MEDICAL INSULATION LEVEL MONITORING SYSTEM FOR GROUP 2 MEDICAL PREMISES

PPO

PPO-Elektroniikka Oy

MEV®-8 Insulation Monitoring System

- Monitors the safety of electrical equipment in **Group 2 medical premises**, such as operating rooms and intensive care units where defective electrical equipment can cause serious incidents.

Group 2 medical premises - definition

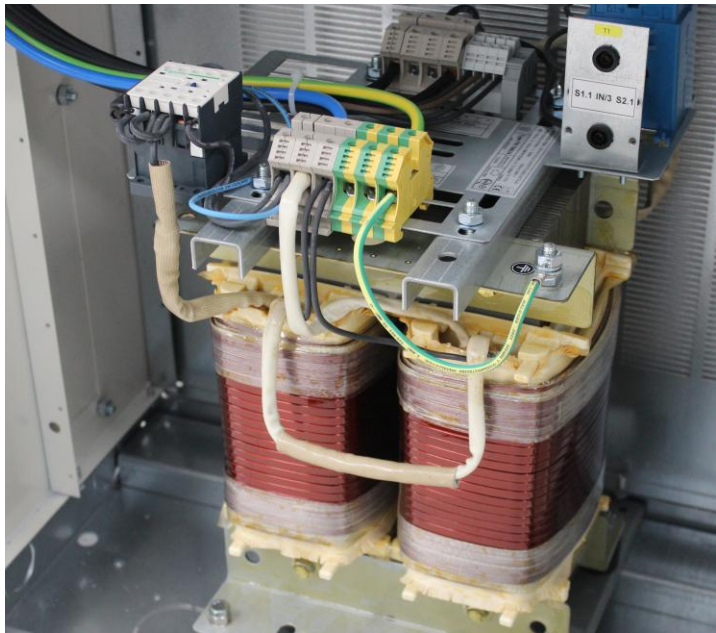
Group 2 locations are the most critical facilities where medical devices are used for heart-related functions;

The failure of the medical device may cause immediate danger to the patient’s or staff´s life.

The principle of the MEV®-8 Insulation-level Monitoring System

- The electric power network of the operating room is separated from electrical grid with a **medical isolation transformer.**

- **The insulation-level monitoring system monitors all the electrical devices connected behind this transformer**. Units control the insulation level of the IT system, the transformer load, and temperature as well as the continuity of protective earth **24/7**.



- The equipment **indicates the faults and problems before dangerous situations arise**. This gives time to replace the defective device without breaks in the operation.

A modern system according to the IEC/EU standard

Mandatory

Insulation Monitoring Device

Monitors the insulation of a floating IT network (leakage current), transformer load (current A) and temperature (°C)

Mandatory

System Monitoring Panel

Indicates any insulation level alarms, line controller alarms, and test lead faults as well as transformer overloading and temperature alarms.

Recommendation

Protective earthwire monitoring device

Monitors the continuity of a floating IT network's protective earth.

Note! This unique unit monitors P/E wires continuity 24/7.

Recommendation

Insulation fault Locator

Locates any insulation faults in a floating IT network.

Insulation monitoring since 1981

- **PPO-Elektroniikka** was founded in 1981 to develop a system to improve electrical safety in operating rooms. Our first-generation insulation monitoring system MEV-2 was completed in the same year.

- Our MEV-system brought up: The electrical failures were clearly a risk to patients, staff and operating room equipment.

- At the request of hospital engineers, our first digital insulation monitoring device MEV-3 was launched in 1983.

- MEV-3 -system revealed **a big problem**; there were many more medical devices with electrical current leakages than had been expected. Hospitals had even more than 20 device alarms a day.

Mandatory in Finland since 1983

- No operation will be performed in Finnish operating rooms if insulation monitoring is not in use.

- Insulation monitoring has been required in all operating rooms and other critical care areas in all countries **in the European Union since 2015**. Device coverage according to the standard is still weak: Official supervision is inadequate, and hospitals stick to old solutions because of a lack of knowledge and cost.

EN 61557-8 standard

- A medical IT system must be used for final circuits supplying medical electrical equipment and plans for life support, surgical applications and other electrical equipment in these premises.

- Installing at least one dedicated medical IT system is mandatory for each group of rooms serving a similar purpose. These systems must incorporate an insulation monitoring device (IMD) compliant with EN 61557-8 standards.

- Furthermore, every medical IT system must feature an acoustic and visual alarm system strategically positioned for continuous medical and technical personnel monitoring, ensuring real-time awareness through audible and visual signals.

