

An Improved Method of Operating Three-Phase Hydraulic Elevators From Single-Phase Service

Unattended elevator systems – especially those which transport people – require high reliability and minimal maintenance over their useful life.

RONK ELECTRICAL INDUSTRIES pioneered single-to-three phase conversion with the introduction of the ADD-A-PHASE® converter in 1952. This converter has proven so reliable that it is still widely specified today to power a wide range of three – phase loads from single-phase utility power. The TYPE HE-AA (automatic adjust) ADD-A-PHASE® increases applications for a static type autotransformer- capacitor converters to include equipment whose loads vary more than 50%, such as the hydraulic elevator. A load -sensing circuit allows the run capacitors to be automatically switched in and out with changes in the elevator motor's load requirements. In this way, the TYPE HE-AA ADD-A-PHASE® converter maintains very reliable current balance to the motors that operate under variable load conditions.

Phase conversion for elevator motors has normally been handled by a rotary phase converter – which is what most converter manufacturers' produce. The TYPE HE-AA ADD-A-PHASE® allows the hydraulic elevator manufacturers to realize the advantages that the autotransformer-capacitor type design offers over rotary phase converters.

HIGHER RELIABILITY

Rotary phase converters may prove problematic in insuring the reliability required of elevator systems. To increase energy efficiency, rotary converters are equipped with automatic controls such as timers and relays to initiate the elevator motor only when demanded. This increase in electromechanical content further compromises system reliability. Exchanging reliability for greater energy efficiency can be an unfavorable trade- off. By contrast, the TYPE HE-AA ADD-A-PHASE® is fully automatic with only one electromechanical component, a switching relay, which gives it a much longer life and greater system reliability.

GREATER EFFICIENCY

Rotary phase converters, with or without automatic controls, are considerably less energy efficient than the TYPE HE-AA ADD-A-PHASE® converter. This is due to the fact that their rotating elements (rotors) must be maintained during no-load conditions, resulting in much higher idle losses. Another concern with rotary converters is that they do not normally balance phase currents and this imbalance forces inefficiencies in load motors. OVERALL EFFICIENCY is determined by the efficiency of the converter and efficiency of the load. The ADD-A-PHASE® type converter is 97% efficient and the no-load losses in the TYPE HE-AA ADD-A-PHASE® are limited to very small excitation losses in the autotransformer. A 15HP TYPE HE-AA ADD-A-PHASE®, for example, would only be producing about 60 watts of no-load losses. The TYPE HE-AA ADD-A-PHASE® converter maintains great current balance, allowing the motor to operate very efficiently.

FAST RESPONSE

From an at rest state, the rotor of the rotary converter must be accelerated to its synchronous speed before the elevator motor can be initiated. This normally takes between 3 – 10 seconds. By contrast, the TYPE HE- AA ADD-A-PHASE® converter is constantly energized, providing immediate response for the elevator motor and not allowing sag in the system.

QUIET OPERATION

Electromechanical systems such as the rotary phase converter can generate mechanical noise. Sources of noise include the windings of the moving rotor, movement between the converter's capacitor shroud and frame and rotor magnetizing current whine during no-load/under-loading of the system. Rotary converter noise levels will also increase as the converter's bearings wear. The TYPE HE-AA ADD-A-PHASE® converter has only one moving part – a switching relay – which produces very little noise. This low noise level is very important inside buildings where room and/or elevator shaft cavities will amplify any frequencies from the converter's noise signature which match the resonant frequency of those cavities. Much quieter than rotary phase converters, the TYPE HE-AA ADD-A-PHASE® autotransformer-capacitor converter is a great match in elevator systems and noise abatement needs. Newer electronic phase converters and drives produce harmonics which can contribute to problems in the facilities electrical distribution system. The TYPE HE- AA ADD-A-PHASE® does not generate harmonics!

RONK NOTES

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FULL-LOAD PERFORMANCE GUARANTEE

The TYPE HE-AA ADD-A-PHASE[®] converter is guaranteed to develop the full-load rating of the elevator drive motor, plus normal overload.

In summary, the TYPE HE-AA ADD-A-PHASE[®] converter responds to the performance – noise abatement and lack of harmonic generation needs better than other converter models, making it the converter of choice to power three-phase hydraulic elevators from single phase utility service.

OVERVIEW

The Ronk TYPE HE-AA ADD-A-PHASE[®] is a great choice for installation on hydraulic elevators where only single phase power is available. This product is 97 % energy efficient, has low inrush on single phase lines (required by most utility providers), generates no harmonics, has low idle losses, very low audible noise signature, near unity power factor and is over 90% recyclable.