

# HOW SAFE IS YOUR DATA?

Electrical monitoring solutions for data centers



 **MADE IN SWITZERLAND**

24/7 availability with constant power and fault current monitoring



 **Metrological certified**





# ELECTRICAL MONITORING SOLUTIONS FOR DATA CENTERS

## Availability in data centers

The reliability of stored data in data centers depends on many different conditions, e.g. the use of energy and security of power.

These conditions must be constantly monitored to achieve level of Tier 1 - 4. To support this, the most significant is to monitor

combined power quality, energy and fault current detection.

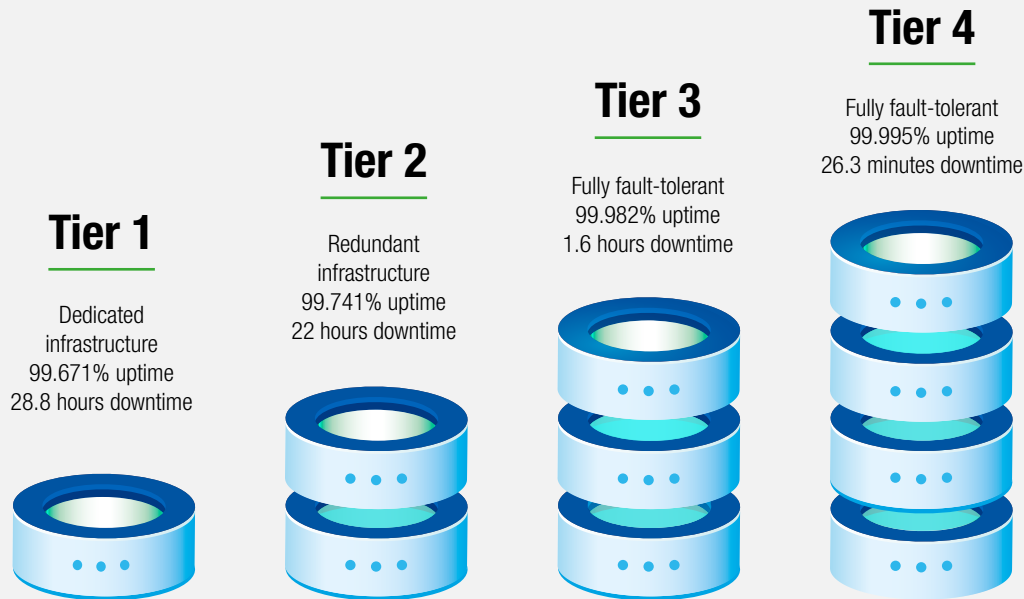


Figure 1: Tier 1 - 4

Source: own design, content of <https://www.hpe.com/ch/de/what-is/data-center-tiers.html> (31.1.2020)

### The Problem

Various studies have shown that mains power quality problems generate costs that run into the billions each year. Already in 2007, the Pan-European LPQI Power Quality Survey estimated that the damage was equivalent to 150 billion Dollars annually. Meanwhile, the challenges for everyone have continued to grow. And this is especially true for data centers.

### The requirements

When planning the energy supply of a data center, many requirements have to be taken into account:

- Secure site location in terms of energy supply and environmental conditions
- High energy efficiency in order to minimize operating costs
- Maximum availability through the use of redundancies (UPS, generators)
- Highly secure (fire protection, access, defence against cyber attacks)
- System stability and reliability of the equipment used
- Possibility for later expansion
- Following standard such as DIN EN 50600, etc.

### Possible Solutions

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# 1 INVESTMENT SECURITY BY POWER QUALITY

