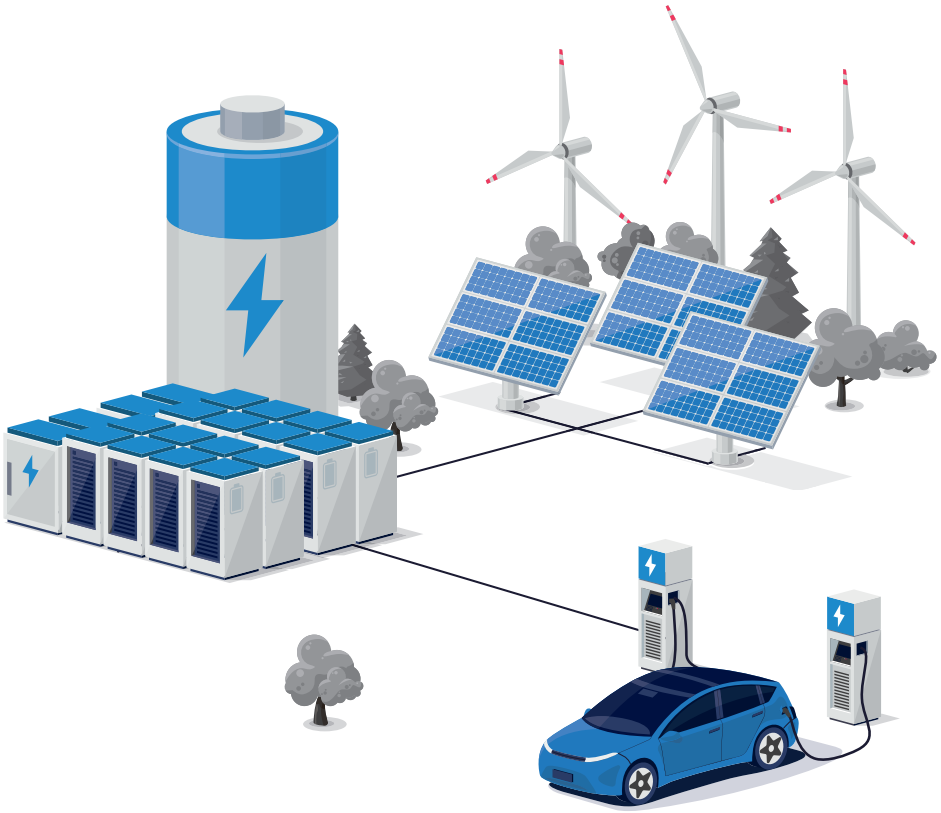
Functional description

Phase balancing meters



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Janitza electronics GmbH
Vor dem Polstück 6
35633 Lahnau | Germany
Support: +49 6441 9642-22
info@janitza.com | www.janitza.com

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Contents

General

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Disclaimer

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Comments on the manual

Your comments are welcome. If anything in this manual seems unclear, please let us know and send us an email at: info@janitza.de

ATTENTION
Observe the operating manual for the installation and operation of the device!

Basics

When dealing with energy meters, a distinction is made between balancing meters and non-balancing meters. Today, balancing meters are used predominantly. This difference is particularly important if you both draw energy from the grid and supply it to the grid, for example with a photovoltaic system. Another factor is that symmetrical loading becomes very unlikely as soon as single-phase consumers are employed. The same also applies to single-phase generators.

