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Author	Gareth Lloyd
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Title	Static & Rotary Converters – Frequently Asked Questions

Summary	This document gives answers to some frequently asked questions on static & rotary converters.

NOTE: Please read in conjunction with the static & rotary converter user guides, installation & operating instructions.

This document gives some answers to frequently asked questions about static and rotary converters.

Air Compressors
Compressor motors can be operated successfully using “Hi-Torque” static converters. Direct-on-line starting is essential. The use of a RT rotary converter is recommended for Hydrovane-style systems. In all instances please ensure that you advise the motor size and current rating before ordering.

Aluminium Bodied Motors
Aluminium motors may not operate successfully in conjunction with static converters. We would recommend the use of a rotary converter to address this issue where necessary.

Car Ramps
These applications require the use of a “Hi-Torque” static converter. Ensure that you advise the motor size, current rating and style of car ramp (electro-mechanical or hydraulic) at the point of enquiry. Hydraulic ramps generally work a motor to full load whereas screw-type electro-mechanical ramps often work a motor to short term overload. Plated motor currents often suggest a higher short-term kW demand - e.g. a 3kW/8A motor would suggest the motor is likely to develop 4kW so we would recommend a 5.5kW converter rather than the 4kW unit. (Note that a 3kW motor on a machine tool would only be plated at 6.5A). The power regulator switch fitted to the converter may have to be adjusted in line with a variation in load. Even though the ramp may have a 3 ton capacity mechanically, the artificial nature of the supply created by a converter may result in one power setting to lift a Ford Mondeo and another to lift a Land Rover. The operation of the equipment in conjunction with a converter may involve some operator discipline. The RT rotary converter may offer a more operator-friendly solution.

Continuous Duty Applications
We do not recommend the use of TRANSWAVE Converters for applications which operate on a 24hr/day continuous duty. For remote, non-operator controlled, cyclic-duty applications such as refrigeration compressors and pumps, the need for an "on-demand" supply is accommodated by a "Hi-Torque" static converter. See "refrigeration compressors and pumps" below.

D.C. braking circuits (rectifier circuits) and lighting circuits (control transformers)
There is more room for error connecting these circuits to a converter output than would be experienced on a mains three-phase supply. Two specific phases must be connected to 415v 2-wire circuits, both on rotary and static converters. Similarly a specific phase has to be selected for 240v phase-neutral requirements. In some instances, particularly woodworking applications, a wiring diagram of the braking circuit would be helpful as it may be necessary to modify the control wiring of the machine to ensure that the braking circuit is connected to the same two phases as the starter control circuit. This ensures the successful operation of the brake/light. Failure to identify the need to modify the circuit or connecting to the wrong phases could lead to malfunction of the braking mechanism or light.

Hi-Torque/Heavy-Duty Converters – when should I consider them?
Standard specification static and rotary converters operate the vast majority of applications successfully. However there are instances where additional starting performance is required for atypical applications such as electro-mechanical screw-type car ramps where the plated motor current suggests a higher short-term kW demand than stated on the motor plate. Similarly on engineering equipment there is often a requirement to start mechanical speeds in excess of the synchronous speed of the motor. A standard specification static or rotary converter will invariably only start a 1:1 ratio of motor to geared speed, particularly where there is a direct-drive rather than a clutch-assisted start. For example: the Harrison M300 lathe is driven by a 3hp 1400rpm motor but has a top mechanical speed of 2500rpm. The standard specification converter is likely to achieve only 10 of its 12 mechanical speeds; however the heavy-duty version will achieve all 12.

MOT/Brake Testing Equipment
The use of a rotary converter is recommended for this application.

Multi-Motor applications (e.g. Edgbanders, Shoe Repair Machinery) and multi-operator environments
The rotary converter is the most appropriate solution for these examples as it automatically adjusts in line with any variation in demand or sequence of motor starting. If considering the use of a static converter, sequential starting (large followed by small) is necessary and a power regulator switch will have to be adjusted in line with any variation of demand.

Multi-speed motor? Frequent stopping/starting?
It may be prudent to consider the use of a rotary converter for these applications. Otherwise a pilot motor may be required with a static converter if the magnetic characteristics of the motor do not lend themselves to the creation of a satisfactory artificial phase. Motors with 720rpm and 960rpm windings may prove problematic. When using the standard static TRANSWAVE converter with multi-speed machines, care should be taken to ensure that the motor comes to rest before effecting a change of motor speed or rotation. Failure to do so could damage the motor and/or the converter.

