R6

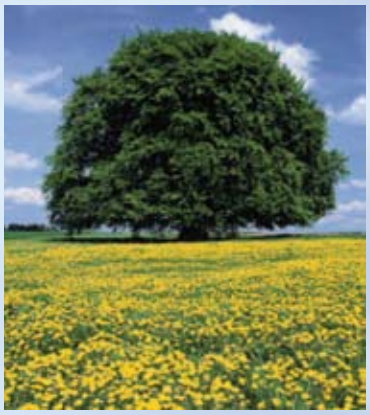
COMBIVERT R6
LINE REGEN SYSTEMS

KEB

The kinetic energy of electric drives can be a valuable energy potential. Historically, that kinetic energy was eliminated through friction and/or a mechanical or electric braking device.
Regenerative loads are becoming more common due to increased usage of distributed high efficiency AC-drives and servo systems.

These same frequency inverters and servo controllers offer the possibility of converting the kinetic energy of the mechanical system into stored energy in the DC-circuit. Typically the excess energy is dissipated in a braking resistor as heat. However, in combination with a regenerative unit, it is possible to feed back the energy into the main line power supply.

This is particularly useful in all applications where prolonged or continuous downward motion occurs or heat dissipation to the surrounding environment is not wanted.



R6

COMBIVERT R6

Energy saving by using line regen -

an environmental contribution that pays off!

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Applications

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
- Passive Harmonic Filter options to achieve app. 5% TDD and compliance in accordance with IEEE519.

Connection of generators to utility system
- Power quality standards (e.g.: IEEE-519 / THiD < 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

Lifting and conveying / storage retrieval systems
- DC-interconnected operation of multiple drives, support energy sharing and return of peak energy into the main line power supply
- no heat source mounted on the moving system

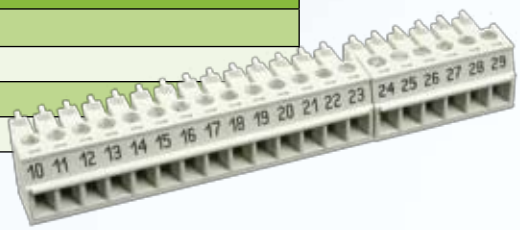
Test bench and test systems
- continuous energy return
- parallel operation for higher power ratings

Centrifuges
- regenerative braking of high kinetic energy
- increased productivity through short acceleration and deceleration times

Theatre technology
- no heating of resistors
- high energy efficiency of the system
- low-noise braking operation

For the integration into the control system, the **KEB COMBIVERT R6** has both serial communication and free programmable analog/digital in- and outputs.

Free programmable inputs / outputs	
4 x	digital in
2 x	digital out
2 x	Relay out
1 x	Analog out



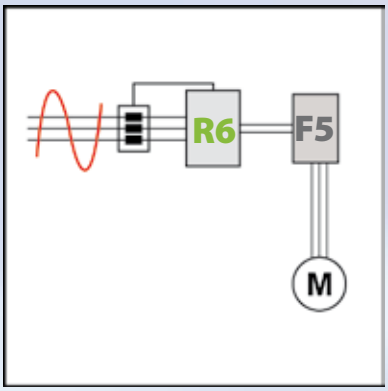
Easy handling is ensured through the factory-provided short menu (CP-Parameters). More customized adjustments are possible in the application level.

The universal PC tool **KEB COMBIVIS** offers a user friendly programming and monitoring platform for an easy start-up, diagnosis or maintenance. The download is free-of-charge at **www.kebamerica.com**.

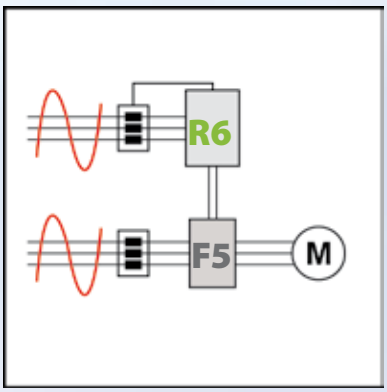
KEB COMBIVERT R6 - System characteristics

An economical block shaped feedback is available in a wide power range using single units or in a multiple parallel configuration.

