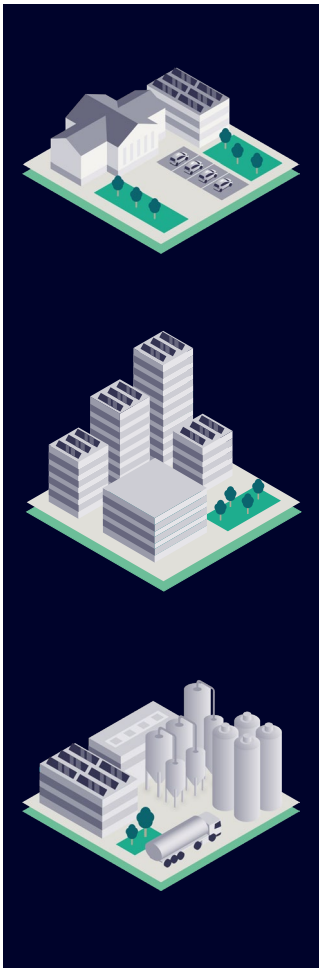
ENERGY EFFICIENCY

General specification – what to measure where



Measuring energy consumption is always the basis for energy efficiency. This document provides a general specification on any power monitoring system for infrastructure and industry applications.

The energy industry has ambitious goals: climate neutrality, a reduced CO_2 footprint and a distributed power supply. This also applies to low-voltage power distribution in buildings, critical Infrastructures, and production plants. One way to achieve these goals is through perfectly coordinated hardware and software, including the digitalization of the individual processes. This is the only way to confront the growing challenges of energy efficiency while also ensuring reliable power distribution.

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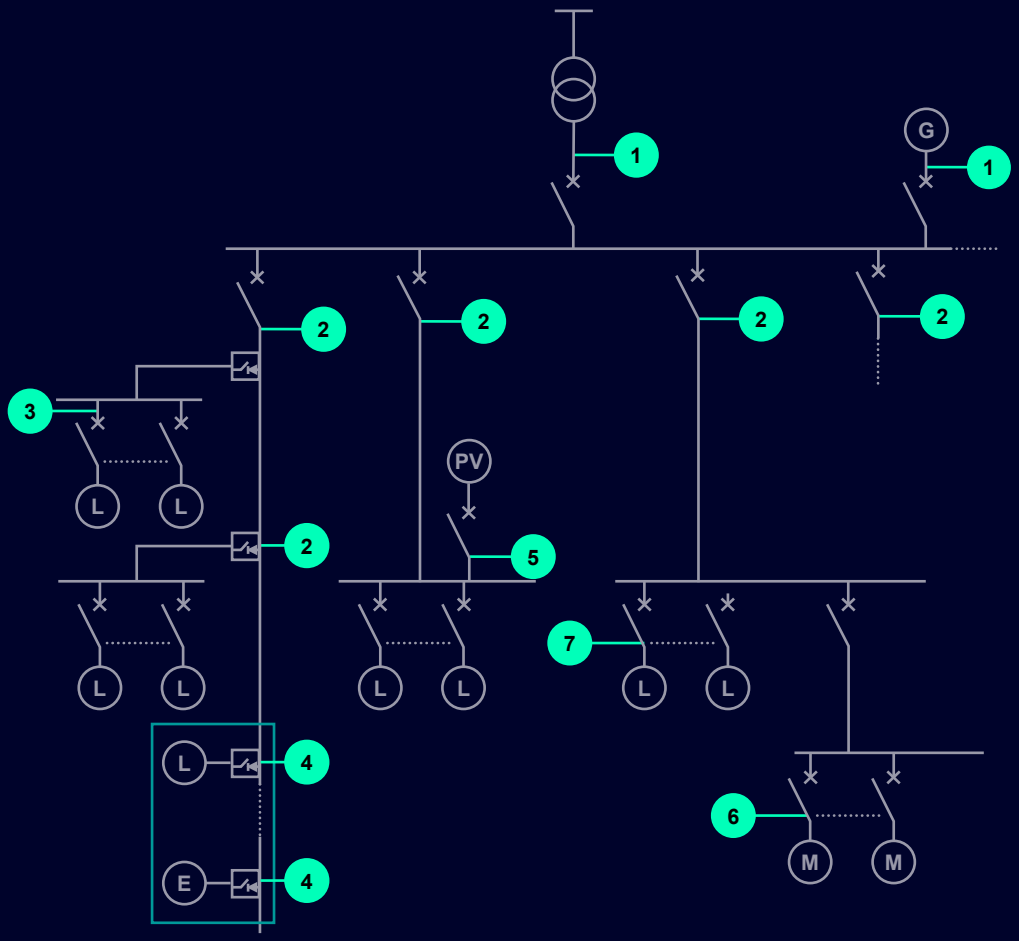
Power metering must be built into the power distribution system through the following methods:

- PMD- Power Meter installed on as many machines or systems that count for 80% of the total energy consumption. All the largest consumers must be included (from large to small).
- All Power Meters must be connected to the Factory Floor Network without be routed through a PLC or specific sub-system to access data in a comprehensive overall energy system.
- PMD-II Power Meter for simple, linear consumers w/o harmonic interference. (meter 3)
- PMD-III Power Meter installed on each power feeder (meters 2 and 6)
- All Consumers that are relevant for billing energy costs to external cost centers must be metered with MID certified meters. (meter 4)
- Power Quality (PQ) Power Meter optionally installed on each Power Main coming into the plant (meter 1)
- Provisions must be provided for Short Circuiting the CT's (short circuit terminals)

