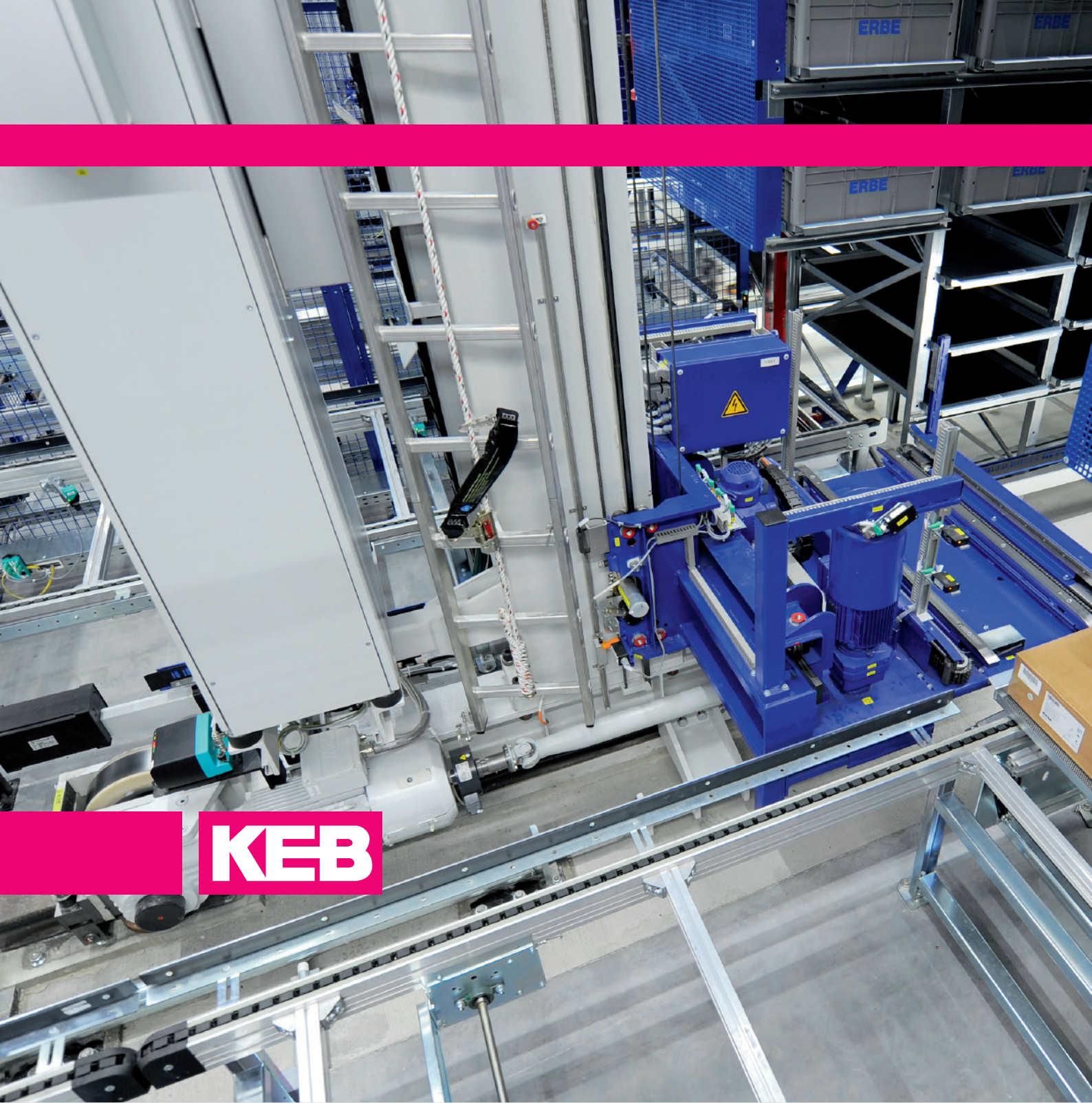


# COMBIVERT R6

LINE REGEN SYSTEMS UP TO 1000 KVA

V - 1.1 EN



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## PHILOSOPHY

Traditionally excess kinetic energy was dissipated through friction or a braking device (mechanical or electrical), most commonly a braking resistor. This unused energy now has a valuable potential. Using a regenerative unit the generated energy can be feedback in the DC circuit through the drive or it's possible to feed it back onto the mains power supply line.

COMBIVERT R6 regen units are able to supply and feedback energy of a single inverter or a common DC-link of several drive controllers. The system can also be designed to match the required power by the cascading of several units.

