



KEB



APPLICATION ESCALATOR DRIVES

ENERGY SAVINGS & **OTHER ADVANTAGES**



ESCALATOR TECHNOLOGY FROM KEB

Variable frequency drives (VFDs) paired with line regenerative units are a great fit for escalator applications. Compared to line fed escalators, VFDs provide maximum application performance benefits such as smooth speed profile ramps, adjustable torque limits, and drive modes based on user traffic. A VFD will also reduce large inrush currents and power consumption due to power factor improvement. Compared to braking resistors, a line

regenerative unit can provide energy savings in overhauling (e.g. down) applications and provide a reduction in both heat generation and controller cabinet size. Another benefit of KEB drives for escalators is their compact size and integrated braking transistor. This allows the drive enclosure to fit into the tight spaces often found in escalator applications.

NOTABLE ESCALATOR INSTALLATIONS

Toronto Transit Commission



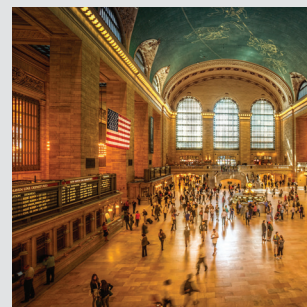
LA Metro



Newark Airport



Grand Central Station



HIGHLIGHTS

- Reduced energy consumption
- Reduced inrush currents to motor
- Smooth speed profile ramps
- Open loop, closed loop, and ASCL control modes.

STANDARD PRODUCT RANGE

- 5 - 40Hp
- 230VAC & 480VAC
- Single phase input available
- Operates both Induction and PM motors

STANDARD FEATURES

- ASCL (Asynchronous Sensorless Closed Loop)
 - Closed Loop Performance without Encoder
- Open Loop Control (V/Hz or Sensorless Vector)
- Closed Loop Control (Field Orientated Control)
- Integrated braking transistor - Rated 100% duty
- Programmable I/O with EZ plug terminals
- Integrated brake control
- Small footprint - Low profile for small enclosures

RELIABILITY

- Thermostatically controlled fan - Provides longer fan operating lifetime
- Large die IGBTs - Extended component lifetimes
- Oversized DC-bus capacitors
- Motor and drive overtemperature protection



SAFETY

- Motor flux and phase check
- Torque Limit (close loop only)
- Software and Hardware overcurrent monitors

OPTIONS

- EMI Filter
- SIL3 rated safety input
- Input/Output reactor
- Fieldbus options (Ethernet TCP/IP, DeviceNet)
- Harmonic Filter
- Regenerative Unit
- Brake resistors



HIGHLIGHT

KEB drives are assembled, tested, and supported at our 86,000 sq. ft., ISO 9001:2015 North American manufacturing facility located outside of Minneapolis, MN.

COMBIVERT R6 LINE REGEN - BENEFITS AT A GLANCE

SAVE MONEY - RETURN ENERGY TO THE GRID

DESCRIPTION

During typical elevator operation, energy is both delivered to the motor and regenerated back onto the drive.

Traditionally, braking resistors have been used to dissipate the regenerated energy as heat. The dissipated heat from the braking resistors represents the wasted regenerated energy of the elevator system.

Instead of braking resistors, a KEB R6 regen unit can be used to put power back onto the line. The R6 measures the utility power and matches its output accordingly.

The returned energy is consumed by other building loads resulting in a net savings for the building owner.

The energy savings using an R6 will vary by application and elevator usage but a typical payback period could be less than 2 or 3 years.

COMPACT FOOTPRINT

The R6 regen unit can be mounted in the controller cabinet and does not require a standalone enclosure. This is especially important when space is a constraint.

REPLACE RESISTORS

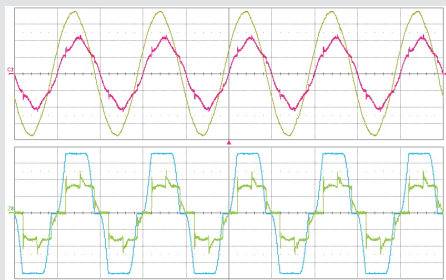
Replacing the braking resistors with an R6 unit will reduce the heat in the control cabinet.

OPTIONS

- Serial keypad - Can be connected to controller's remote monitoring system
- LCD keypad - Provides a text description of basic R6 parameters and time-stamped fault log.
- Input EMI Filter
- Harmonic Filters

LOW HARMONIC SOLUTIONS

An optional low harmonic KEB filter can be used with the R6 regen unit to reduce the level of current harmonics during regeneration mode.



