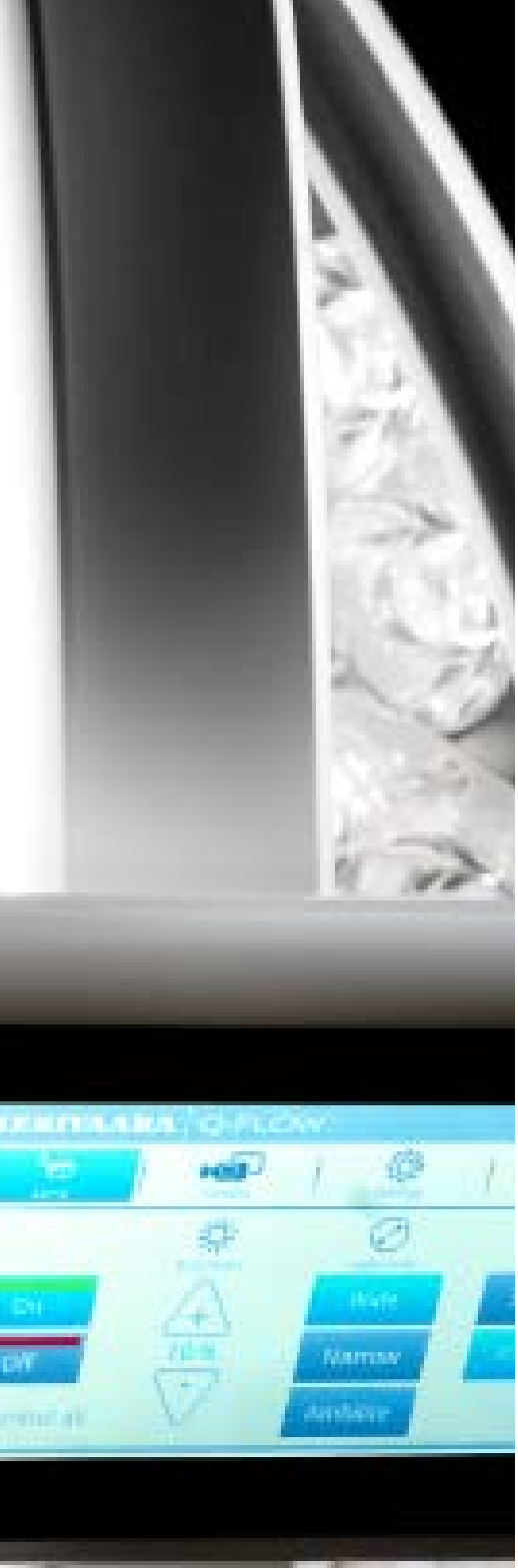
Single Arm: The suspension arm can be up to 1200mm in length and either fixed height or vertically adjusting. The pendant column can also be fitted with a docking mechanism to allow the anaesthetic machine to be moved with it.

Dual Arm: The dual suspension arms offer full flexibility in positioning with both articulating joints providing 330° of rotation. Both suspension arms can be up to 1200mm in length, and can be at a fixed height, or the second arm can be adjusted vertically. The pendant column can also be fitted with a docking mechanism to allow the anaesthetic machine to be moved with it.

Tandem Dual Arm: Two dual arm multimovement pendants are installed into a single ceiling location, allowing the services to be provided by two pendant columns that can be positioned on either side of a bed space. The medical services on each column can be configured as required. The dual suspension arms offer full flexibility in positioning with both articulating joints providing 330° of rotation. Both suspension arms can each be up to 1200mm in length, and they can both be at a fixed height or the second arm can be adjusted vertically.

