Table of contents

Device classes

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The devices can be divided into the following classes according to the electronic power system:

- Basic design:
  - Supply unit
  - Axis / inverter
  - DC/DC converter
- Combinations:
  - Converter: Supply unit + axis / inverter

See also ↘ “Device classes, overview”.

Supply unit

General information

A supply unit converts the three-phase grid voltage into direct voltage and provides the resulting DC bus with energy.

Types:

- **Feeding supply unit** → Rectifier:
  Provides the DC bus with energy.

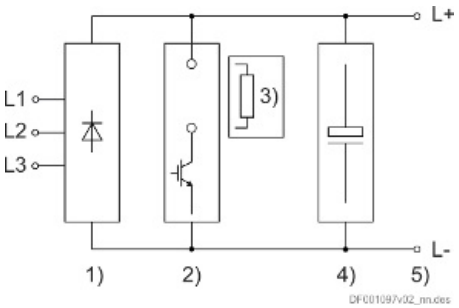

Fig. 11: Electronic power circuit diagram of a feeding supply unit

1) Grid input

2) Braking transistor

3) Optional external braking resistor

4) DC bus capacitors

5) DC bus connection

- **Regenerative supply unit** → Grid inverter:

Provides the DC bus with energy **and** feeds excessive energy of the DC bus back to the grid.

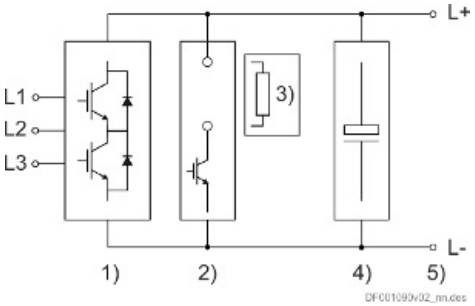

Fig. 12: Electronic power circuit diagram of a regenerative supply unit

1) Grid input with grid inverter

2) Braking transistor

3) Optional external braking resistor

4) DC bus capacitors

5) DC bus connection

Principle of the command value specification

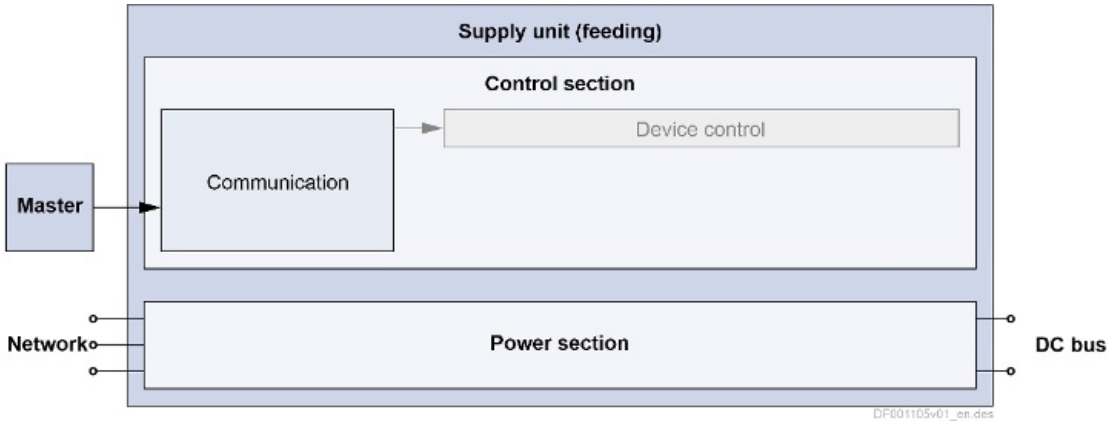

Fig. 13: Principle of the command value specification for a feeding supply unit

In case of a feeding supply unit, no command values such as the level of the DC bus voltage can be specified. The amplitude of the grid voltage and the energy fed back into the DC bus voltage determine the level of DC bus voltage.