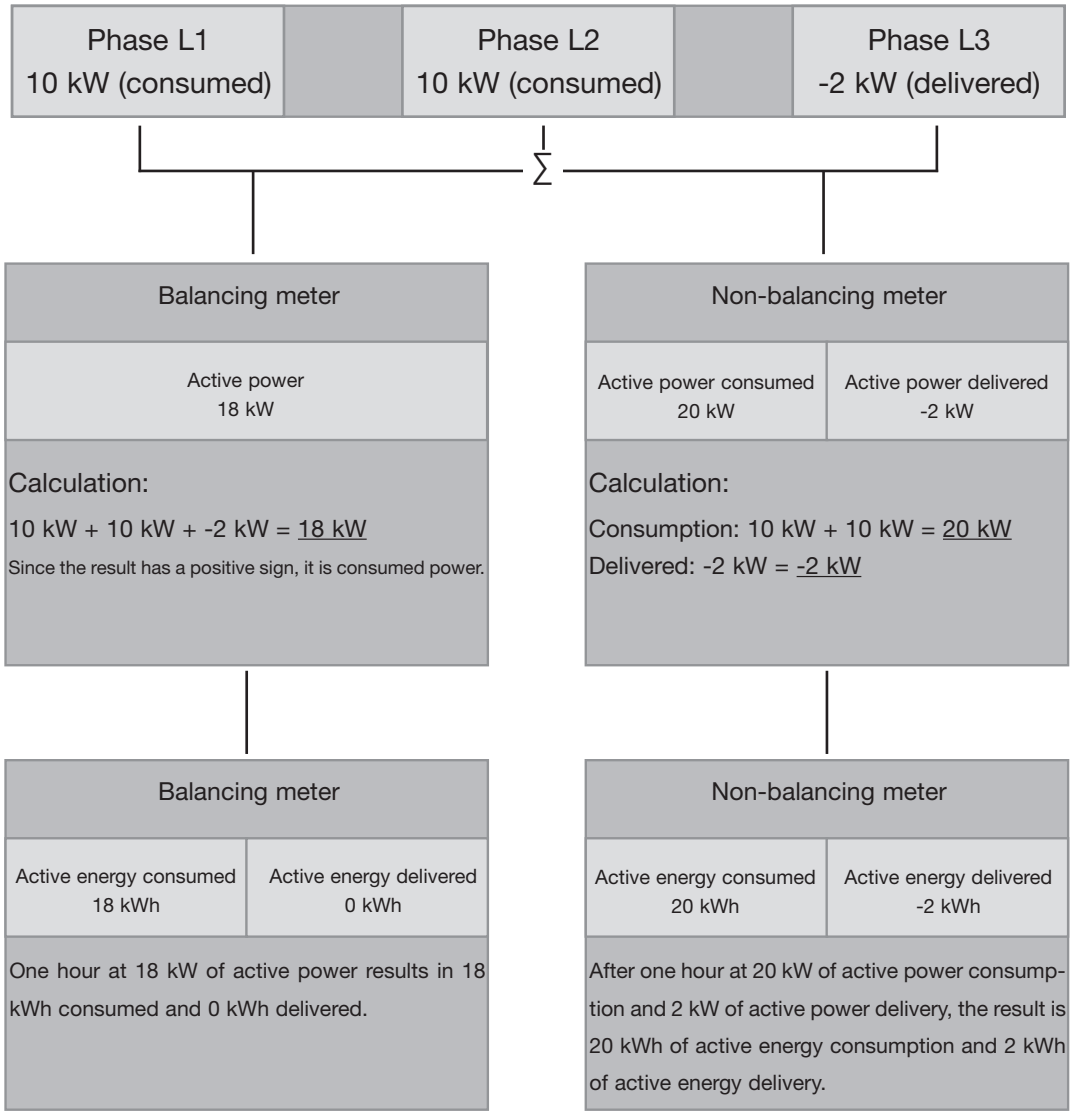
Users may be subject to disadvantages in the case of non-balancing meters, as the remuneration for delivered energy is usually significantly lower than the cost of consumed energy.

If both generation and consumption are three-phase and symmetrical, balancing meters plays a minor role. If you only consume energy, you do not need a balancing meters.