Benefits

- Slim design - saves space
- Soft neutral colours - sympathetic to the theatre environment
- Easy to clean and disinfect
- All cables housed inside pendant
- Large load capacity - up to 150kg
- Installed, commissioned and serviced by Bender UK



Surgical Lighting

reddot award 2017
winner

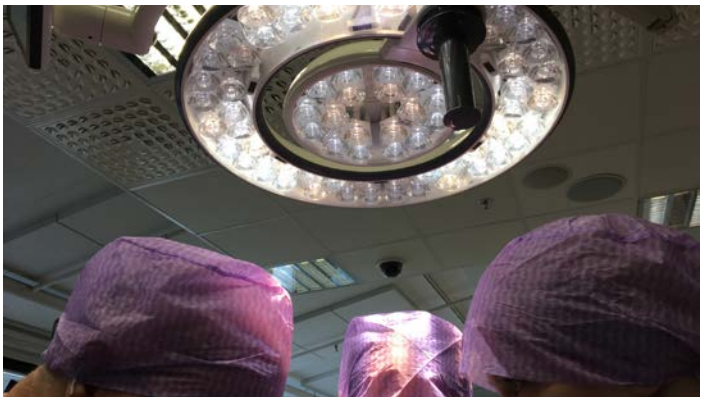
MERIVAARA Q-FLOW™

Bender UK is the authorised distributor of Merivaara Q-Flow LED surgical lighting and AV systems in the UK and the Republic of Ireland.

In operating theatres, effective and efficient surgical lighting is a vital tool in patient care. The award-winning Merivaara Q-Flow light dramatically improves some of the key problem areas concerning heat, staff fatigue and colour rendering found in other types of surgical lighting.

The choice of lighting systems often depends on the personal experience of clinical staff, which is why Bender UK works closely with customers to enable them to trial its Merivaara Q-Flow solutions within operating theatres before making a commitment to purchase.

The Q-Flow light is both supremely efficient and user friendly. It is designed to optimize laminar air flow, reduce potential contamination, eliminate shadows, operate with an intuitive control system and is easy to clean for infection control. purposes. Q-Flow delivers class-leading R9 colour rendering.



The light delivers a hugely efficient column of daylight quality light to illuminate deep cavities – while consistent green ambilite makes it easy for staff to view images and read monitors.

Dynamic Obstacle Compensation (DOC™) adapts automatically to the shadows in the light field providing perfect light for any circumstance even if the light beam is masked. The intensity of the remaining beams will increase and the light in the operating area is compensated in order to maintain the ideal illumination of the surgical site.

Intuitive Sterile Surgeon Control (Intueri™) brings more safety to the operations and better ergonomics. The surgeon can adjust dimming and light field size while operating, with the interface appearing automatically around the operating area when the user grabs the sterile handle.

The Q-Flow light is always in focus (750mm-1750mm from site) and offers the widest light field diameter range on the market. Daylight quality light is delivered with 98Ra colour rendering, outstanding performance for distinguishing red (vascular tissues) at 99R9 and excellent clarity of skin colour variations (99R13) for dermatology, plastics and suturing.

Merivaara Merliux X1LED

Bender UK provide a range of examination lights to meet the needs of clinical use and budgets. The Merivaara Merliux X1LED is part of this range.

Benefits

Q-FLOW™

COMFORTABLE FOR THE SURGEON

- Less eye stress thanks to green ambilite
- Optimal control without complex buttons with Intuitive Sterile Surgeon Control (Intueri™)
- First class definition to tissues and blood vessels with the best R9 colour rendering and Ra colour definition along with 4K camera technology
- Dynamic Obstacle Compensation (DOC™) gives perfect light for any circumstance even if the light beam is masked

CONVENIENT FOR HEALTH CARE STAFF

- 4K camera ready
- Intuitive user interface
- Seamless control of light and camera through a single interface
- Lightweight and easy to manoeuvre light heads and arms

COST-EFFICIENT FOR THE HOSPITAL

- Designed, tested and optimised for the ultra clean ventilated environment
- Reduces the clinical risk for the patient
- Innovative future proof control allowing for various different interfaces
- OpenOR theatre management system
- Cardanic touch screen
- 50,000Hours – almost 20 years at a user rate of 10hrs/day, 5days/week
- No moving parts within the light head and only serviceable parts are within the suspension system

"How does your light do that? Even when I get my head completely in the way, it still gets through to light everything up. I'm impressed – it's the first time I can see for 23 years!"