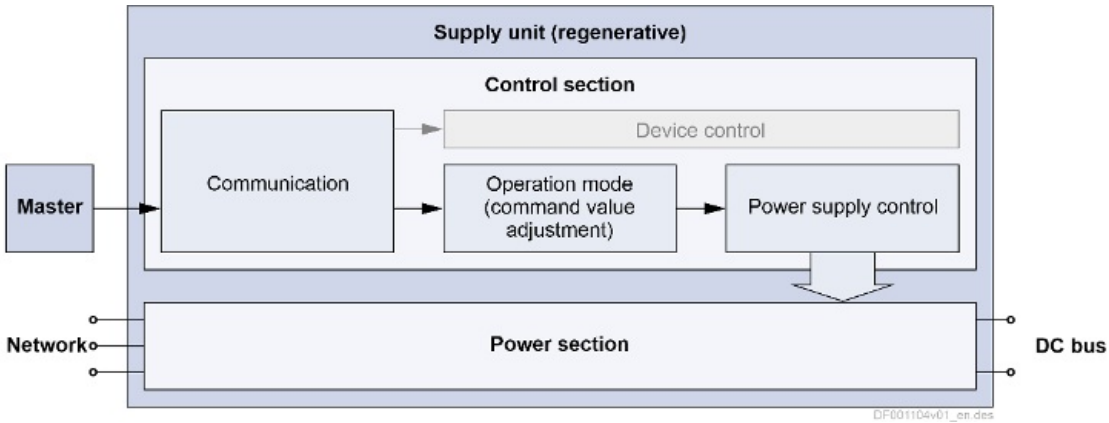

Fig. 14: Principle of the command value specification (e.g. level DC bus voltage) in the regenerative supply unit

Axis / inverter

General information

An axis or an inverter is a motor inverter, converting the direct voltage of the DC bus to a frequency-variable voltage with variable amplitude to control a three-phase motor.

In case of double or multiple-axis devices, two or several axes or inverters are arranged in parallel.

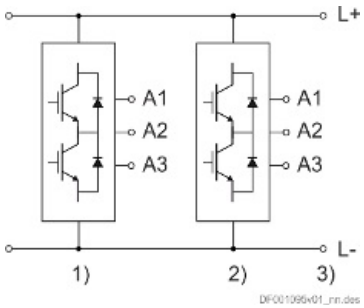

Fig. 15: Electronic power circuit diagram of a double-axis motor inverter

1) Inverter stage axis 1 with output to motor

2) Inverter stage axis 2 with output to motor

3) DC bus connection

Principle of the command value specification

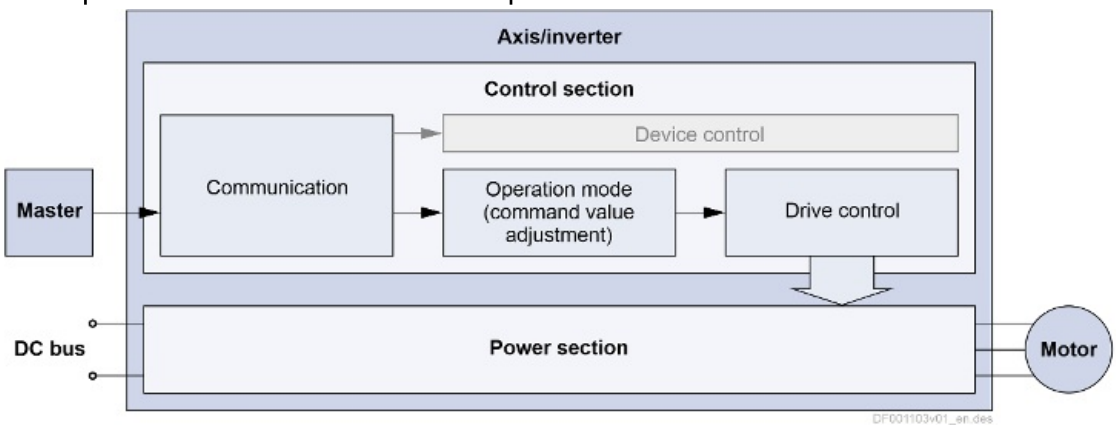

Fig. 16: Principle of the command value specification (e.g., motor torque or speed) in axis / inverter

DC/DC converter

General information

A DC/DC converter is a direct voltage converter, converting direct voltage of the DC bus to a direct voltage of a different level (buck converter).

Energy flow is possible in both directions.

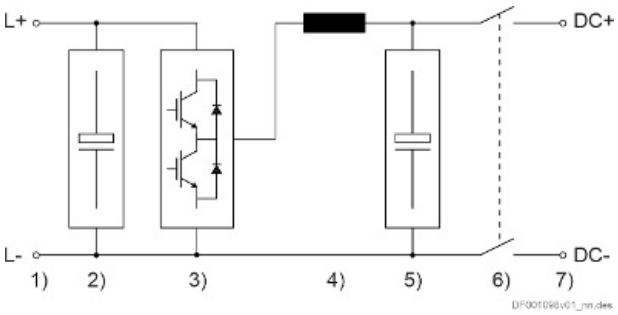

Fig. 17: Electronic power circuit diagram of a DC/DC converter

1) DC input voltage

2) Capacitors (optional)

3) Inverter stage

4) Commutation choke

5) Capacitors

6) Contactor (application)

7) DC output voltage

The DC/DC converter is connected to the DC bus. It is assumed that the energy provided for the DC bus is always sufficient.