Why is insulation monitoring needed?

Electrical faults can occur in any medical equipment

The medical device may pose an immediate danger to the patient, who is entirely dependent on equipment that ascertains vital functions.

The leakage of electrical current is an invisible killer without any visible signs.

Electrical leakage currents occur in both old and new electrical devices due to malfunction, age and poor design. Common reasons for insulation faults include bad connections, damaged cable insulants and defective components. Fast technological development and the rush to launch medical equipment create new challenges; new equipment may cause disturbances in power networks and other electrical devices.

A residual current device that switches the electricity off does not give a prewarning – is not enough to guarantee safety!

Safety, efficiency and cost savings

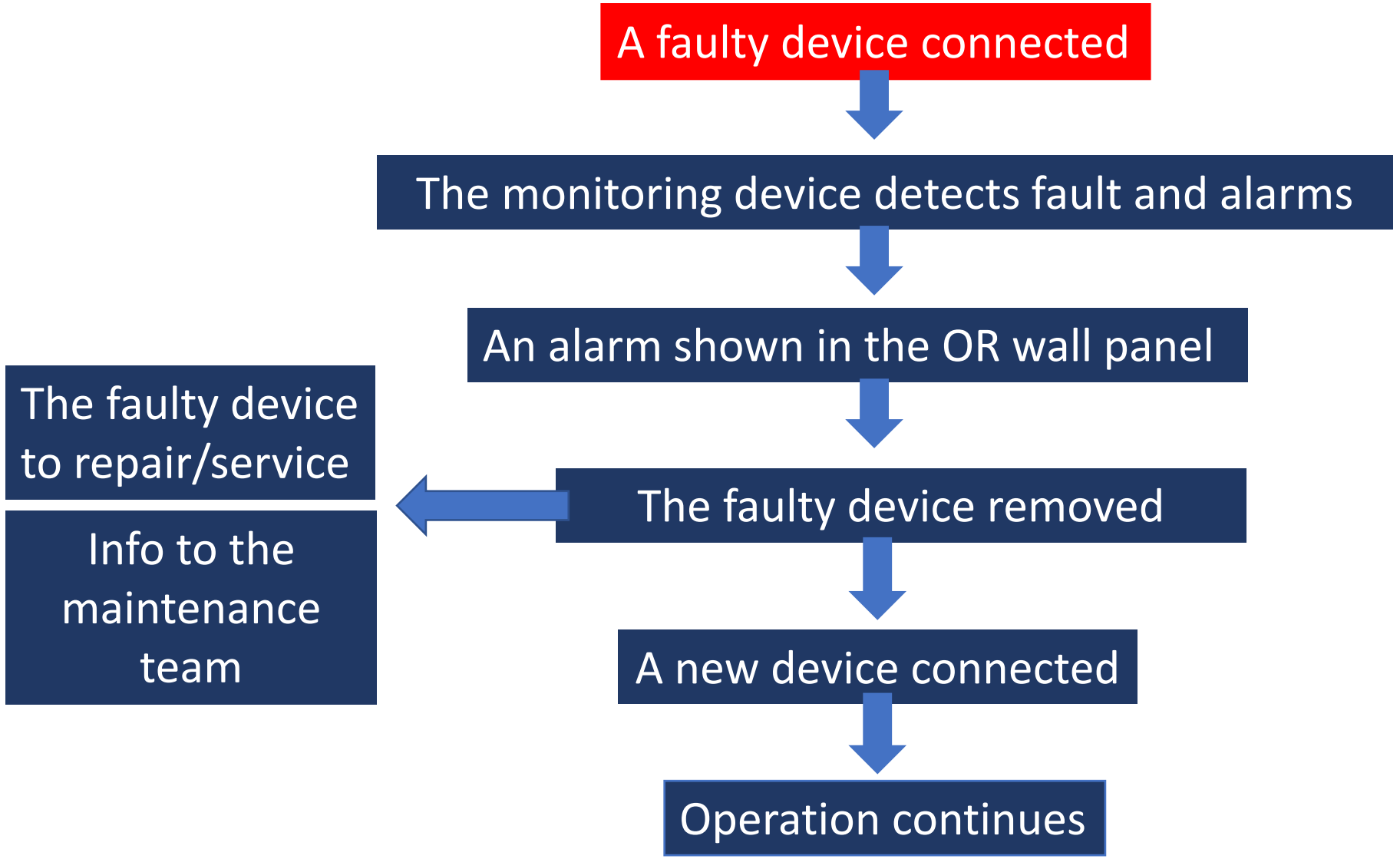
Insulation monitoring is one of the most efficient measures to prevent dangerous situations!

