

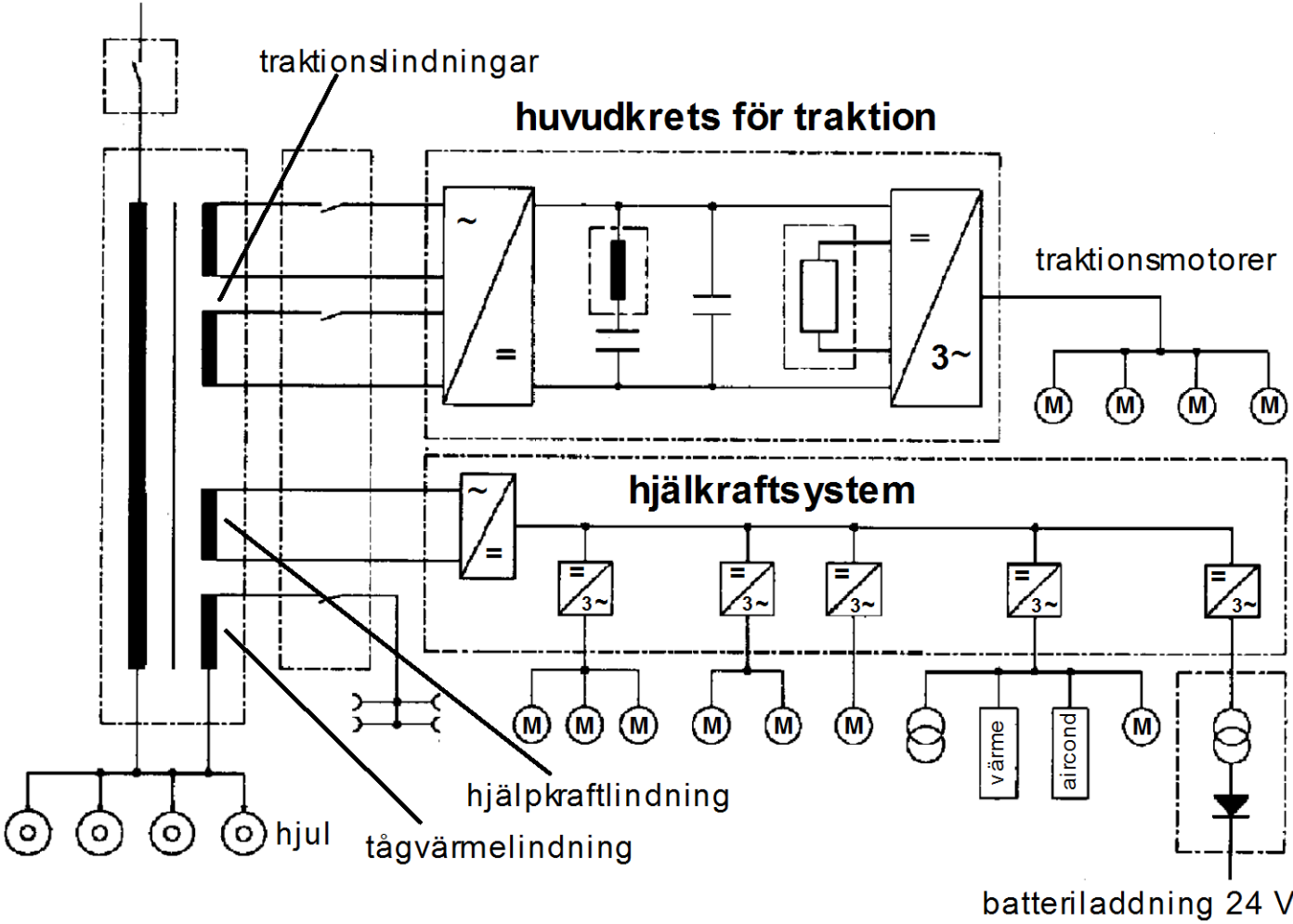
# Auxiliary power systems

- Operation of pumps and fans, for example to cool the electrical equipment.
- Operation of climate control systems.
- Battery charging
- Power feed to electronics
- Generation of standard voltages, e.g. three-phase 400 V, 50 Hz.

# Required Auxiliary Power

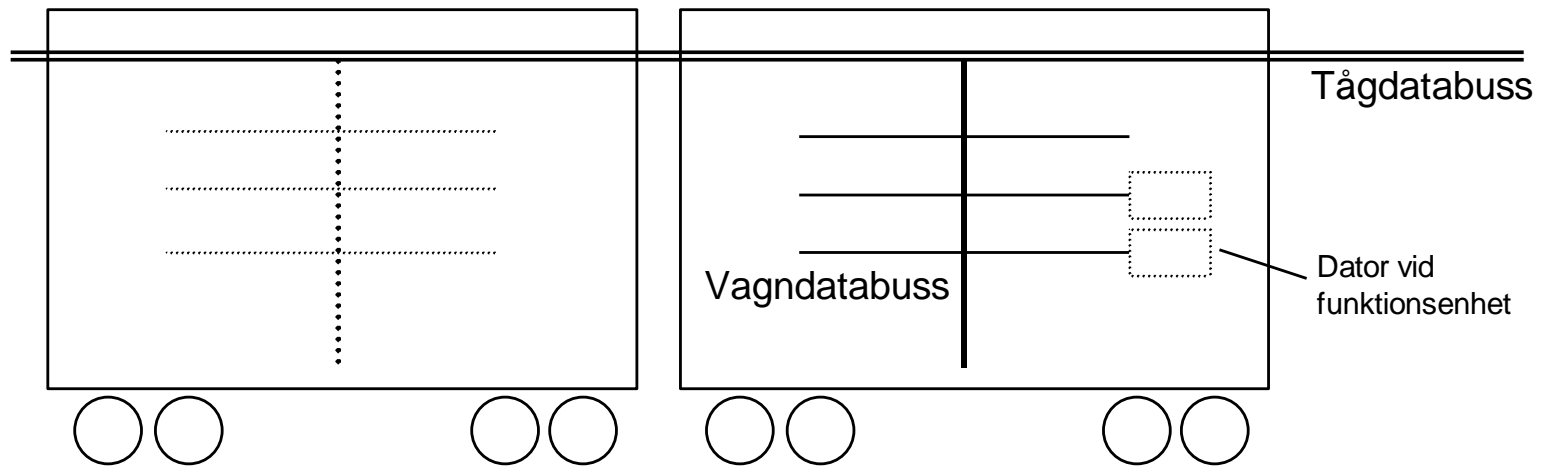
- Rc-loco train heating 800 kVA
  - 1000V, 16.7 Hz
- Passenger car approx. 50 kVA
- X2000 train heating 450 kVA
  - 1000V, 16.7 Hz
- X2000 auxiliary power approx. 130 kVA in power unit and 220 kVA for all cars
  - three-phase 230/400 V, 50 Hz

# Example of an auxiliary power system in an electric locomotive.



# Computer Systems

## Structure of a computer network on a train



# Monitoring systems

## Graphical representation of the controlling systems

