# MEDICAL INSULATION LEVEL MONITORING SYSTEM SAVES LIVES IN GROUP 2 MEDICAL PREMISES


PPO

*PPO-Elektroniikka Oy*

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# PPO-Elektroniikka Oy

**PPO-Elektroniikka Oy specializes in electronics and safety technology. We have been solving our customers' technical challenges and problems for over 43years. We aim to improve safety and prevent damage with our high-quality solutions:**

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

- Environmentally friendly Forest Fire Extinguishing Agent
- Solutions for wireless data & control
- Lightning solutions for hospitals
- Tracking solutions

**PPO-Elektroniikka Oy – a reliable and agile Finnish partner that does what it promises.**

# Group 2 medical premises

**Group 2 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 (operating rooms / intensive care).**

# Continuos monitoring in the OR

**In Finland, insulation monitoring system monitors all electrical devices**

**24/7**


# 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 is required in all operating rooms and other critical care areas in all countries in the European Union since 2015.


# 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?

**Prewarnings**

Extremely important **in G2 medical premises,** where the medical devices are used for cardiac-related functions. The medical device may pose an immediate danger to the patient, who is entirely dependent on equipment that ascertains vital functions.

**Old and new devices**

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**

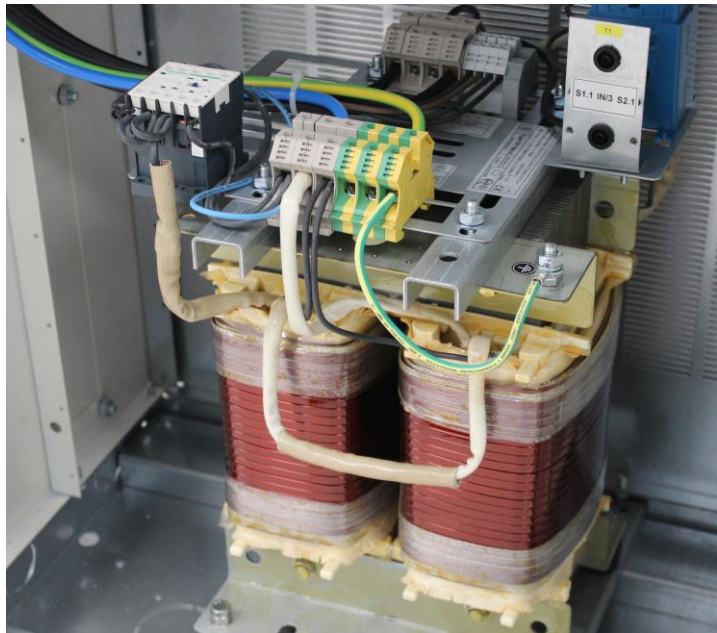
**does not give a prewarning – is not enough to guarantee safety!**

# MEV-system functions 24/7 in Finland

- 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.



# Safety, efficiency and cost savings

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


## 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 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.**

# EU Declaration of Conformity

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**declare under our sole responsibility that the following product**

Equipment: Device for floating network monitoring.
Monitor insulation state, protective earth continuity and transformer overload.
Brand name: Insulation level monitoring system
Model/type: MEV-8, LC-8, M-8, EV-8, SP-8, FI-8, CU-8 and AG-8

**is in conformity with the**

RoHS The Restriction of Hazardous Substances Directive 2011/65/EU
LVD, low voltage directive 2006/95/EY
EMC, electromagnetic compatibility 2004/108/EY

**and the following harmonised standards and technical specifications have been applied:**

EMC: EN 61000-4-2 - ESD
EN 61000-4-3 - RF Radiated - Immunity
EN 61000-4-4 - Fast transients
EN 61000-4-5 - Surge
EN 61000-4-6 - RF conducted - immunity
EN 55022-B - Rated emissions

Other: SFS 6000-7-710 - Requirements for special installations or locations - Medical locations
IEC 60364-7-710 - Requirements for special installations or locations - Medical locations
NEK HD 60364-7-710 - Requirements for special installations or locations - Medical locations

IEC 61557-8 - Electrical safety in low voltage distribution systems up to 1 000 v a.c. And 1 500 v d.c. - Equipment for testing, measuring or monitoring of protective measures Part 8: Insulation monitoring devices for IT systems