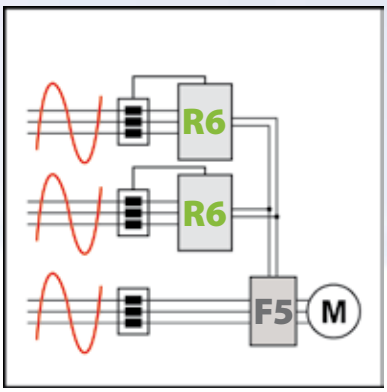
Feed-in / DC - Frequency Inverter



AC feed-in parallel



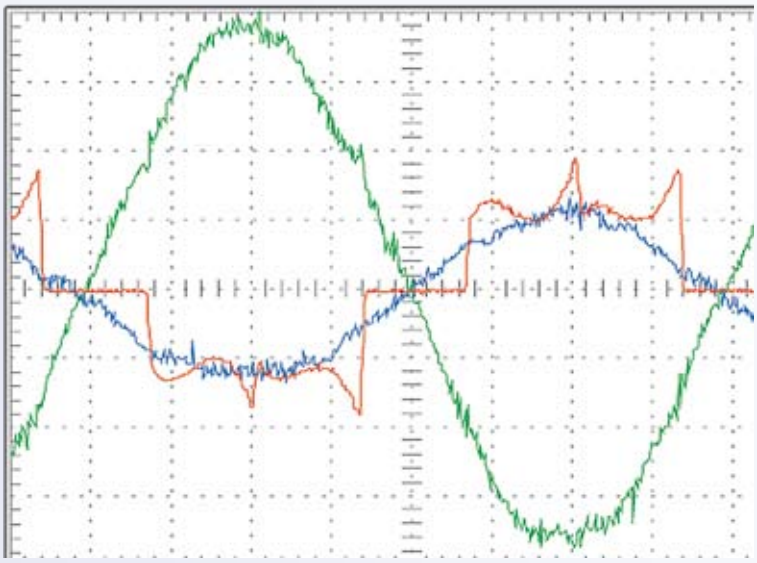
AC feed-in modular



- high capacity for DC connection of inverters and servo controllers
- complete systems:
  regen unit / commutation choke / EMC filter, EN 618003-, class C3.
- high overall efficiency provides optimum use of the kinetic energy
- indication of energy demand, energy returned and the net consumption (kWhr) gives a general overview on the economic efficiency of the system
- compact, modular design permits optimal system integra-tionor retrofitting in existing factories
- universal design supports all popular supply voltages from 200 V … 500 V AC (size 15 and 19), 50/60 Hz and/or 380 V … 500 V AC (size 25 and 29), 50/60 Hz
- integrated DC fuse in size 15 and 19 reduces external wiring / installation costs
- digital control and serial connection into the control system by …

Bus systems of the 1st and 2nd generation ...

INTERBUS
DeviceNet
KEB-HSP 5 / DIN 66019-
MODBUS
CANopen
PROFIBUS
EtherCAT
ETHERNET POWERLINK
PROFINET
SERCOS interface
Ethernet TCP/IP
EtherNet/IP