## Power Quality simplified

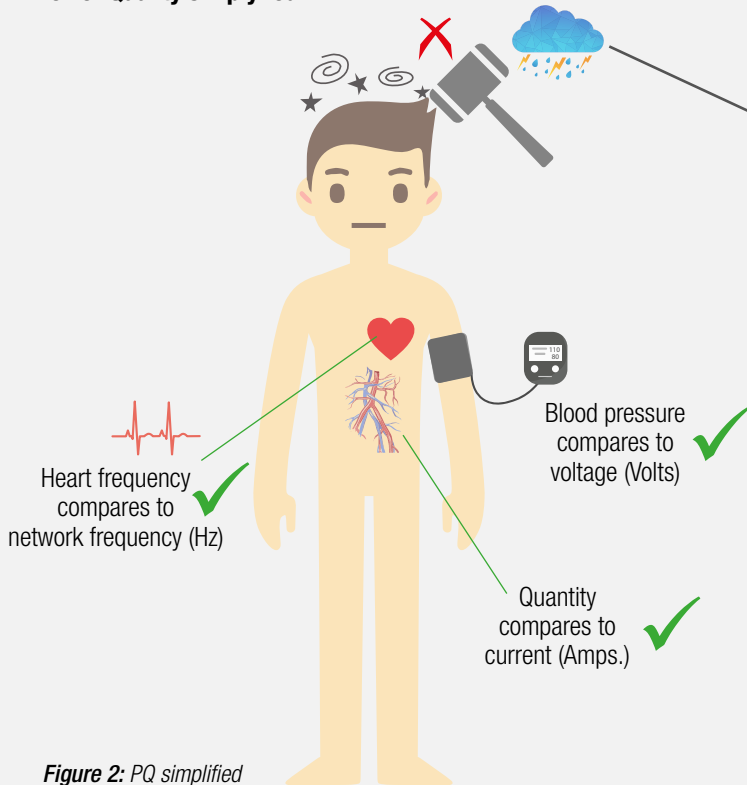
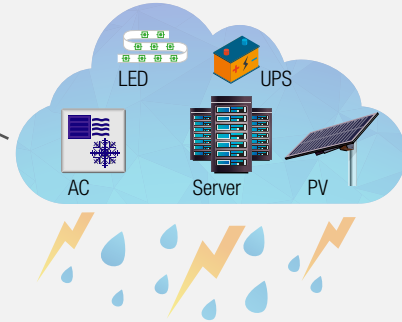


Figure 2: PQ simplified

Source: Camille Bauer Metrawatt AG

## Possible influences of Power Quality



**PQ = Power Quality = degree of network pollution**

About 80 % of all PQ-problems find its cause within the infrastructure (non-linear users and energy sources) so, are not generated by external sources and also effective in the network.

**Even if all is ok, you might have headache.**

### The headache is caused by:

- A significant increase in sources of interference in the electricity grid, e.g. LED, computers, frequency converters, etc.
- A decentralized feed that makes the network unstable
- UPS under low load condition (whistling of the UPS)
- Harmonics

### Possible effect of the malfunctions:

- The modern resources or equipment are often more sensitive
- The used measuring devices do not recognize interferences fast enough

### The correction and prevention

- Determining the current situation by measuring
- Detect the change over time
- Identify sources of interference before damage occurs
- Set up an early warning system
- Take corrective measures
- Monitor the effects of the measures

### It is important to avoid malfunctions

Using investment intensive redundancies in data centers actually should avoid these malfunctions but because of adverse conditions caused from other users and asymmetrical loads, limit levels are regularly exceeded. That is why a permanent power quality monitoring

is becoming more and more essential. Depending on the size of a data center it makes sense to monitor on the feed from the power company (point of common coupling or PCC), in all protected supply areas or at the feed of stand by power systems.

### Goal

Avoid downtimes, expensive production losses and unnecessary redundancies



## ② ASSET PROTECTION BY RESIDUAL CURRENT MONITORING (RCM)

### What is it about

The residual current module reduces the safety risk in electrical systems in low-voltage networks and gives early warning of creeping deviations.