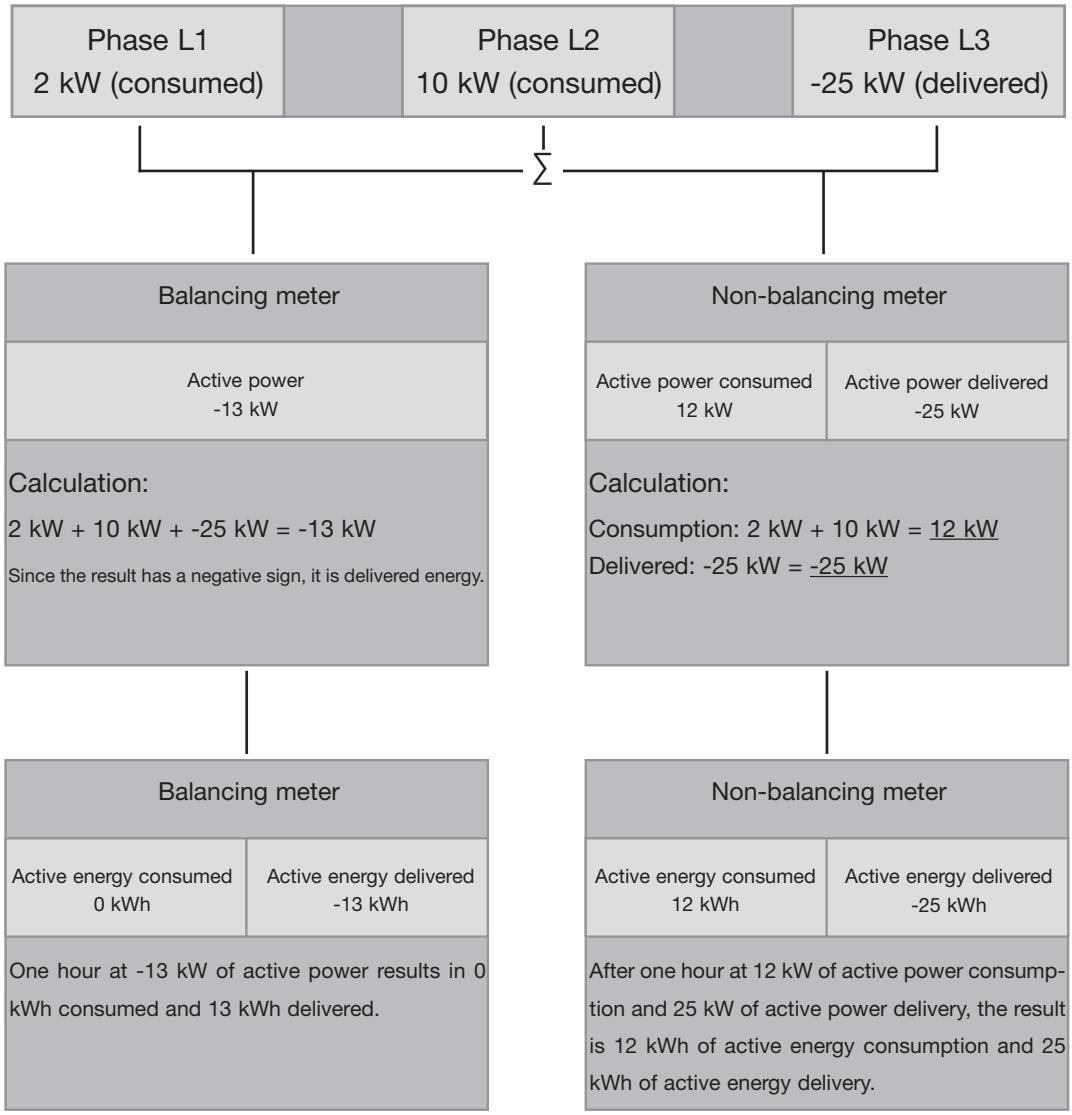
Functional description

Balancing meters measure the current of the individual phases and multiply it by the measured voltage. The resulting power values, whether consumed or delivered, are then offset against each other. The power of all three phases is added together (L1+L2+L3 = sum). Delivered power is given a negative sign, consumed power a positive sign. This means that either the power consumed or the power delivered will necessarily equal zero, depending on whether more is generated or consumed. The respective power is then multiplied by time and the result is attributed to the energy consumed or delivered, depending on the sign. A non-balancing meters, on the other hand, shows both consumption and generation in this same case. It only adds up consumed and delivered power separately and bills the one and credits the other according to the energy consumed or delivered, without first offsetting them against each other. This is illustrated by the following examples.