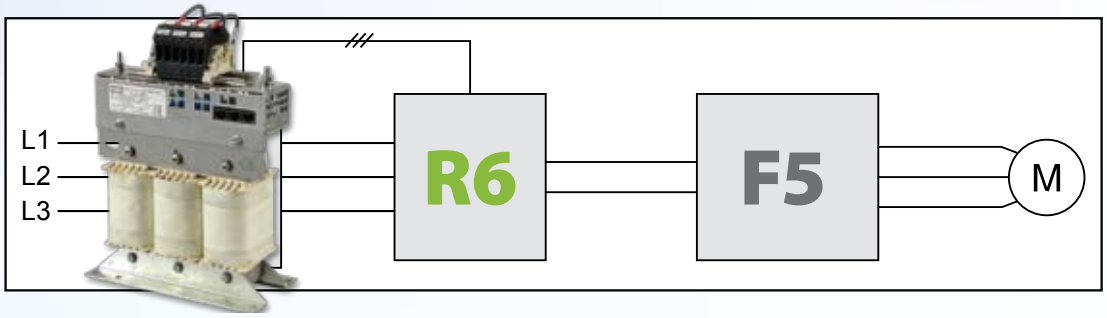


Voltage

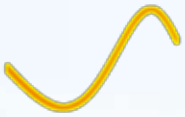
Current with harmonic filter

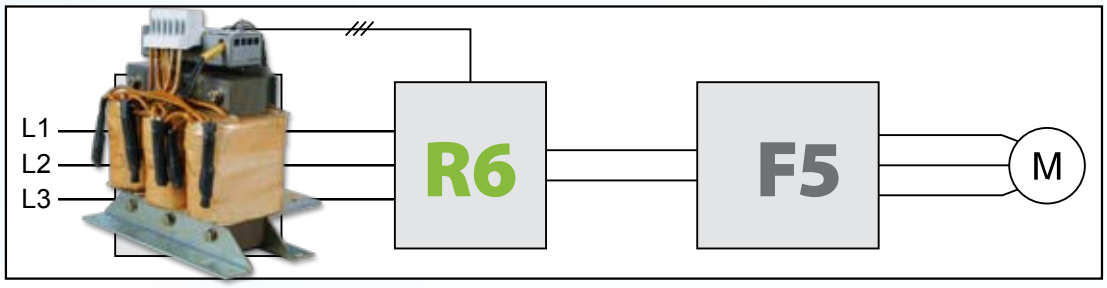
Current with line reactor

Block diagram with commutation choke



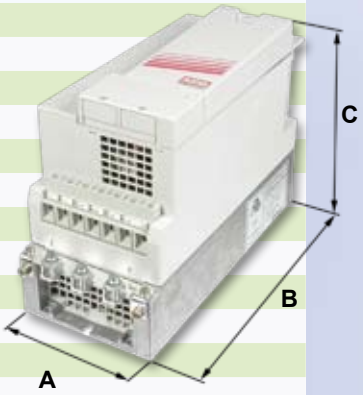
Block diagram with harmonic filter





In combination with **KEB COMBILINE** filters, the **R6-units** create a sinusoidal return current as well as current draw from the main line power supply.

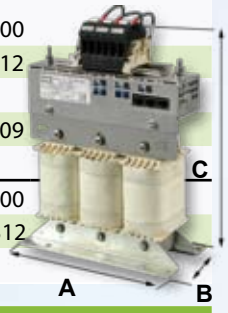
Supply- and regenerative units					
Part-No.		15.R6.S3E-R00A	19.R6.S3E-R00A	25.R6.S1R-R00A	29.R6.S1P-910D
Housing size		E		R	P
Phases		3		3	
Rated voltage	[V]	480 (230)		480	
Mains voltage	[V]	180…550± 0 %		305 … 528 ± 0 %	
Mains frequency	[Hz]	50 / 60 ± 2		50 / 60 ± 2	
Regeneration					
Rated output power	[kVA]	18 (10.5)	45 (26)	153	346
Rated active power	[kW]	17 (10)	42 (23)	140	330
Max. output power	[kVA]	27 (15.5)	67.5 (39)	230	433
Max. active power	[kW]	25.5 (15)	63 (34.5)	210	413
Regenerative active current	[A]	26	65	221	500
Regenerative DC current	[A_{DC}]	32	80	270	590
Overload current (E.OL) 60 s	[A]	39	97.5	331	625
Max. regenerative DC current	[A_{DC}]	48	120	405	738
Supply					
Rated input power	[kVA]	18 (10.5)	48.5 (28)	153	336
Rated active power	[kW]	16 (10)	44.5 (25.5)	135	310
Max. input power	[kVA]	27 (15.5)	72.5 (42)	230	420
Max. active power	[kW]	24 (14.5)	67 (38)	202	388
Rated supply current	[A]	26	70	221	485
DC supply current	[A_{DC}]	32	87	270	590
Overload current (E.OL) 60 s	[A]	39	105	331	606
Max. DC supply current 60 s	[A_{DC}]	48	130	405	738
Overload limit	[%]	160	160	160	160
DC fuse internal	[A]	50	125	option	
Dimensions (A x B x C)	[mm]	130 x 290 x 208		340 x 520 x 357	340 x 960 x 453
Weight	[kg]	5.6	5.6	25	97.5



* The values in brackets apply to the operation on 230 V power supply.

Main line commutation

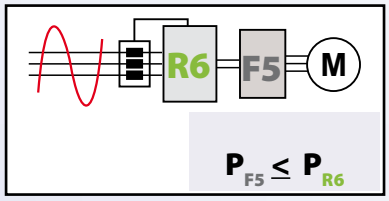
Block-shaped feed-back with / without synchronization	Commutation choke		size	15	19	25	29
	Rated current		[A]	26	70	221	485
	Overload		[%]	160	160	150	125
Single operation Parallel op. **Master**	**Part-No.**			15.Z1.B05-1000	19.Z1.B05-1000	25.Z1.B04-1000	29.Z1.B04-1000
	Dimensions (A x B x C)		[mm]	178 x 100 x 258	243 x 115 x 290	316 x 222 x 234	412 x 266 x 312
	Weight		[kg]	5.6	13.7	30	45
	Synchronization			internal	internal	00.R5.940-2409	00.R5.940-2409
	Weight		[kg]	-	-	0.65	0.65
Parallel operation **Slave**	**Part-No.**			15.Z1.B05-1002	19.Z1.B05-1002	25.Z1.B04-1000	29.Z1.B04-1000
	A x B x C		[mm]	178 x 100 x 178	243 x 115 x 290	316 x 222 x 234	412 x 266 x 312
	Weight		[kg]	5.6	13.7	30	45



