HITACHI

Brochure

Power Quality Products

Portfolio for Data Center
power networks and auxiliaries

Data Centers

Typical loads and challenges for power quality

Typical loads in a data center

Server / IT loads:

These are the primary loads in any data center, including data servers and other equipment for networking and computing. They are supplied through 3-phase, double-conversion UPS systems, designed to maintain very high power factor [1] and low harmonic distortion in power supply network. In practice however, these power quality disruptions might be higher at lower server loading. Along with the server load condition, characteristics of feeding cables [2] and operating mode of UPS (eco / normal) can also affect power quality, requiring harmonic and/or reactive power compensation. Bypass scenarios and generator capability limitations also need to be considered in the deployment of suitable power quality measures.

Cooling system loads:

IT loads need significant cooling for reliable operation. Therefore, data centers have large cooling systems, including air-conditioning systems, liquid cooling solutions etc.. All these systems use multiple motors and drives, which can introduce issues like low power factor and harmonic pollution in the power supply network of the data center. This may result into poor operational efficiency, unplanned outages and also penalties from utility for non-compliance with grid code.

Other non-IT loads:

Typical building loads like lighting, elevators and office equipment are included in this category. Like cooling system loads, they can also introduce power quality issues (e.g. harmonics) in the supply network. However, their impact is significant only if their total capacity is considerably high.

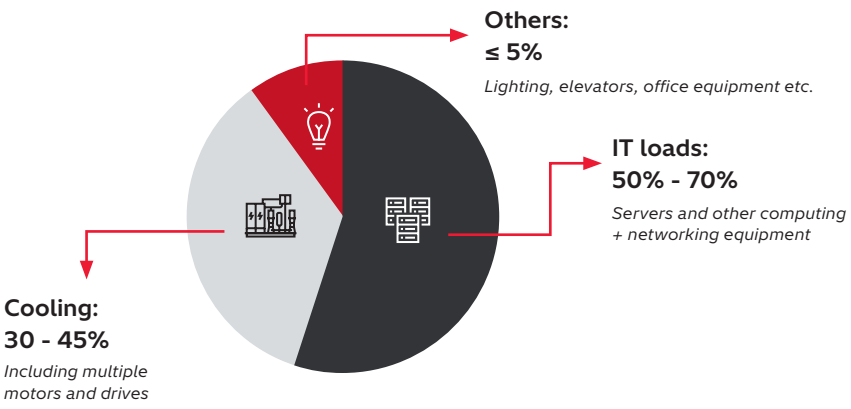
The 'non-linear'[3] loads introduce some disruptions in the electricity flowing through the data center's power network, affecting its quality. As a result, the data center can face unwanted outages, premature equipment failure and penalties from utilities for non-compliance with grid codes. With higher energy losses in the network and need to run fossil fuel-powered backup generators in case of disruptions, poor power quality can also result into higher CO2 footprint for a data center.

Rapid growth posing challenges

Enhanced communication networks, rapid growth of AI and online services, from shopping to streaming, necessitate a quick. large-scale data centers deployment - both new installations and expansion of existing facilities. Besides increasing the demand of electricity, this also puts the power networks at a risk of potential high levels of power quality issues. For example, AI processing is causing rapid, unpredictable fluctuations in power demand with the grid scrambling to keep up and maintain reliable power.

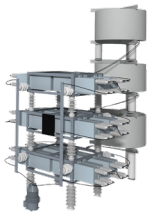
To filter out these issues and ensure reliability of data centers as well as power network, customers need solutions that are flexible, reliable, and easy to install, operate and maintain.

1. Based on loading conditions, the power factor may become leading sometimes.
2. At low loading condition cable acts as a capacitance may result in to natural network resonance, combined with additional C will amplify the harmonics to higher harmonic distortions.
3. Non-linear loads in an alternating current (AC) network are the loads for which the current waveform is not the same as voltage waveform - and often distorted (non-sinusoidal).



Power Quality Products

Reliable, flexible solutions for data centers



1. Open rack capacitor / filter banks (HV / MV)

- Simple, cost-effective design
- Suitable for bulk power quality compensation on utility networks / incomer feeding data centers
- Reliable performance in any climate / geography

2. Metal-enclosed capacitor / filter banks (MV)

- Modular, safe, 'plug-and-play' solution
- Multiple designs with fixed or switched configuration
- Fully enclosed, ensuring safety and environment protection
- Range of enclosures and accessories
- Factory-assembled and tested, saving commissioning time
- Can be expanded / relocated easily, with site expansion

3. MV STATCOM

- Power electronics-based reactive power compensator
- Compact solution, with instantaneous response
- Suitable for voltage stabilization
- Can be designed as per customer's requirement
- Needs less installation space and maintenance
- Can be combined with conventional passive solution