Consultant Surgeon, HCA

Photos courtesy of Merivaara

AV System - Digital Theatre Solution

MERIVAARA OpenOR™

OpenOR™ is a compact AV system which integrates operating room devices, data and image management. The OpenOR™ Classic or enhanced Over IP options are available to purchase through Bender in the UK and the Republic of Ireland.

Classic Benefits

- Open architecture, specific to customer needs
- Intuitive and streamlined interface
- Management of camera, image, lights and operating table
- Available in users' own language
- Compact and easy to install
- Flexible - modules can be added at a later stage

Over IP Additional Benefits

- Medically certified IP transmission technology
- No delay in image transmission
- Plug and Play function for connecting surgical instruments

Vendor Neutral

OpenOR™ will integrate seamlessly with the MIS stack system camera of your choice. This offers you full flexibility on your choice of MIS equipment: OpenOR™ provides the standardised digital theatre control system – this simplifies staff training and limits user errors. The hospital is then free to choose the MIS supplier in each theatre based on their clinical preference and without restriction.

Future Proof

With OpenOR™-OverIP there are no infrastructure or hardware changes required as technology progresses to 3D, and 4K resolution and beyond. Software updates are included as part of the on-going technical support and maintenance. The medical monitors supplied are all Nexxis ultra high definition so will not need upgrading when the MIS camera resolution surpasses HD resolution. Additionally, no alterations are required if the Hospital changes the endoscopic/arthroscopic supplier as OpenOR™ will integrate with any endoscopic/arthroscopic stack system.

Custom-Designed Safety Checklist

The WHO safety checklist can be designed and implemented onto the touch screen interface. This can be displayed on all monitor displays at the appropriate time (pre-anaesthesia, pre-incision, and post-surgery) for all staff to view, and then stored onto the hospital information system automatically.

Intuitive Touch Screen User Interface

Duplicate 24" touch screens (sterile zone and nurse workstation) are provided to enable simple control of all of the required user functionalities, eg: image routing, recording, device control.

Merivaara AV Systems can be supplied as part of Bender UK's turnkey operating theatre solutions.

Photos courtesy of Merivaara

Photo courtesy of Eizo

Maintenance & Repair

In the UK and the Republic of Ireland over 500 hospitals and clinics benefit from Bender installations, providing patient and staff protection against electric shock, and ensuring 'no fail' security of supply to critical medical facilities.

Why Service?

In accordance with BS7671:2008 Amendment 3:2015 it is recommended that periodic testing and inspection of Medical IT IPS and UPS equipment is carried out at specified intervals.

Electrical services HTM 06-01 which provides guidance on maintenance requirements for electrical systems recommends the following service intervals:

IPS = 12 monthly

UPS = 6 monthly

This ensures equipment is reliable and operating efficiently; reducing business risk and protecting staff and patients.

Why Bender?

- Authorised – Bender UK is the only service provider with authorisation to maintain Bender systems in the UK and ROI.
- 5 Year Warranty – provided FREE with Bender parts if we annually maintain IPS systems within 12 months of the commissioned date.
- Spares – our engineers carry a range of spares, reducing down time, return to site costs and penalty charges.
- Experts – our engineers are qualified electricians factory trained on our systems.
- Software – we have access to software updates across all relevant platforms.
- Compliant – our verification service is compliant with regulatory standards.
- Nationwide – our IPS and UPS engineers are regionally-based throughout the UK and ROI.
- Service – a dedicated service coordinator will handle your PPM schedules, callout & remedial actions.
- Technical support – Bender UK engineers will support you 24/7 and 365 days of the year.
- Reliable – we inform you when your service is due and can attend call outs within 4 hours guaranteed.
- Quality – is at the heart of everything we do.

* Benefit from a free Bender 5 year parts warranty where a service agreement is in place within 12 months of the commissioned date.