1	Incomer	PMD3 / PQ
2	Main Distribution (incl. busbar tap-off)	PMD3
3	Load - linear, asymmetric	PMD2
4	External billing application	PMD2 + MID
5	PV infeed (if billing of energy cost is relevant, then with MID certified meter)	PMD2
6	3 phases linear, symmertic, e.g. motor	PMD3
7	Load – non-linear	PMD3



L – Load G – Generator E – E-car charging PV – Photovoltaic M – Motor

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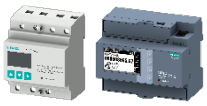
Selection of the best solution for your application: **Overview of PMD/PMF power meters**

	PMD-II Power Meter	PMD-III Power Meter	PQ Meter
Active Energy	Yes	Yes	Yes
Power Factor	Yes	Yes	Yes
Total Harmonic Distortion Voltages (THDu)	No	Yes	Yes
Total Harmonic Distortion Currents (THDi)	No	Yes	Yes
Uncertainty Class (Ea)	Class 0.5 acc. to IEC 62053-21	Class 0.5 acc. to IEC61557-12	Class 0.2 acc. to IEC61557-12
Individual Harmonics Voltage	No	No	Up to 64th
Individual Harmonics Current	No	No	Up to 64th
Flicker	No	No	Yes
Voltage Sag/Swell	No	No	Yes
PQ Event recorder	No	No	Yes
PQ visualization acc. EN50160	No	No	Yes
SENTRON measuring device	 PAC1600 or PAC2200 or 3VA2/3VA6 or 3WA	 **PAC3220** or PAC3120/PAC4220 or 3VA2/3VA6 or 3WA	 PAC5200

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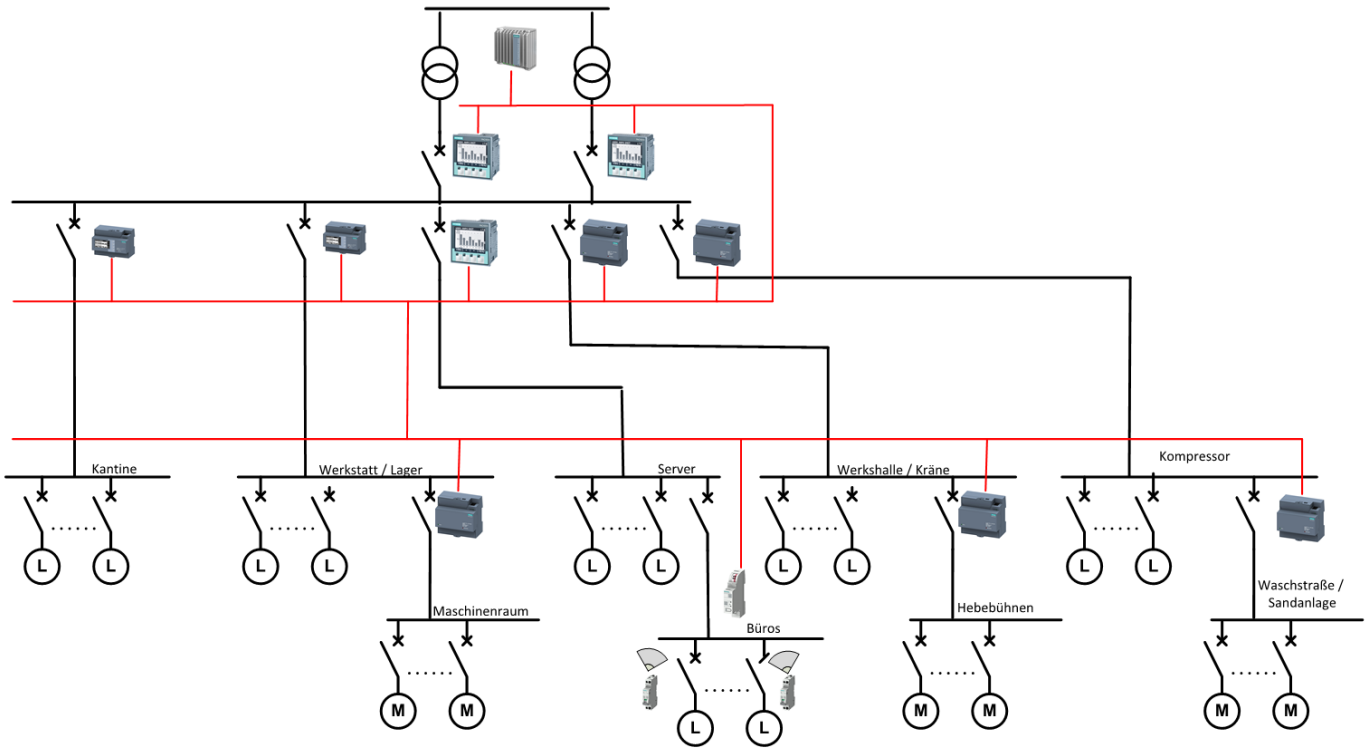
Application example of a tram depot



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