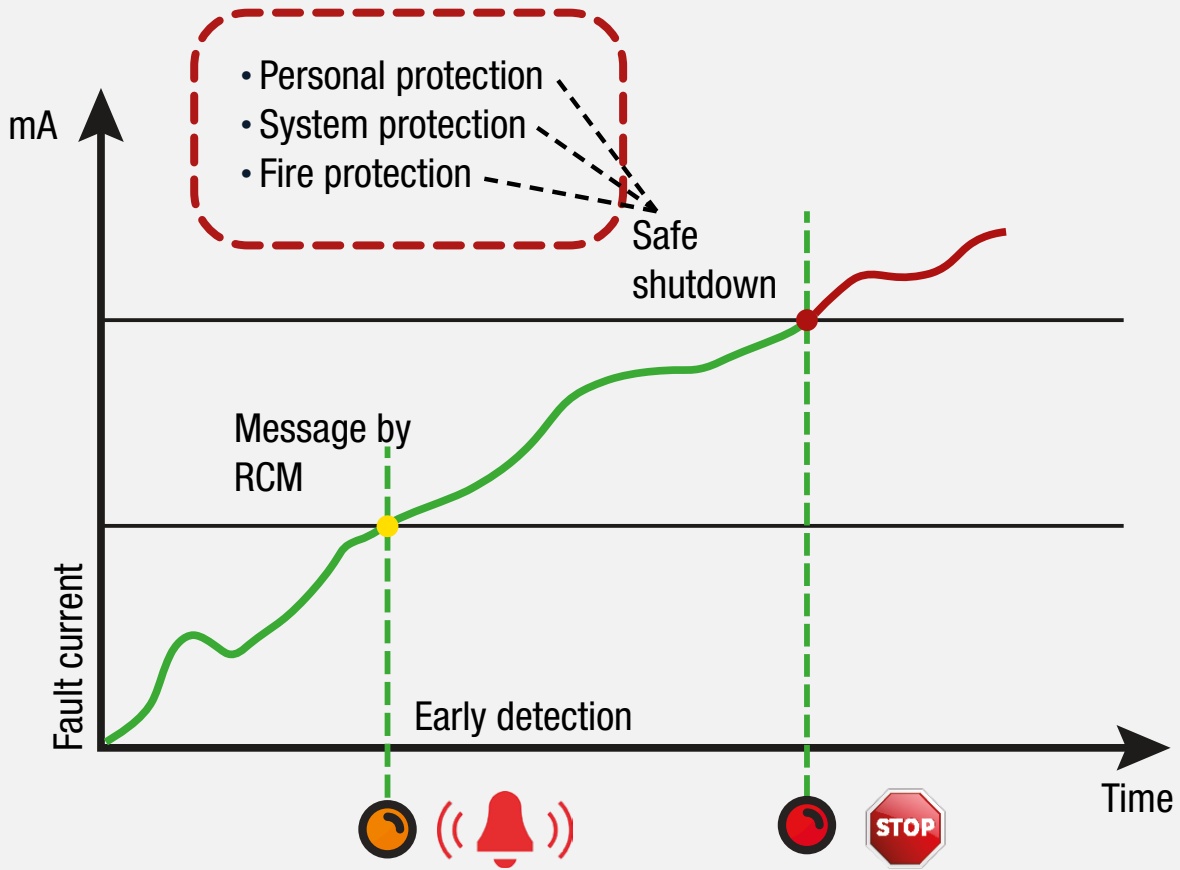


Figure 3: Residual Current Monitoring  
Source: Camille Bauer Metrawatt AG

#### Risk

- Residual currents in low-voltage networks (e.g. data centers) that are not recognized or too late, constitute a fundamental security risk
- Fault currents and deterioration in insulation are generated by defective / bad components (e.g. switching power supplies, LED, server systems, PV, etc.)
- In the data centers, you should / must not switch off in the event of an error!
- Overheating cabling compositions cause risk of fire!

#### Benefit

- Time-consuming manual checks are no longer necessary (switch off topic).
- Continuous monitoring instead of status quo
- Legal certainty with respect to the law, sponsors, accountants (asset protection) and insurance companies

#### Goal

Avoiding damage to people and equipment



# 3 MAXIMIZING PROFIT WITH DECARBONIZATION

## What is it about

Power Usage Effectiveness (PUE) is a technical key figure that has become an industry standard for reporting the energy efficiency of a data center. The PUE value determines the relationship between the total electrical energy consumed (total energy consumption) and the electrical energy consumed with regard to the IT infrastructure (server, storage, switches and more). This means that the PUE value is used to determine the efficiency of energy use within a certain period.

So, the PUE value puts the total energy expenditure of the data centers in relation to the energy consumption of the computer infrastructure, then with a theoretical PUE value of 1 the total power flows into it. In practice, values up to 1.2 are judged to be very efficient. That means 20 percent of the energy used is used inefficiently. Besides the power usage effectiveness (PUE) there are standards which are getting more and more in focus, like the EN DIN 50600 and the

TIA-942. Also the EU is now actively promoting Europe's transition into a low-carbon society, and is updating its rules in order to facilitate the necessary private and public investment into the clean energy transition. Even during the World Economic Forum Annual Meeting (2020) a Swiss Data Center Efficiency Label was announced with the initial goal to decarbonize data centers in Switzerland and significantly reduce their overall energy consumption.