Preventative Maintenance and Service of:

- Bender Isolated Power Supplies (IPS)
- Bender Theatre/Surgeons' Control Panels (TCP/SCP)
- Uninterruptible Power Supplies (UPS)
- 3rd party manufacturers' equipment
- Turnkey theatre packages

Choice of Agreement Options:

- Including parts and/or labour
- Daytime, evening & weekend service available
- 24/7 telephone support
- Rapid response (4-6 hours)
- Verification only
- 1-5 year duration
- Multi-site packages

Training Solutions:

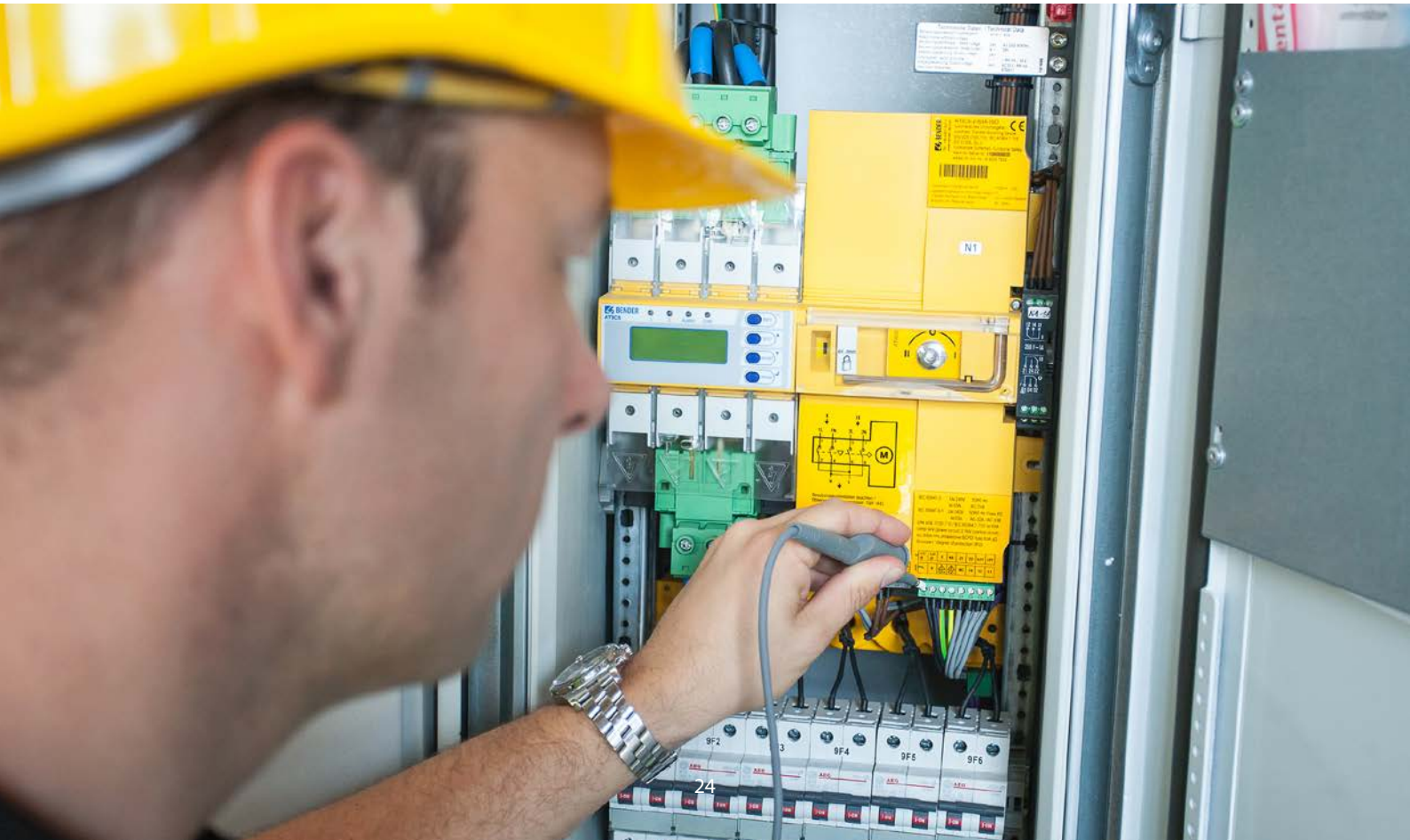
- IPS and UPS end-user
- First response

What to Expect

Bender UK provides the highest level of service and technical support available in the marketplace. From preventative maintenance to call out and repairs, you can expect a truly professional service, delivered in a timely manner with associated downtime, disruption and costs kept to a minimum.