APPLICATIONS

Not every elevator application will return the same amount of energy. When evaluating if a jobsite is suitable for a regen unit, look for these characteristics:

JOB CHARACTERISTIC	TYPICAL APPLICATION
Efficient technology - Permanent Magnet machines - Gearless configurations	Any Gearless machines
High Rises Tall floor heights	Apartments Office buildings
Heavy Usage High Traffic	Hospitals Hotels
Large Capacity	Freight Cars



HIGHLIGHT

Interested in how much savings your installation will have with an R6 drive? You can get a good estimation using the KEB regen calculator tool. Go to: kebblog.com/elevator-regen-calculator

COMBIVERT R6 LINE REGEN - BENEFITS AT A GLANCE



OVERVIEW

Variable-frequency drives (VFDs) paired with line-regenerative units are a great fit for escalator applications. Compared to line-fed escalators, VFDs provide maximum application performance benefits, such as smooth speed profile ramps, adjustable torque limits and drive modes based on user traffic.

Thanks to its power factor (PF) improvement, a VFD will also reduce large inrush currents and power consumption. Compared to braking resistors, a line regenerative unit can provide energy savings in overhauling applications (i.e., downward-traveling escalators) and provide a reduction in both heat generation and controller cabinet size.

EASY INSTALLATION

- Minimal parameter adjustment required
- Automatically detects 230 or 460V connections
- Includes internal DC fuses
- Can be used with 3rd party drives

PERFORMANCE AND FEATURES

- 150% current overload (for 60 seconds)
- Block commutation control scheme
- Programmable I/O



PRODUCT RANGE

- 208-230VAC & 460-480VAC
- 50/60 Hz operation
- Up to 135kVA

TECHNICAL DATA

DATA TYPE	
Voltage Class	208-230V and 480V
Mains Frequency	50 or 60Hz
Overload Capacity	150% for 60 sec.
Approvals	cULus and CE

R6-NCM REGEN UNITS AND CHOKES

PART NUMBER	RATED SUPPLY CURRENT (A)	RATED REGEN CURRENT (A)	CHOKE PART NUMBER
15R6N3E-RK00	26	26	15Z1B04-1000
19R6N3E-RK00	70	65	19Z1B04-1000



HARMONIC FILTERS

Only KEB Z1 Harmonic filters are approved for use with the KEB R6 line regen units.

WHY KEB Z1 FILTERS?

The Z1 filters provide a unique output voltage which reduces the ripple current in bus capacitors.

Z1 HARMONIC FILTERS

PRODUCT RANGE

- Designed to meet IEEE 519 distortion requirements
- Can be used with 3rd party escalator VFDs

PERFORMANCE

- Low-loss Design: >99% efficient at rated load
- Near-Unity Power Factor
- Targeted <8% THiD at rated load

PATENTED KEB DESIGN

- High performance core
- Reliable - Passive components only
- Utilizes a balanced 3-phase capacitor network
- Capacitors have integrated 3-phase protection device

DESIGNED FOR NORTH AMERICAN OPERATION

- 208-230V/480VAC installations
- Optimally designed for 60 Hz power
- NEMA 1 options may be available upon request
-  certified

TECHNICAL DATA

DATA TYPE	
Voltage Class	230V and 480V
Mains Frequency	60Hz
Overload Capacity	150% for 60 sec. every 10 min.
Efficiency at Rated Current	99%
cos(θ) at Rated Current	≤ 8% THiD
Circuit breaker for current overload protection	Yes
Trapezoidal output voltage to reduce ripple current in VFD and Regen	Yes
3-Phase Capacitors for Balanced Voltage	Yes
Approvals	cULus and CE



PART NUMBER	RATED CURRENT (A)	POWER LOSS
16Z1C05-1001*	23	260
17Z1C05-1001*	28	317
18Z1C05-1001*	34	385
19Z1C05-1001*	43	487
20Z1C05-1001*	55	623
21Z1C05-1001*	62	702
23Z1C05-1001*	115	1130



HIGHLIGHTS

The KEB Z1 Harmonic Filters should be sized off of the actual input current to the drive.

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KEB

ABOUT KEB AMERICA

New building trends are emerging which require new drive technology. More powerful drives, line regeneration, and low harmonic solutions are constantly in demand so building loads can operate trouble-free. KEB America, located in Shakopee, Minnesota, is your North American partner for elevator drives, regenerative units, harmonic filters, and more.

With KEB you can expect to find innovation that comes with more than two decades of experience in elevator applications. KEB has been a leader in drive technology for over 25 years.

With a worldwide installed base of over 150,000 units KEB is a trusted partner in elevator and escalator applications. Globally, KEB has four production sites and a service network spanning 30+ countries. Dedicated elevator and escalator application engineers are available to provide support and sales assistance.

Automation with Drive

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