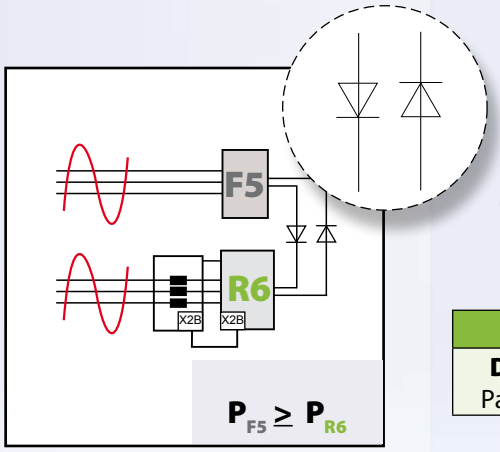
Sinusoidal feed-back with / without synchronization	Harmonic filters THD ≤ 8 %		size	15	19	25	29
	Rated current		[A]	25.2	63	221	460
	Overload		[%]	160	160	160	160
Single operation Parallel op. **Master**	**Part-No.**			15.Z1.C04-1002	19.Z1.C04-1002	25.Z1.C04-1000	29.Z1.C04-1000
	Dimensions (A x B x C)		[mm]	291 x 208 x 285	352 x 355 x 335	552 x 550 x 520	660 x 670 x 650
	Weight		[kg]	26.4	62	244/245	513/514
	Synchronization			internal	internal	00.R5.940-2409	00.R5.940-2409
	Weight		[kg]	26.4	62	0.65	0.65
Parallel operation **Slave**	**Part-No.**			15.Z1.C04-1000	19.Z1.C04-1000	25.Z1.C04-1000	29.Z1.C04-1000
	A x B x C		[mm]	291 x 214 x 257	352 x 307 x 326	552 x 550 x 520	660 x 670 x 650
	Weight		[kg]	25.5	61	244/245	513/514

Type of Connection

The **KEB COMBIVERT R6** regenerative units are designed for the supply and energy return from one or several parallel motor drive controls.

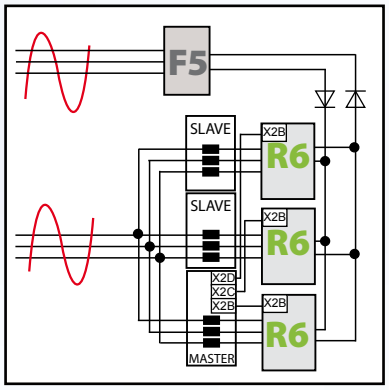


For that purpose the connected drive controls are supplied via a DC bus connection. The braking energy returned to the DC bus is fed back into the main line power supply.



For applications having smaller requirements for energy return, the supply of the regenerative unit and the drive controller is done in parallel. We recommend the use of decoupling diodes to route the current flow appropriately.

Size	15.R6.	19.R6.	25.R6.	29.R6.
Diode Part.-No.	00.90.147-3500	00.90.147-4101	00.90.147-6009	00.90.147-6009



When the power of more than one unit is required but not as much as the next larger size, the units may be operated with up to 3 units connected in parallel. The "master" synchronization signal of the main line power supply X2B) is connected in parallel to all regenerative units.

With parallel connection of E housing units, the "slave" units are to be connected to commutation chokes and harmonic filters without a synchronization circuit.

EMC-Filter

EMC Filter	Size	15	19	25	29
Part.-No.		15.E4.T60-1001	19.R6.T60-1001	25.E4.T60-1001	30.E4.T60-1001
Dimensions (A x B x C)	[mm]	132 x 352 x 50	198 x 422 x 65	110 x 630 x 240	250 x 640 x 130
Weight	[kg]	2	6	16	14

Accessory:

For compliance with a good EMC-environment, a ferrite ring shall be installed over the DC bus connection at each motor drive. The following ferrites are available based on the wire cross section:

Ferrite	Core size [mm]	Internal diameter [mm]
00.90.396-2621	R42/26/18	24.9
00.90.390-5241	R56/32/18	29.5
00.90.395-3820	R63/38/25	36.0
00.90.395-5222	R87/54/30	54.5
00.90.395-5520	R102/66/15	64.5

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