## COMBIVERT R6



## SAVING ENERGY THROUGH REGENERATION - AN ENVIRONMENTAL CONTRIBUTION THAT PAYS OFF!

### PASSENGER AND FREIGHT ELEVATORS

- replacement of traditional braking resistors
- reduced fire hazard of the system
- return on investment through energy savings possible after less than 2 years of operating time

### CONNECTION OF GENERATORS TO UTILITY SYSTEM

- power quality standards (e.g.: IEEE-519 / THDi < 8 %) can be met with harmonic filters
  - combustion engines
  - wind energy plants
  - hydropower plants

### ECCENTRIC LOADS

- increased efficiency of variable speed drives with changing kinetic and regenerative load cycles

### THEATRE TECHNOLOGY

- no heating of resistors
- energy optimization
- low-noise braking operation

### LIFTING AND CONVEYOR / STORAGE RETRIEVAL SYSTEMS

- DC-interconnected operation of multiple drives support energy sharing
- return of peak energy into the mains line power supply
- no additional heat sources

### TEST BENCHES AND TEST SYSTEMS

- permanent regeneration of energy
- can be cascaded for large loads

### CENTRIFUGES

- regenerative braking of high centrifugal masses
- utilization of kinetic energy
- increased productivity due to short start-up and run-down times



## BENEFITS

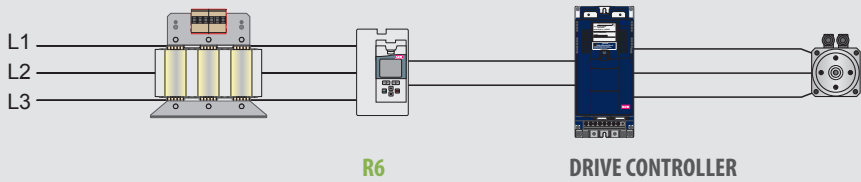
- Easy replacement for braking resistors
- Usable for all common supply voltages of 180 ... 528 V AC, 50/60 Hz
- Compatible with all typical DC - powered drive controller
- Integrated pre-charging circuit
- Compact and lightweight devices
- Wide power range up to 1.000 kVA
- Cascadable power parts
- Optional choke or harmonic filter
- Reduced fire risk in sensitive areas
- Reduced cooling requirements of the environment
- Energy meter for the validated savings
- freely configurable inputs and outputs
- Various field bus interfaces available by operator

# COMBIVERT R6 -FUNCTIONALITY



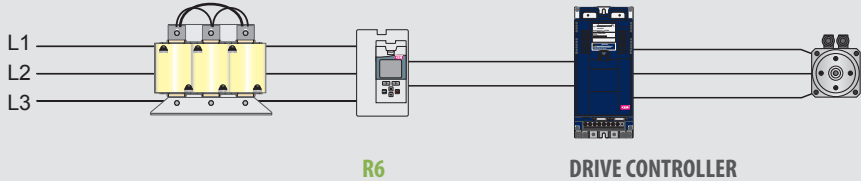
## SIMPLIFIED DIAGRAM

### WITH COMMUTATION CHOKE



With COMBILINE harmonic filters the R6 - System generates sinusoidal current at the mains line power supply.

### WITH HARMONIC FILTER



The COMBIVERT R6 can regenerate energy from drive controllers back onto the mains power supply line. This can be from a single drive controller or from a common DC-link of several inverters.

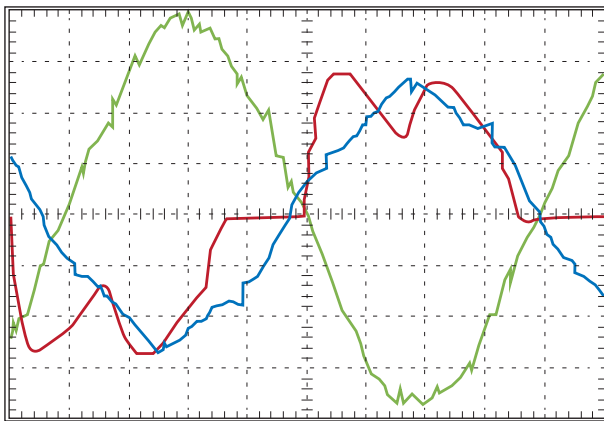
In supply mode the COMBIVERT R6 pre-charges the DC-link and acts like a typical B6 rectifier. The DC-link voltage corresponds to the rectified AC supply voltage.

When the energy fed into the DC-link by one or several drives in a deceleration or braking operation the regen unit will feed this excess energy back to the mains power supply line enabling access to this energy by other consumers on the grid

Depending on the system design either standard chokes or harmonic filters can be used to improve the THDi (lower harmonics).