Insulation Monitoring System

- Protects the patients and personnel from electric shocks
- Prevents electrical fires and burns
- Ensures that unnecessary downtime can be avoided
- Ensures that the life of surgical equipment is extended.

Acquiring an insulation monitoring system is a long-term investment; the price is low in relation to the value. It is a matter of human life that cannot be measured in money.

Case example: Faulty equipment in the OR



References in Finland

Our MEV-insulation monitoring system is in use in all wellbeing services counties in Finland.

Our solutions are delivered to hospitals directly or through hospital builders or central manufacturers.

We also install and perform commissioning inspections.

We have 21 self-governing wellbeing services counties with five University Hospitals.

Also, private hospitals use our systems.

Some examples of our projects in Finland

HOSPITAL	PROJECT NAME	LOCATION	YEAR	DEVICES
HELSINKI University Hospital	Meilahti / Angio (T-part)	Helsinki	2025	MEV-8
Terveystalo hospital, Kamppi	Operating rooms (Private)	Helsinki	2025	MEV-8
HELSINKI University Hospital	Meilahti / OR Department (A-osa)	Helsinki	2024	MEV-8
Central Ostrobothnia / Central Hospital	New OR Department	Kokkola	2023	MEV-8
Oulu University Hospital (OYS)	OYS TULSA 2030	Oulu	2021-2022	MEV-8
HELSINKI University Hospital	Park Hospital	Helsinki	2020	MEV-7
Central Finland Health Care District	Hospital Nova of Central Finland	Jyväskylä	2020	MEV-7
Kymenlaakso Central Hospital	Carea G-building	Kotka	2020	MEV-8
Central Ostrobothnia Hospital District	Kokkola, Operating rooms	Kokkola	2020	MEV-7
HELSINKI University Hospital	Emergency Unit in Lohja hospital	Lohja	2020	MEV-8
Kainuu Central Hospital	Kainuu New Hospital	Kajaani	2019	MEV-7
HELSINKI University Hospital	New Children's Hospital Meilahti	Helsinki	2018	MEV-7

Case example: Oulu University Hospital (OYS 2030)

MEV-8 –insulation monitoring system installation:
20 operating rooms

- Medical isolation transformers 151 pcs
- MEV-8 Insulation level monitoring device 151 pcs
- LC-8 Line monitoring device 285 pcs
- FI-8 Fault locator unit 285 pcs
- SP-8 System monitoring panel 160 pcs

News:MEV®-8 Central Monitoring System for Malaysian Hospitals

7.9.2023

Our Malaysian partner, **BEC Engineering Sdn Bhd**, has delivered the **MEV®-8 Central Monitoring System** (CMS-8) to the Prince Court Medical Center (PCMC) and Institut Jantung Negara (National Heart Institute). This is an excellent example of how we build electrical safety in critical hospital facilities with our international partners.

Our reliable and durable MEV®-8 system protects patients, staff and electronic medical equipment from electrical hazards in Malaysian hospitals. Since 2019, we have already delivered our system to several private hospitals.

Over the years, the size of the monitoring system has grown

MEV-2 (1981 – 1983)

OR

MEV-3 (1983 – 2001)

MEV-4 (2000 – 2009)

