



Single to Three-Phase Converters

Introduction

Single to three-phase converters allow three-phase motors to run on single phase electricity supplies provided the single-phase supply is of adequate capacity.

It is advantageous to use three-phase motors in many applications. They are simpler, more reliable and cheaper than equivalent single-phase machines. In some applications, say on a piece of equipment such as a grader, the motors may only be supplied as three-phase. Where no three-phase electricity is available and single-phase motors are unsuitable, a single-to-three-phase converter may be the only answer.

Types of Equipment

Static Converter

This is the cheapest system and uses static capacitors and inductors to create an approximation to true three-phase. The reaction between the converter and the motor load helps to establish the three-phase waveform. Close balance of the phases can only be obtained under limited conditions. For this reason static

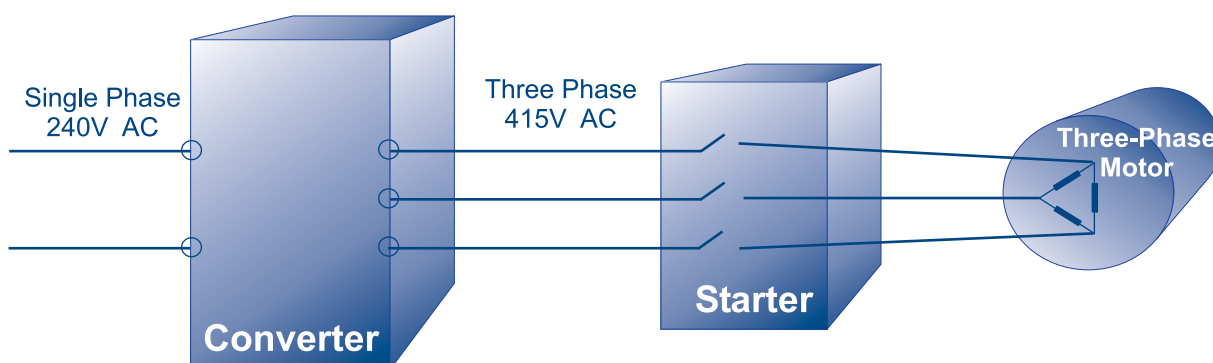
converters are more suitable for single motor application where they can be matched closely with the motor and where starting torque requirements are low, e.g. fans.

Static Converter with a Balancing Motor (Rotary Converter)

These converters are similar to the Static type but include an unloaded three-phase "balancing" motor in the circuit to give greater flexibility and a more accurate phase balance. They are more suitable for multi-motor applications such as in a farm workshop where motors of various sizes may be in random use.

Motor/Generator Set

As the name suggests a single-phase motor is used to drive a three-phase generator. Although very simple these systems are expensive and can give an unstable electricity supply frequency unless the single-phase motor is synchronous with the mains frequency (50Hz).





General Considerations

Single-to three-phase converters only change the single phase to a three-phase supply and do not increase the amount of power available from the supply. It is necessary first to verify that the existing electricity supply capacity is sufficient to provide the additional power required for the extra motor(s) by contacting your local electricity supply company.

It may be more economical to upgrade the single-phase supply to a three-phase supply than to use a single-to three-phase converter for the new three-phase motor(s). It is important to note that in addition to the electricity company charges for supply reinforcement to a three-phase supply, there will be additional costs for the changes necessary to the electrical wiring on the farm itself.

In marginal cases it may be technically possible and more economical to avoid supply reinforcements by using a single-to three-phase converter system which incorporates electronic "soft start".

It is important to inform and take advice from your local electricity company and the manufacturer of the converter before finalising an investment proposal. Details of the new motors to be run and conditions of use must be taken into account so that the correct converter can be chosen.

Features of Single-to Three-Phase Converters

	Cost	Flexibility	Starting Torque	Starting Current Control	Other Features
Static	***	*	*	**	Limited soft-start facility. best for individual steady loads. Only low starting torque available.
Static with Balance Motor	**	**	**	**	Limited soft-start as above. Multi-motor use. Better starting torque.
Motor / Generator	**	***	**	*	Simple reliable construction. Frequency control can be a problem. Not readily available.
Electronic Inverter	*	***	***	***	Good low current soft-start. Speed control, motor reversal. Good motor protection, best for single motors.

*** Best
* Worst

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