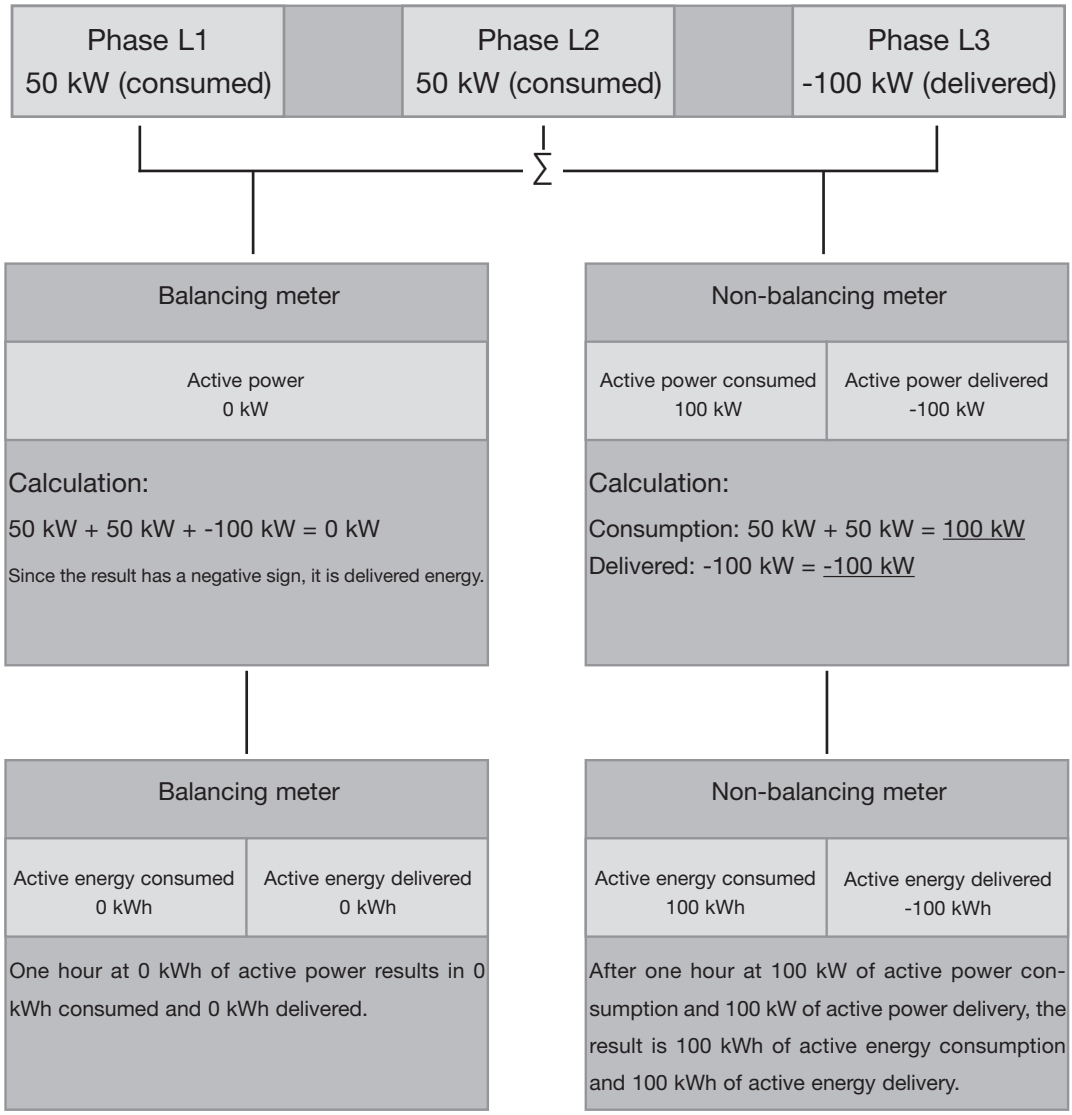
Example 1


Phase L1
10 kW (consumed)
Phase L2
10 kW (consumed)
Phase L3
-2 kW (delivered)
∑
Balancing meter
Active power
18 kW
Calculation:
10 kW + 10 kW + -2 kW = 18 kW
Since the result has a positive sign, it is consumed power.
Non-balancing meter
Active power consumed
20 kW
Active power delivered
-2 kW
Calculation:
Consumption: 10 kW + 10 kW = 20 kW
Delivered: -2 kW = -2 kW
Balancing meter
Active energy consumed
18 kWh
Active energy delivered
0 kWh
One hour at 18 kW of active power results in 18 kWh consumed and 0 kWh delivered.
Non-balancing meter
Active energy consumed
20 kWh
Active energy delivered
-2 kWh
After one hour at 20 kW of active power consumption and 2 kW of active power delivery, the result is 20 kWh of active energy consumption and 2 kWh of active energy delivery.

Example 2


Phase L1
2 kW (consumed)
Phase L2
10 kW (consumed)
Phase L3
-25 kW (delivered)
∑
Balancing meter
Active power
-13 kW
Calculation:
2 kW + 10 kW + -25 kW = -13 kW
Since the result has a negative sign, it is delivered energy.
Non-balancing meter
Active power consumed
12 kW
Active power delivered
-25 kW
Calculation:
Consumption: 2 kW + 10 kW = 12 kW
Delivered: -25 kW = -25 kW
Balancing meter
Active energy consumed
0 kWh
Active energy delivered
-13 kWh
One hour at -13 kW of active power results in 0 kWh consumed and 13 kWh delivered.
Non-balancing meter
Active energy consumed
12 kWh
Active energy delivered
-25 kWh
After one hour at 12 kW of active power consumption and 25 kW of active power delivery, the result is 12 kWh of active energy consumption and 25 kWh of active energy delivery.

Example 3



Cost calculation for example 3

Assume one hour of constant power in consumption and delivery with the following values:

Remuneration for delivered energy per kWh: 0.09 euros
Cost of consumed energy per kWh: 0.25 euros

Phase L1: 1 h x 50 kW = 50 kWh
Phase L2: 1 h x 50 kW = 50 kWh
Phase L3: 1 h x 100 kW = 100 kWh

Balancing metere:
Consumption: 0 kWh
Delivery: 0 kWh
0 kWh x 0.25 € = 0.00 € cost
0 kWh x 0.09 € = 0.00 € remuneration
No remaining costs.

Non-balancing meter:
Consumption: 100 kWh
Delivery 100 kWh
100 kWh x 0.25 € = 25.00 € cost
100 kWh x 0.09 € = 9.00 € remuneration
Remaining costs: €16.00

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Germany

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info@janitza.com | www.janitza.com

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