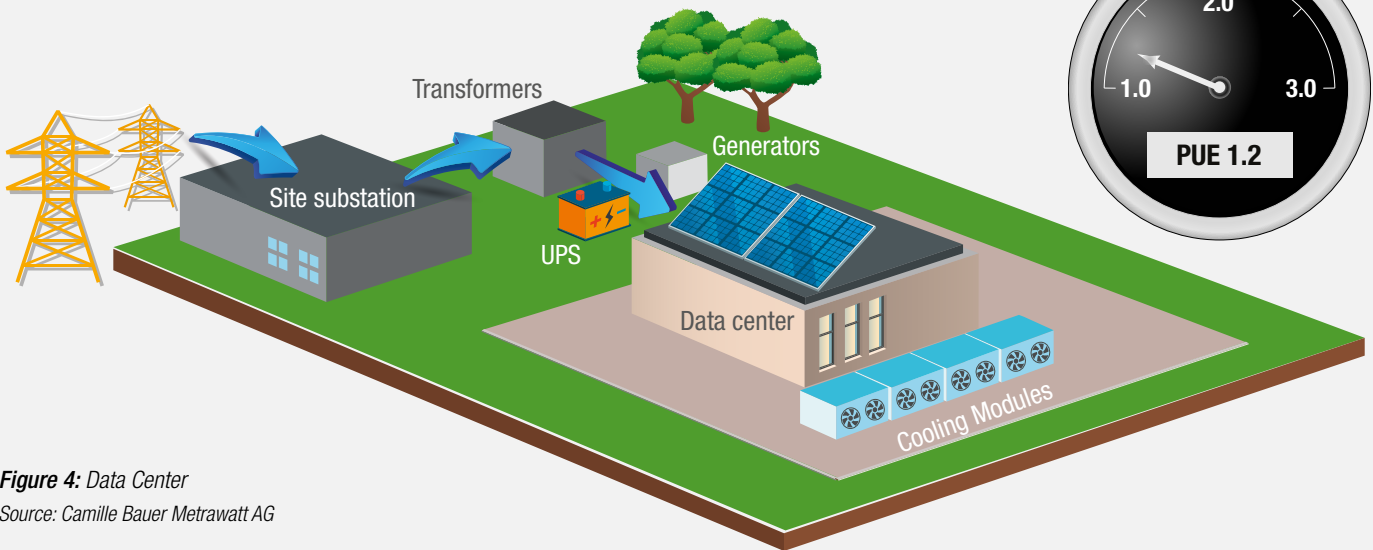


Figure 4: Data Center  
Source: Camille Bauer Metrawatt AG

### Solution

Monitoring of the following in e.g. the main distribution frame, the sub distribution frame, etc. up to the server rack of:

- The energy usage long time
- The mean values of active, reactive and apparent power
- The load profile
- The trend of the used energy
- Accurate metrological certified energy values and power quality monitor to save energy

The ultimate purpose of this monitoring is to increase the efficiency of the use of energy.

### Goal

Your data center becomes more «green»



# YOUR SAFE DATA WITH OUR SOLUTIONS

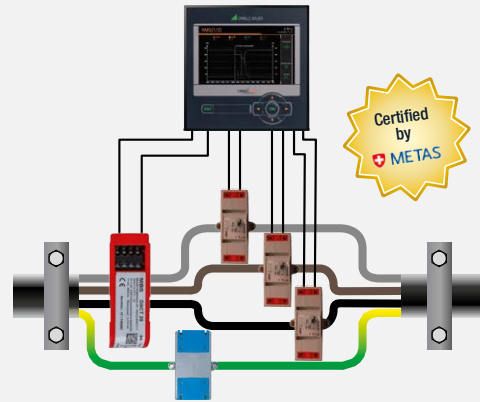
## Permanent monitoring

Monitor Power Quality and energy 24/7

**Power Quality analysis including energy and differential current monitoring.**

**Using suitable current transformers/sensors pays off. All in one!**

- A certified solution by a certified independent (metrological) body (PQ and energy 0.2S)
- Supports DIN EN 50600, TIA-942 in the area of energy efficiency
- Reporting without additional software



Application example of a qualified mains quality analysis in combination with a residual current monitor and an earth conductor current monitor



LINAX PQ5000 - 19" Rack

## Mobile monitoring

Power quality fault finding and temporary energy assessment

## Energy Monitoring

Professional solution for recording the energy consumption down to rack level



LINAX PQ5000 Mobile



MID-Energy Meter



Energysens

## UPS battery tester

Mobile test instrument for evaluation of battery systems



METRACELL BT Pro

The METRACELL BT Pro is a universal, portable and multifunctional test instrument for the evaluation and maintenance of battery systems and uninterruptible power supplies, which are based primarily on lead-acid accumulators.

