

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



MEV[®]-8

PPO-Elektroniikka Oy

PPO-Elektroniikka Oy specializes in electronics and safety technology. We have been solving our customers' technical challenges and problems for over 43 years. 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).



Continuous 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

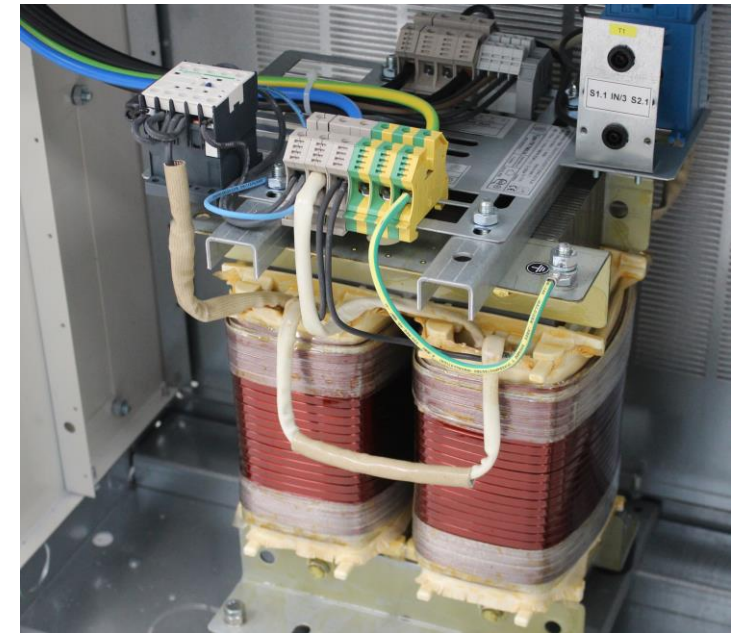
Electrical leakage currents occur in both old and new electrical devices due to malfunction, age and poor design. Common reasons for insulation faults include bad connections, damaged cable insulants and defective components. Fast technological development and the rush to launch medical equipment create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

EU Declaration of Conformity

We



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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-Elektronikka Oy

A handwritten signature in blue ink, appearing to read 'Timo Ohtonen', written over a horizontal line.

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

A faulty device connected

The monitoring device detects fault and alarms

An alarm shown in the OR wall panel

The faulty device
to repair/service

The faulty device removed

Info to the
maintenance
team

A new device connected

Operation continues



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

				
				
 ESP TEKNIikka OY				
				
				

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



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.



MEV®-8 Some Of Our International Distributors

ASIAN PASIFIC REGIONAL MARKET



UK, IRELAND



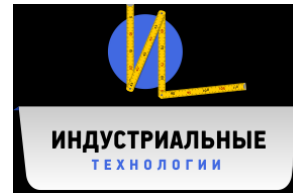
PORTUGAL



NORWAY

MedCare

UKRAINE



INDIA



CHINA

Guangdong Kefeng Scien
Technology Co., LTD

BRAZIL

La&E
TECHNOLOGIES AND SYSTEMS

EGYPTI



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.



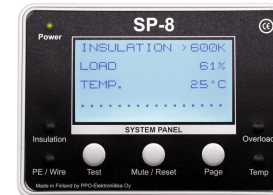
EV-8 Monitoring Panel

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.

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.

- 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



Team PPO 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; In 2023, we have distributors in 25 countries globally.



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