With standard COMBILINE mains chokes all industrial requirements are fulfilled (block shaped regeneration). Using the COMBILINE harmonic filters will result in nearby sinusoidal current waveform for supplying and regenerating energy (THDi typ. < 8%)

## VOLTAGE / CURRENT DIAGRAM FOR REGENERATIVE OPERATION WITH R6-NCM



*Voltage*  
*Current with harmonic filter*  
*Current with mains filter*

Next to the established control version R6-S the modulation scheme was improved with the “**Natural Current Modulation**”. This new R6-NCM technology is available with the new control Type, called “N-version”

The **Natural Current Modulation** principle emulates the current waveform of a typical B6 rectifier system also in regeneration mode. This results in a much smoother commutation and an additional synchronization module (as used with R6-S) is no longer required.



### THE ESSENTIALLY ADVANTAGES OF R6-NCM

- Reduced noise level in regen mode
- Improved current waveforms (reduced THDi values)
- Standard mains chokes and patented harmonic filters of the KEB COMBILINE Z1 series can be used
- No additional synchronization unit needed

**Supply and Regenerative Systems**

| ARTICLE CODE            | 15R6_1E-900A     | 19R6_1E-900A | 19R6_1E-910A | 25R6S3R-900A     | 29R6S1P-910D |
|-------------------------|------------------|--------------|--------------|------------------|--------------|
| Control version         | N / S            | N / S        | N / S        | S                | S            |
| Housing size            | E                |              |              | R                | P            |
| Phases                  | 3                |              |              |                  |              |
| Rated voltage [V]       | 400              |              |              | 400              |              |
| Mains voltage range [V] | 180 ... 550 +0 % |              |              | 305 ... 528 +0 % |              |
| Mains frequency [Hz]    | 50 / 60          |              |              |                  |              |

**REGENERATIVE OPERATION**

| Output rated power [kVA]                             | 18   | 45   | 153        | 346 |
|--|------|------|------------|-----|
| Rated active power [kW]                              | 17   | 42   | 140        | 330 |
| Max. power output [kVA]                              | 27   | 67.5 | 81         | 230 |
| Max. active power [kW]                               | 25.5 | 63   | 75         | 210 |
| Regenerative rated current [A]                       | 26   | 65   | 221        | 500 |
| Regenerative DC current [A <sub>DC</sub> ]           | 32   | 80   | 270        | 590 |
| Over load current (E.O.L) 60 s [A]                   | 39   | 97.5 | 117 [10 s] | 331 |
| Max. regenerative DC current 60 s [A <sub>DC</sub> ] | 48   | 120  | 144 [10 s] | 405 |

**POWER SUPPLY OPERATION**

| Input rated power [kVA]                        | 18              | 48.5 | 153        | 336             |
|--|-----------------|------|------------|-----------------|
| Rated active power [kW]                        | 16              | 44.5 | 135        | 310             |
| Max. input power [kVA]                         | 27              | 72.5 | 87 [10 s]  | 230             |
| Max. active power [kW]                         | 24              | 67   | 80 [10 s]  | 202             |
| Rated supply current [A]                       | 26              | 70   | 221        | 485             |
| DC supply current [ADC]                        | 32              | 87   | 270        | 590             |
| Over load current (E.O.L) 60 s [A]             | 39              | 105  | 126 [10 s] | 331             |
| Max. DC supply current 60 s [A <sub>DC</sub> ] | 48              | 130  | 156 [10 s] | 405             |
| Overload disconnection [%]                     | 160             | 160  | 200        | 160             |
| DC-fuse internal                               | optional        |      | -          | internal        |
| Dimensions (A x B x C) [mm]                    | 130 x 290 x 208 |      |            | 340 x 520 x 357 |
| Weight [kg]                                    | 5.6             |      |            | 25              |

**Assignment of filters and chokes / hamonic filter**

|                | SIZE                  | 15R6         | 19R6         | 19R6         | 25R6         | 29R6         |
|----------------|-----------------------|--------------|--------------|--------------|--------------|--------------|
| COMBIVERT R6-N | max. over load        | 160 %        | 160 %        | 200 %        | 160 %        | 160 %        |
|                | EMC filter            | 16E6T60-3000 | 20E6T60-3000 | 20E6T60-3000 | 25E4T60-1001 | 30E4T60-1001 |
|                | Choke                 | 15Z1B04-1000 | 19Z1B04-1000 | 20Z1B04-1000 | 25Z1B04-1000 | 29Z1B04-1000 |
|                | Harmonic filter *     | 15Z1C04-1000 | 19Z1C04-1000 | 19Z1C04-1000 | 25Z1C04-1000 | 29Z1C04-1000 |
| COMBIVERT R6-S | EMC filter            | 15E4T60-1001 | 19R6T60-1001 |              | 25E4T60-1001 | 30E4T60-1001 |
|                | Choke                 | 15Z1B05-1000 | 19Z1B05-1000 | 19Z1B05-1011 | 25Z1B04-1000 | 29Z1B04-1000 |
|                | Harmonic filter *     | 15Z1C04-1002 | 19Z1C04-1002 |              | 25Z1C04-1000 | 29Z1C04-1000 |
|                | Synchronisation unit  | integrated   |              |              | 00R6940-2407 | 00R6940-2407 |
|                | Synchronisation cable | 00F50C3-4010 |              |              |              |              |