Output variations
All standard static and rotary converters are fitted with a 5-pin 3-phase neutral and earth socket offering the facility for both 415V and 240V control requirements. A 16A or 32A plug is supplied free of charge with the converter as a loose item.

Printing Machinery
Machines without an inching facility can be operated directly from a suitably rated static converter. Applications requiring an inching facility must be operated in conjunction with a rotary converter to avoid electrical damage to the motor windings. Japanese printing machines (e.g. Ryobi) often incorporate 200 volt three phase motors, connected to a mains supply via a three-phase 200/415V transformer. To ensure successful operation of the machine, the use of a rotary converter is recommended, together with a means of isolation between the converter output and the three phase transformer.

Produce Conveyors, Grading and Potting Equipment
Care should be taken to ensure that the TRANSWAVE converter rating is high enough to enable the motor to start under a load condition. Be wary of multi-motor applications where it may be necessary to consider a rotary converter or to ensure that one motor is running constantly to allow fractional horsepower ancillary motors to switch on and off at will. Other solutions to minimise this impracticality are available using individual capacitor circuits. Motors sized below the minimum loading of the converter will be damaged if operated independently from any converter other than the rotary.

Pump applications (slurry/dirty water - irrigation/clean water), aerators and mixers
Most installations of this nature are controlled remotely, rather than via an operator. The majority of converters manufactured for this type of application are of the “Hi-Torque” static style and custom-built. The recommended converter rating is determined by the duty cycle of the motor - i.e. cyclic or continuous - the application, motor current, power rating and speed.

Refrigeration Compressors
Compressor motors can be operated successfully using the “Hi-Torque” static converter. For motor sizes in excess of 2.2kW/3HP the fitting of an off-load valve is advisable. Direct-on-line starting is essential. The use of a RT rotary converter is recommended for Hydrovane-style air compressors.

Resistive Load (Heating Elements)
Phase Converters are not designed to support resistive load such as Heating Elements, Ovens, Chip Fryers, Pizza Ovens, and Sunbeds. We are not aware of any product capable of supporting this type of three-phase load on a single phase supply. Such demands often take the form of three separate single phase elements with a common neutral.

Shock-Load applications (e.g. Guillotines & Presses)
The use of a rotary converter is recommended for these applications.

Static converters - Maximum single motor load?
The starting characteristics of a three-phase motor supplied by a static TRANSWAVE converter are generally similar in nature to that of a star/delta starter. The motor starting current is suppressed by the converter to approximately 3 times the full load current of the motor, significantly reducing the amount of available starting torque. This leads to starting difficulties, particularly if the maximum loading of the converter is sized close to the load of the motor. The maximum single motor rating reflects the largest single motor the converter is capable of starting. The maximum loading of the converter reflects the maximum multi-motor running capability. Where possible, the use of direct-

on-line starters is recommended for machinery operated in conjunction with a TRANSWAVE converter - note that the combination of a converter and a star/delta starter could compound these starting difficulties further.

Static converters - Minimum load?
Motors driving a table rise/fall, scribing saw, feed rollers, coolant pump or table feed are invariably of a fractional horsepower nature. If operated independently from a TRANSWAVE static converter, these motors would be subjected to an electrical condition, which would damage the motor windings. The minimum load reflects the minimum size of motor capable of interfacing independently with the converter, thereby establishing an acceptable artificial three-phase supply. Ancillary motors sized below the minimum loading of the TRANSWAVE should be operated in conjunction with and not independently of a larger drive motor that falls within the rating of the converter.
Note: The Rotary converter does not have a minimum load.

Starting Currents/Star-Delta Starters
The Full Load running Current (FLC) of an induction motor operating on a single-phase supply is approximately 5 amps per kW. When operated in conjunction with a TRANSWAVE Converter, the starting current of a three-phase motor is limited to approximately 3 times its FLC. This is significantly lower than the motor starting current of an equivalent sized single-phase motor, which would typically draw between 6-8 times its FLC.

As the starting characteristics of a three-phase motor supplied by a converter are similar in nature to Star/Delta starting on a three-phase supply, significant reductions in starting torque are experienced when compared with direct on line starting on a three-phase supply. Generally, when machinery is operated in conjunction with a TRANSWAVE Converter direct on line starting is recommend. For machinery fitted with a Star/Delta starter, the period in the star connection should be set as short as possible to ensure a successful start. We may invite you to alter the Star/Delta timer setting to facilitate the above. This is not the case when machinery is operated on a mains three-phase supply.

Welding Equipment
Contact us for advice.