Helsinki 15.1.2023

PPO-Elektroniikka Oy

Timo Ohtonen, General manager

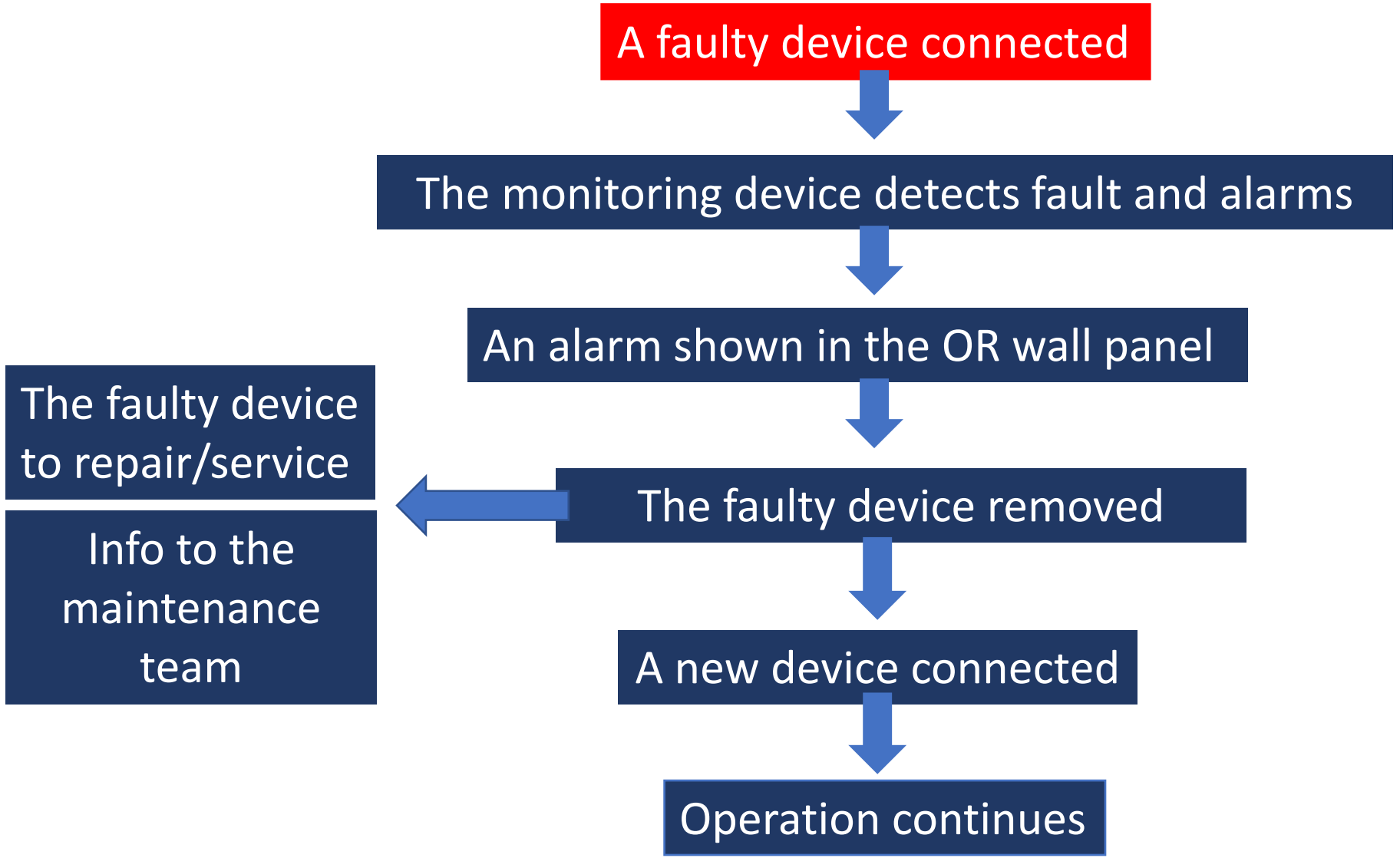
# Operating room is full of electrical devices

Serious hazards have to be prevented and minimized in every possible way. The obligation is both legal and moral.

International Consortium of Investigative Journalists in 2019:
*“Manufacturers, doctors, and others potentially linked more than 1.7 million injuries and nearly 83,000 deaths to medical devices in reports to U.S. regulators over the last decade.”*

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

# 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.

# Examples of our clients in Finland

| | | | | |
|---|---|---|---|---|
| ABB | AMPLIT | ARE | ARO SYSTEMS | Automaatio Center |
| Assemblin | Caverion | CONSTI | e avenue | ELPRO |
| esp ESP TEKNIIKKA OY | Granlund | GISTELE | intertrafo | KEMPELEEN KOJEISTOTUOTE OY |
| KONECRANES | kontram | M-Light | NORELCO | QUATTRO mikenti group |
| KOJEISTO OY | SLO | SÄHKÖJEESI | SÄHKÖPOINT OY | VoltmenOy part of INSTALCO |