- Rct and Rel measurement methods: possible electrical and electro-chemical damage to the battery block is reliably detected
- Voltage measurement: designed for single and block voltage measuring up to 600V DC
- Capacity test: recording of discharge current and voltage curve
- Data transfer: transfer of battery databases is possible



# POWER QUALITY AND INDUSTRIAL ENERGY & DATAMANAGEMENT

## Supply and services

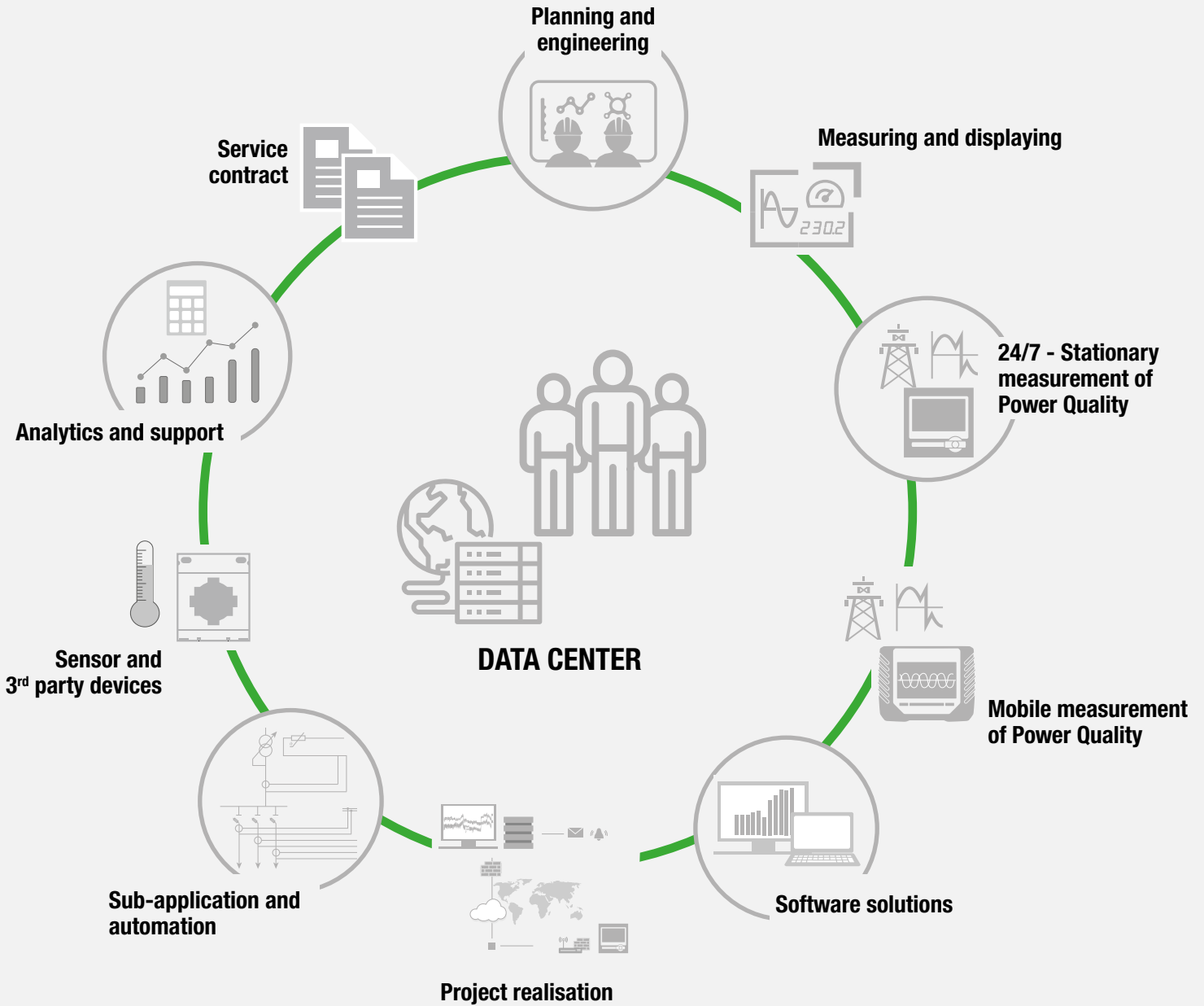


Figure 5: Software, Systems and Solutions

Source: Camille Bauer Metrawatt AG





We design modular customer-specific solutions and systems which can be extended at any time regardless of manufacturer.

Through our non-proprietary interfaces also an integration in already existing applications and systems with components from different manufacturers is not a problem.



**GMC INSTRUMENTS**

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