"Please can we have 20 more contractors just like you and your company. We use you as our model company that we ask other contractors to aspire to."

W. Richardson - Electrical Estates Manager, Vinci Facilities



Bender Residual Current Monitoring System (RCMS) Technology

Within hospitals there are both critical and non-critical circuits supporting wards and departments.

Critical circuits serving patient connected equipment are generally supplied from a fully monitored Medical IT (or IPS) system in line with HTM standards.

Whilst non-critical (TNS) circuits are not connected to medical equipment, they play a vital role in the safe running of medical departments. Typically, these circuits support power sockets for non-patient connected equipment such as general ward areas, computers and environmental systems eg lighting, ventilation etc

Despite this vital role, TNS circuits are often never monitored or tested in contrast with the continuous monitoring inherent to IPS systems.

In busy departments the disconnection of circuits or an electrical fault can be highly disruptive or completely intolerable and this can lead to considerable cost in terms of management time spent planning and organizing the process and lost revenues associated with the clinical downtime. When testing is not carried out at all, the duty holder is unable to demonstrate that due diligence has been taken should they be challenged over an incident related to electrical safety.

Infrastructure Visibility and Test Without Disconnect

Bender Residual Current Monitoring System (RCMS) technology provides a solution to ensure hospital managers have early visibility of potential developing electrical issues within their entire hospital as well as providing cost saving benefits associated with periodic insulation resistance testing of TNS circuits.

As a continuous monitoring system it offers a cost-effective, disruption-free alternative to the disconnection test which, in conjunction with an effective management strategy, fully satisfies the requirements of BS7671. Once installed RCMS ensures that TNS circuits will never have to be disconnected in the future for testing. Additionally, due to the unique type A and B sensitivity of Bender's monitoring CT's, developing insulation faults are identified at a pre-critical stage enabling remedial action to be taken before unexpected power loss or risk of fire.

Bender UK Combined IPS with TNS/RCMS Panel

RCMS can be installed on TNS circuits housed within Bender IPS panels as a convenient, space saving, fully monitored electrical distribution solution.

RCMS can also be installed on new TNS distribution boards or retro-fitted to existing TNS distribution boards.

In summary Bender RCMS offers the following benefits:

- 24-7 visibility of the electrical infrastructure
- Increased lifespan of ageing infrastructure
- Reduced disruption and downtime
- Advanced warning of developing insulation faults
- Condition reports for the electrical infrastructure
- Reduced risk of fire or electrical shock
- Reduced break-fix times
- Rapid return on investment

Power Quality & Energy Management

Electrical infrastructure and equipment

When specifying a Bender IT (IPS) critical care power installation, power quality meters (PEM) will be included as standard into the IPS panel design, unless requested otherwise.

Bender PEMs, when incorporated into the IPS installation, provide additional benefits to estates teams and energy managers by monitoring and providing information on electrical values including voltage, current, frequency and energy use. The PEMs can also be connected to hospital building management systems to enable remote monitoring.

Energy management and monitoring

In addition, Bender PEMs can be used to monitor power distribution systems across healthcare estates where interference is an increasingly frequent occurrence. They continuously monitor harmonic content and the electrical supply providing warnings of any developing issues in order to ensure safe and secure operation of a hospital's electrical installation.

Risks such as overload or changes in energy consumption can be monitored, assessed and dealt with accordingly.

Powerscout®

Powerscout® is a web-based software solution which helps detect malfunctions at an early stage. Powerscout® integrates data from Bender RCM, PEM and third party devices.