\* Different Types for 60 Hz mains on request

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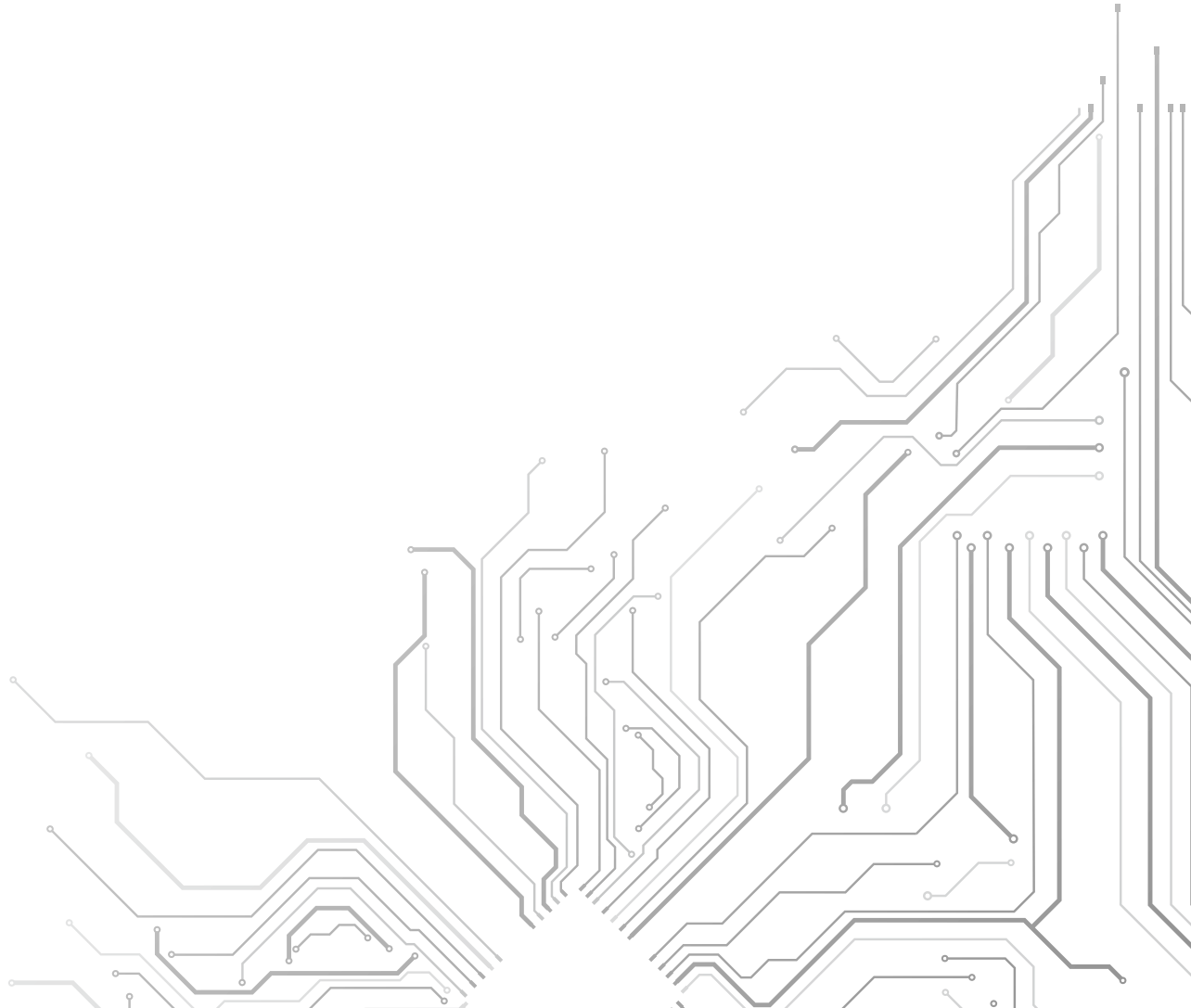
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