# Examples of our clients in Finland

| Company name | Project name | Location | Date | Devices |
|---|---|---|---|---|
| **Oulu University Hospital (OYS)** | OYS TULSA 2030 | Oulu | 2021-2022 | MEV-8 151pcs<br>SP-8 160pcs<br>FI-8 285pcs<br>LC-8 285pcs |
| **HUS University Hospital** | Park Hospital | Helsinki | 5.8.2020 | MEV-7 40pcs<br>LC-7 91pcs<br>EV-7 40pcs<br>M-7 40pcs |
| **Central Finland Health Care District** | Hospital Nova of Central Finland (KSSHP) | Jyväskylä | 13.3.2020 | MEV-7 130pcs<br>LC-7 170pcs<br>EV-7 130pcs<br>M-7 130pcs |
| **Kymenlaakso Central Hospital** | Carea G-building | Kotka | 17.2.2020 | MEV-8 53 kpl<br>SP-8 53 kpl<br>LC-8 127 kpl<br>FI-8 127 kpl |
| **Central Ostrobothnia Hospital District** | K-PKS Kokkola, Operating rooms | Kokkola | 27.1.2020 | MEV-7 10pcs<br>LC-7 16pcs<br>EV-7 10pcs<br>M-7 10pcs |
| **Lohja Hospital** | Emergency changes in Lohja hospital | Lohja | 9.1.2020 | MEV-8 4pcs<br>SP-8 4pcs<br>LC-8 16pcs |
| **Kainuu Central Hospital** | Kainuu New Hospital | Kajaani | 14.10.2019 | MEV-7 67pcs<br>LC-7 81pcs<br>EV-7 67pcs<br>M-7 67pcs |
| **HUS University Hospital** | New children's hospital | Helsinki | 20.1.2018 | MEV-7 220pcs<br>LC-7 295pcs<br>EV-7 220pcs<br>M-7 220pcs |

# Examples of our clients in Finland

**For the organization of specialized medical care, Finland is divided into 20 hospital districts. Five of them are university hospital districts. The Hospital District of Helsinki and Uusimaa (HUS) is the largest of these and consists of 24 Hospitals. In the HUS hospitals have over 3000 pcs MEV systems in use.**

**HUS Helsinki University Hospital (HUH) is one of the leading health care organizations in Europe. At HUS, about 680 000 patients receive medical care annually. HUS has almost 27,000 employees and is responsible for providing specialized health care for the residents of 24 member municipalities. In addition, the treatment of many rare and severe diseases is nationally centralized to HUS. For example, all Finnish organ transplants are done in HUS.**

**HUS is the biggest health care provider and the second largest employer in Finland.**

**Here is a few references :**

| | |
|---|---|
| • The Hospital District of Helsinki and Uusimaa HUS | 3000 pcs MEV Systems |
| • Tampere University Hospital TAYS | 800 pcs MEV Systems |
| • Oulu University Hospital OYS | 950 pcs MEV Systems |
| • Kuopio University Hospital | 500 pcs MEV Systems |
| • Turku University Hospital | 950 pcs MEV Systems |

# Case example: Oulu University Hospital (OYS 2030)

**MEV-8 –insulation monitoring system installation**
**- 20 pcs OR 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






# 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 –>)

# MEV®-8 Equipment


**MEV-8 Insulation Level Monitoring Device**
Monitors the insulation of a floating IT network (leakage current), transformer load (current A) and temperature (°C)


**LC-8 Line Controller**
Monitors the continuity of a floating IT network's protective earth.
**Note! This unique unit monitors P/E wires continuity 24/7.**


**FI-8 Fault Locator Unit**
Locates any insulation faults in a floating IT network.


**EV-8 Monitoring Panel**
Indicates insulation level alarms, line controller alarms and test lead faults


**M-8 Transformer Monitoring Panel**
Indicates any overloading and temperature alarms.


**SP-8 System Monitoring Panel**
Indicates any insulation level alarms, line controller alarms, and test lead faults as well as transformer overloading and temperature alarms.

PPO

# 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 follow-up article for publication in 2024.

- 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

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

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

# Team PPO at your service

- Over 30,000 MEV-Insulation Monitoring Systems since 1981.
- All hospitals in Finland use MEV®-8 or its earlier generations.
- We have started our fifth-generation MEV®-8 export in 2020;
  In 2023, we have distributors in 23 countries globally.


PPO

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