It is particularly suited to healthcare facilities as it reports on the status and condition of the site's electrical infrastructure, enabling pro-active maintenance and preventing unplanned downtime.

Powerscout® continually collects measurements and generates user specific reports. The automated reports on residual currents form the basis for measuring without switch off.

Test without disconnect

With Bender RCM technology and Powerscout® you can reduce the cost of periodic inspection and testing as detailed in BS7671 and IET Wiring Regulation Part 6.

The technology enables continuous monitoring and reporting, which satisfies the regulations and negates the need to switch off for the five year periodic inspection and test.

Benefits

- No need to switch off for the 5 year periodic inspection and test
- Significantly reduces maintenance costs
- 24 -7 visibility of your electrical infrastructure
- Increased lifespan of ageing infrastructure
- Reduced disruption and downtime
- Provides advanced warning of developing electrical faults
- Status reports on the condition of your electrical installation
- Reduced risk of fire and electric shock
- Increased peace of mind

Why Choose Bender UK?

Consultancy

We have a team of experts at Bender UK who are dedicated to offering advice and design support enabling customers such as private medical groups, NHS trusts and consulting engineers to develop world-class medical facilities.

If you are planning an upgrade to an existing hospital, designing a new build, require assistance or a survey of an existing installation we are always happy to help with any questions on subjects such as product specification or meeting the regulatory standards.

Survey

We will conduct a site survey to gather relevant information from the client to determine precisely what is expected and required for each project. We will also share our experience to explain methods we have employed on previous projects to overcome potential obstacles. We have found this works well for retrofit installations. Our open and collaborative approach ensures a complete understanding of each project prior to starting on site.

Design

Due to our vast knowledge and experience of working in hospitals we are frequently asked for technical help and advice. We also offer a design service working with clients to provide safe, reliable, compliant highly resilient power solutions for Group 2 medial locations.

Accreditations

Bender UK holds all the necessary approvals and accreditations to work on sites such as busy construction projects and leading critical care hospitals. This professional approach to engineering gives our customers complete peace of mind.

Installation and Commissioning

We offer both first and second fix installation of complete turnkey operating theatre solutions that are commissioned and signed off by our team of engineers.