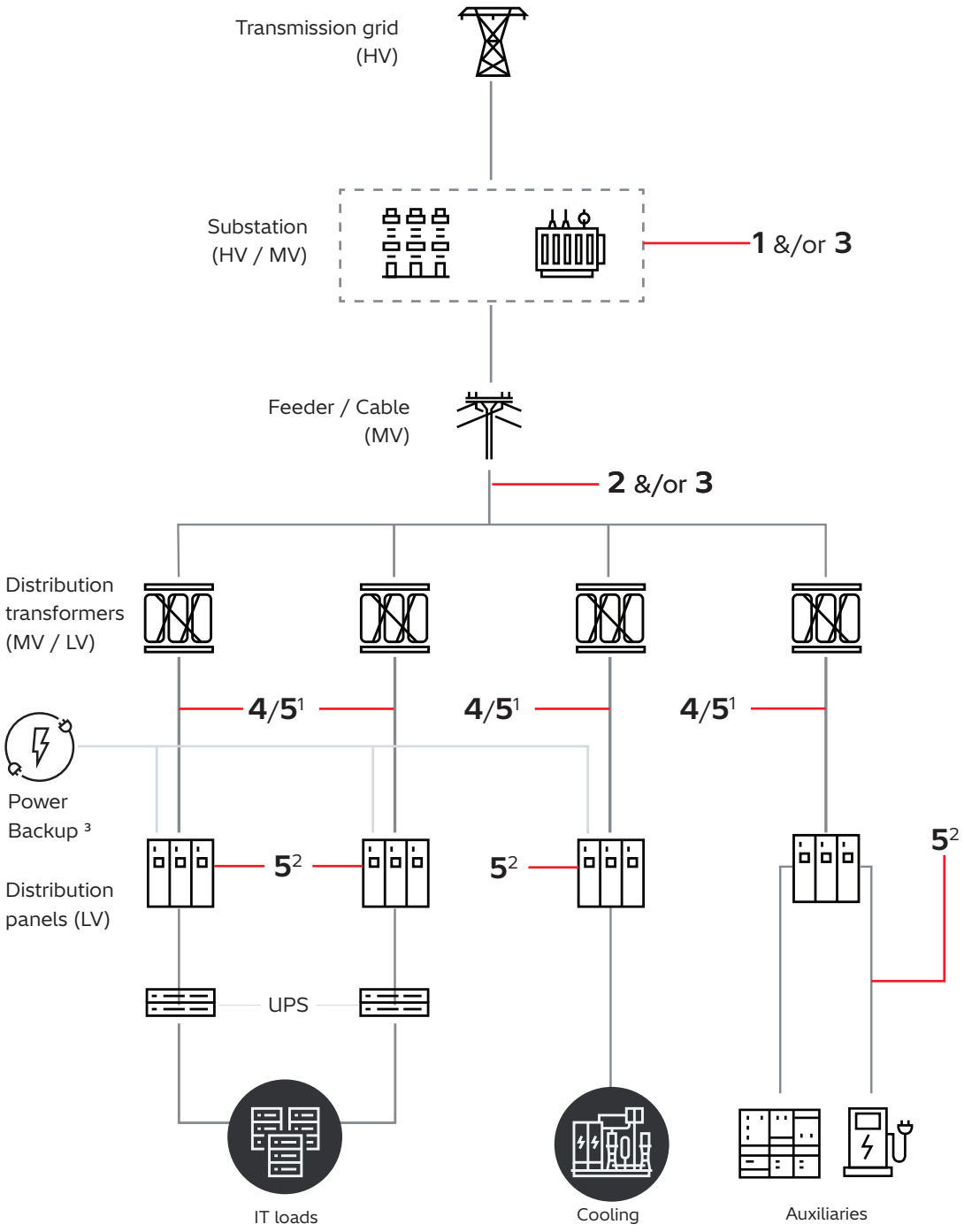
4. Automatic capacitor banks (LV)

- Modular design, powerful and compact
- Suitable for any challenging environment
- Hitachi Energy's dry type capacitor technology
- Easy to install and use with Hitachi Energy controllers
- Models with detuning reactors available for mitigating resonance risk
- Solutions with thyristor switching also available for transient-free switching

5. Modular active harmonic filters PQactiF™ (LV)

- Compact, modular, highly efficient filtering solution
- Available as a module, in a wall-mounted and a standalone cabinet configuration
- Mitigates multiple power quality issues simultaneously: lead / lag power factor compensation, voltage stabilization and unbalance compensation, in addition to harmonic filtering (2nd to 50th order)
- Interactive touchscreen interface option with a wide range of connectivity features

Power Quality Products for Data Centers



Notes

1. Automatic capacitor banks are deployed standalone or as a 'hybrid' solution with active filters, based on the network needs
2. PQactiF can be installed as a standalone solution (cabinet / wall-mounted) or integrated inside the distribution panel as a module.
3. Power backup can be a fossil fuel-based generator, a hydrogen-to-power solution or a battery energy storage solution

Why Hitachi Energy?

We are your trusted partner for grid connection and data center electrification.

Get connected.

With over 100+ data center projects already delivered and 25+ years supporting data center customers, Hitachi Energy has cemented its reputation as a trusted partner. We have an extensive global footprint across 90 countries, ensuring that we are always within reach. With our rich heritage of 130+ years in power systems and assets, we are unmatched in our depth of expertise.

We help you be greener.

Usher in more sustainable operations.

Hitachi Energy is a global leader in power quality, grid solutions, and transformer applications. We are not just about delivering services; we aim for a greener planet. Our collaborations with Hitachi Vantara and GlobaLogic further enhance our capabilities, reflecting 60+ years of transforming data and technology. Our commitment to sustainability is unwavering and is evident in every project we undertake.

We help you operate efficiently.

Be agile without cutting corners.

We are a 24/7 one-stop shop for service solutions, ensuring that our clients receive continuous support. With 200 service centers worldwide and a robust team of 1,500 field engineers, we ensure efficient operations without compromising on quality. Our status as the world's leading OEM of all critical equipment for high-voltage grid connection and the largest installed base in power and distribution transformers cements our reliability. Furthermore, our emphasis on cybersecurity across OT and IT ensures that your operations remain secure at all times.

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