# The Active Front End allows energy regeneration

The Active Front End is an option for the frequency inverter to return energy to the mains. It provides 4-quadrant operation and thus it is well qualified for all applications with generator operating mode.


## Special features

The Active Front End is a supply and regeneration unit that provides a constant DC voltage supply independent of the load situation. At this DC bus one or several inverters can be operated. In this way up to four Active Front End units can be connected to this DC bar in parallel in order to improve the redundancy and to increase the total power.

**Mains interferences / mains conditions**

- Power factor cos Phi 1 independent of the load situation and the energy direction
- No converter transformer required
- Mains voltage drops up to 40 % without interruption of operation
- Wide mains frequency range permitted
- Adjustable regenerating power e.g. for operation with diesel generator
- Mains short circuit power up to 100 kA permitted

**Simple planning and installation**

- Line contactor already integrated
- No external control voltage supply necessary
- Integrated charging circuit for max. fourfold power at the DC bus
- Operation independent of the phase sequence
- Optimised administration of spare parts due to equal components in the Active Infeed Converter and the Altivar inverter

**Energy-saving operation**

- Energy regeneration to the supplying mains
- Improved efficiency due to innovative control system
- No damping resistors with heavy losses required and thus it is especially robust in respect of heavily distorted mains voltages.

**Typical applications**

Crane applications (hoists, long-travels, …)
Downhill conveyors, winches, escalators
Complex drive systems
Test benches and high dynamic drives
Pump / turbine combinations

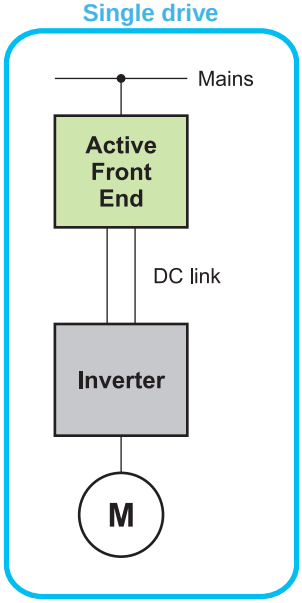
## Applications

The Active Front End is equipped with numerous integrated functions and thus it meets the sophisticated demands in industry, machine building and automation.
The design allows the simple use in combination with an inverter as well as building up a common DC bus for a multitude of drives.

The Active Front End is connected upstream to the standard frequency inverter and consists of three components:

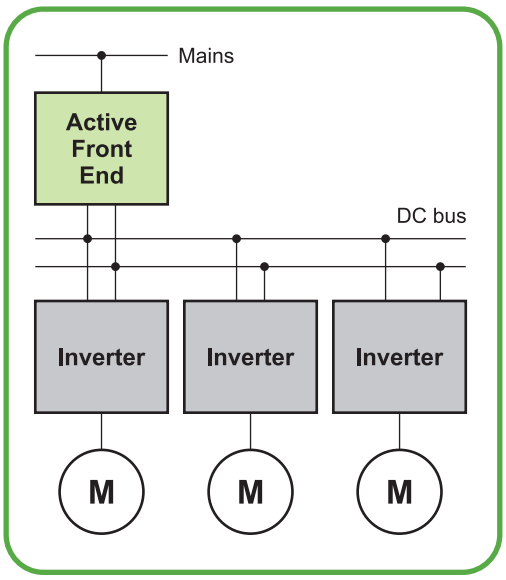
- Active Infeed Converter
- Line Filter Module (EMC filter, line contactor and charging circuit)
- Line Filter Choke (3 parts)

**Single drive**



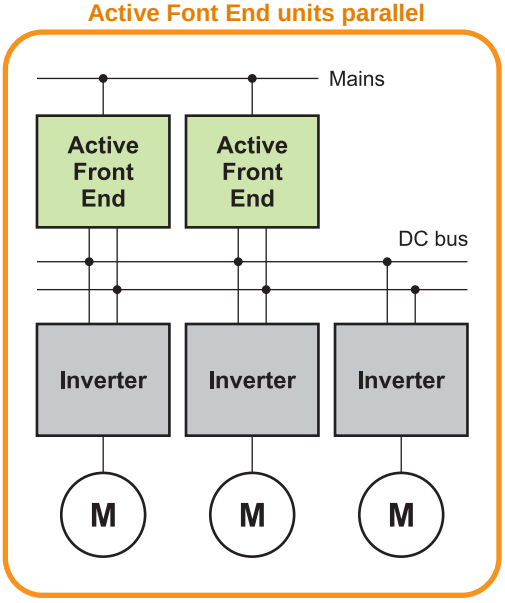

When adding an Active Front End to a standard drive the arising energy (e.g. when lowering a load) is returned to the mains.

**Common DC bus**




The supply via a common DC bus is often a perfect solution for group drives (e.g. at sheet metal processing machines, roller conveyors or test benches). In this case the total power of the inverters can be fourfold higher than the nominal power of the Active Front End.

**Active Font End units parallel**




The parallel connection of up to four Active Front End units is used to increase the safety by redundancy and furthermore it enables increase of power or the use of smaller Active Front End units.

| General technical data | | |
|---|---|---|
| Voltage / frequency | 380...400 V / 440 V / 480 V ±10 %:<br>500...525 V ±10 %:<br>575...600 V / 690 V ±10 %: | 50/60 Hz ±5 % (30...70 Hz for short periods)<br>50 Hz ±5 %<br>50/60 Hz ±5 % (30...70 Hz for short periods) |
| Overvoltage class | Category III | |
| Power range | 120...860 kW | |
| Overload | +20 % for 60 seconds per 10 minutes | |
| Operating temperature | -10...+45 °C (+60 °C with derating) | |
| Protection degree | IP00 | |
| Control concept | Controllable via terminals, CANopen bus or Modbus built-in,<br>other field busses via option cards | |
| Standards | Devices are designed, built and tested on the basis of EN 61800-5-1 | |
| Approvals | CE, UL, in preparation: CSA | |

| AFE-type 400V | 120 | 145 | 175 | 240 | 275 | 340 | 430 | 540 | 675 |
|---|---|---|---|---|---|---|---|---|---|
| AFE input current in A | 177 | 212 | 255 | 348 | 395 | 495 | 628 | 780 | 980 |
| DC power (400 V) in kW | 120 | 143 | 172 | 238 | 268 | 336 | 425 | 530 | 665 |

| AFE-type 480V | 120 | 145 | 175 | 240-13 | 275 | 340 | 430-15 | 540-15 | 675 |
|---|---|---|---|---|---|---|---|---|---|
| AFE input current in A | 177 | 212 | 255 | 348 | 395 | 495 | 628 | 780 | 980 |
| DC power (480 V) in kW | 138 | 165 | 200 | 277 | 315 | 390 | 490 | 610 | 770 |

| AFE-type 690V | 145 | 175 | 220 | 275 | 340 | 430 | 540 | 675 | 860 |
|---|---|---|---|---|---|---|---|---|---|
| AFE input current in A | 120 | 150 | 185 | 228 | 285 | 360 | 450 | 563 | 715 |
| DC power (500 V) in kW | 102 | 127 | 157 | 193 | 242 | 305 | 382 | 478 | 607 |
| DC power (600 V) in kW | 123 | 153 | 188 | 230 | 290 | 365 | 460 | 575 | 730 |
| DC power (690 V) in kW | 142 | 172 | 215 | 268 | 335 | 424 | 528 | 663 | 842 |