What to expect

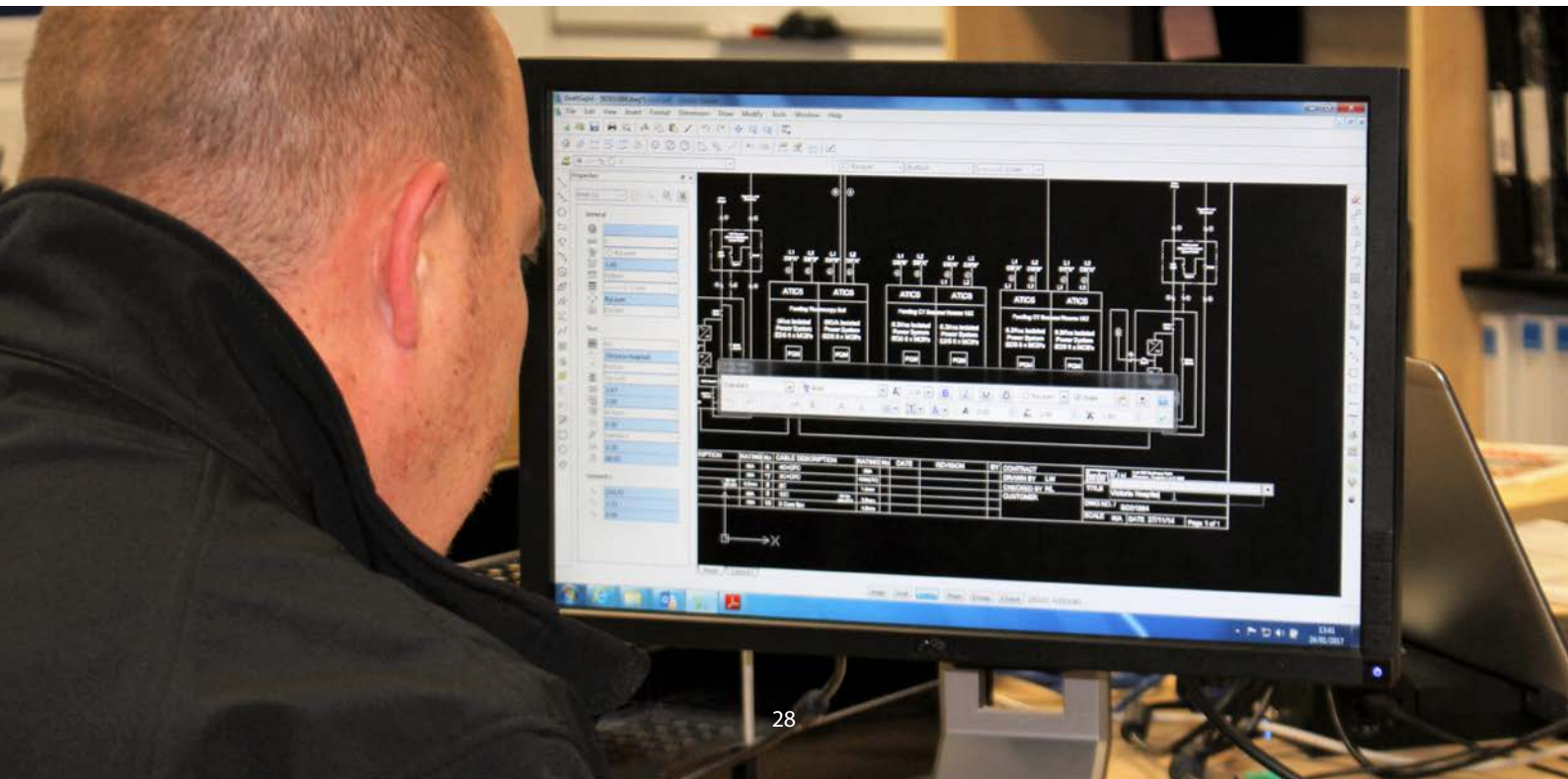
Our engineers both commission and service so they have greater knowledge and expertise gained from working on healthcare projects.

We project manage the complete installation with minimal downtime and disruption to clinical facilities and hospital infrastructure. Our services are designed to reduce risk and save you time associated with managing an installation that contains Bender UK solutions.

Our team is factory-trained to a high standard and fully compliant in the latest regulations for Group 2 medical locations, meaning Bender UK will complete the electrical install as required.

Bender UK projects range from simple theatre power upgrades completed over the course of a weekend, to full turnkey theatre solutions and/or partnering with prime contractors on large new build hospital projects where our involvement will last for years, including through life service and technical support.

We always aim to please our clients and appreciate that sometimes holiday periods are the only time that essential works can be completed. In this instance we will do all we can in order to complete the project.



VALUE

Our products are competitively priced - delivering value for money and reduced life cycle costs.

QUALITY

As an OEM we are confident in the quality of our products and offer industry leading warranties.

Approvals include UL, Lloyds, TUV, Germanischer Lloyd, cULus, Network Rail and Def Stan.

CUSTOMER SERVICE

We value and respect our customers and strive to deliver a first class experience every time.

TECHNICAL SUPPORT

Our nationwide network of factory trained engineers delivers unrivalled technical support 24 hours a day.

PRODUCT RANGE

We produce a range of high quality engineered solutions for diverse market sectors.

DELIVERY

We keep our promises and deliver on time.

INNOVATION

Since inventing the insulation monitor we now hold multiple patents and continue to be recognised as a world leader in electrical safety products.

FINANCIAL STABILITY

High risk projects demand low risk suppliers – Bender's solid financial position reduces risk.

INTERNATIONAL

A family company with a global presence, Bender has offices throughout the world.

COMPETENCE

We actively participate in the development of international standards.

OUR PEOPLE

Friendly, dedicated and knowledgeable - our enthusiastic team are always willing to help.

PHILOSOPHY

We sell products that don't come back to people that do!

BENDER UK

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