Principle of the command value specification

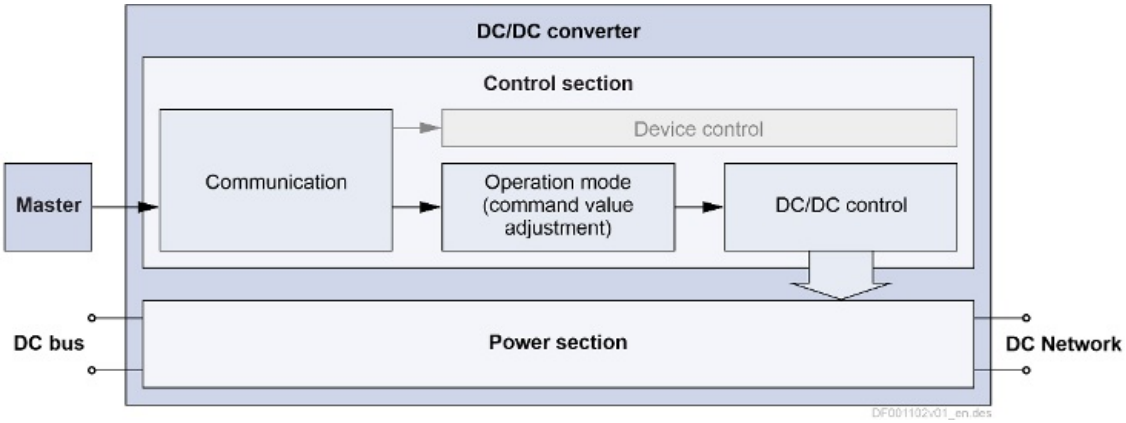

Fig. 18: Principle of command value specification (e.g. DC output voltage level) in the DC/DC converter

Converter

General information

A converter converts a three-phase, frequency-constant grid voltage to a three-phase frequency-variable voltage with variable amplitude to control a motor. Since the conversion is implemented via a direct voltage DC bus, it is from a power electronics point of view a combination of rectifier (supply unit) and motor inverter (axis/inverter).

Due to device-internal parallel connection of multiple inverters, multiple motors can be operated at one device.

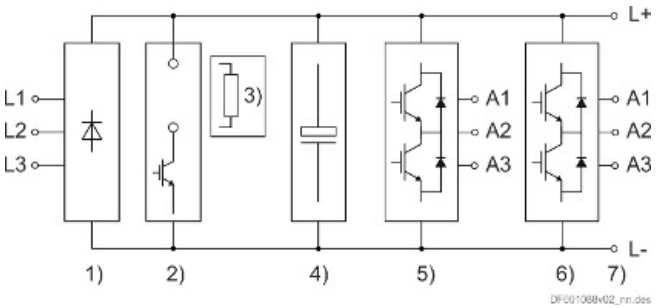

Fig. 19: Electronic power circuit diagram of a double-axis motor converter

1) Grid input

2) Braking transistor

3) Optional external braking resistor

4) DC bus capacitors

5) Inverter stage axis 1 with output to motor

6) Inverter stage axis 2 with output to motor

7) DC bus connection

Principle of the command value specification

The following figure illustrates the principle of command value specification (e.g. motor torque or speed) in the converter. As for the feeding supply unit, it is not possible to specify a command value (e.g. level DC bus voltage).

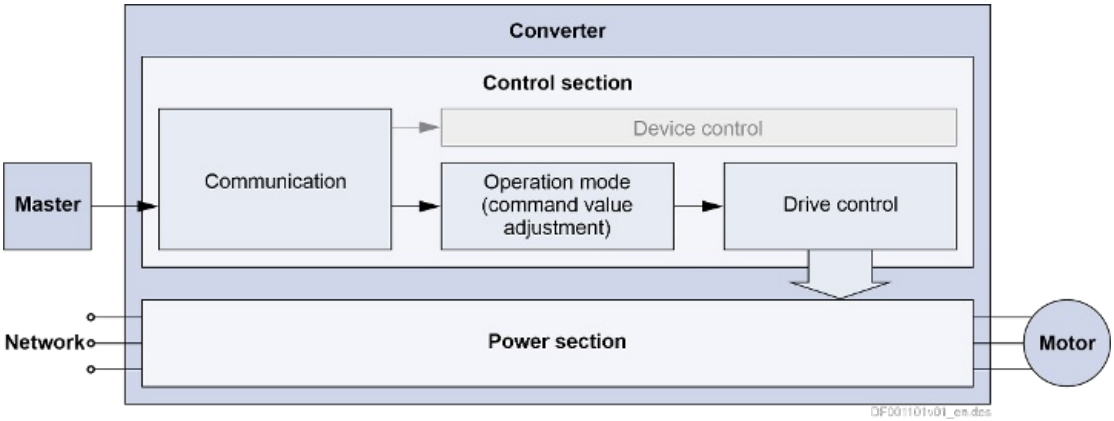

Fig. 20: Principle of the command value specification (e.g. motor torque or speed) in the converter

In case of a feeding supply unit, no command values such as the level of the DC bus voltage can be specified.