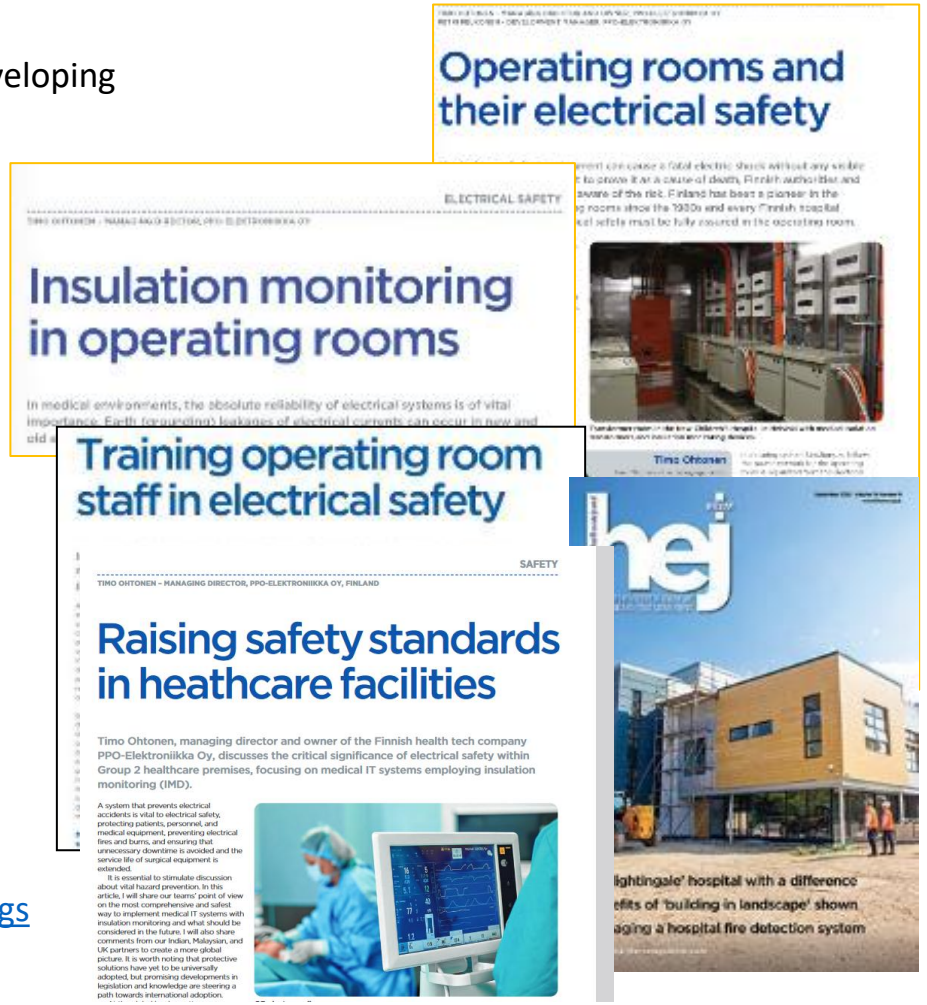
MEV-7 (2008 –>)

MEV-8
(2019 –>)

Our articles in International Publications

IFHE Digest -publication offers views from hospital and healthcare sector written by engineers, architects and facility managers.
IFHE Digest is published every year by The International Federation of Hospital Engineering.

Our articles have been very popular because the issue is current and important in terms of developing legislation and patient safety. That's why IFHE asked us for a follow-up article for the latest publication in 2024 as well as the next publication 2026.



- IFHE Digest 2024 (Pages 68-71
  Raising safety standards in healthcare facilities

- IFHE Digest 2022 (pages 68-70)
  Training operating rooms staff in electrical safety

- IFHE Digest 2019 (pages 19-22)
  Operating rooms and their electrical safety

- IFHE Digest 2017 (pages 51-53):
  Insulation monitoring in operating rooms

- HEJ Healthcare Estate Journal 9/2020 : Insulation monitoring brings safety and cost-savings
  (Pages 69-72) Authors Mr Timo Ohtonen and Mr Petri Pelkonen

PPO-Elektroniikka Oy

PPO-Elektroniikka Oy specializes in electronics and safety technology. We have solved our customers' technical challenges and problems for over 44 years. We aim to improve safety and prevent hazards with our high-quality solutions:

MEV®-8

- **MEV®-8 Insulation Monitoring System for medical IT systems: five generations, 98 % market share in Finland, distributors in 23 countries.**

by PPO ForExt
Forest Fire Extinguishing Agent

- **Environmentally friendly Forest Fire Extinguishing Agent**

chromaviso
Health Promoting Lighting

- Solutions for wireless data & control
- Lightning solutions for hospitals
- Tracking solutions

PPO

MEV team at your service

- Over 35,000 MEV-Insulation Monitoring Systems since 1981.
- All hospital districts in Finland use MEV®-8 or its earlier generations.
- We have started our fifth-generation MEV®-8 export in 2020;
  We have distributors in 23 countries globally in the beginning of 2025.

We are happy to provide you more information.

Mr Kimmo Konttinen, Technical Manager, Tel. +358 9 566 09 215,
kimmo.konttinen@ppo-elektroniikka.fi
Mr Timo Ohtonen, CEO, The Founding Member, Tel. +358 400 420393
timo.ohtonen@ppo-elektroniikka.fi

PPO

Kaarelantie 21, 00430 Helsinki, Finland
Tel. +358 9 566 09 20 www.ppo-elektroniikka.fi