

SPEED CONTROL ON SINGLE PHASE PROPELLER FANS

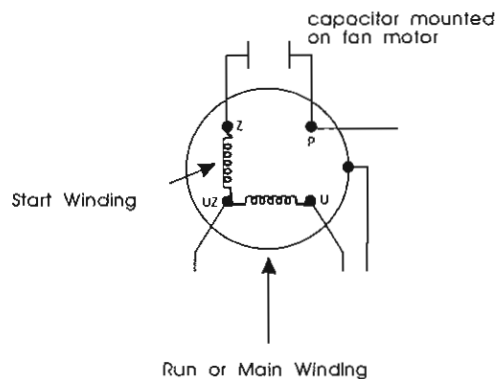
Foreword

Work carried out at the National Institute of Agricultural Engineering has shown that 3 wire speed control has certain advantages over 2 wire control for single phase propeller fans (Fig 4).

Single Phase Fan Motor

The commonest type of single phase propeller fan uses a simple induction motor with two windings - a 'start' winding and a 'run' or 'main' winding which, in normal operation, are connected in parallel. The start winding has a capacitor connected in series with it (Fig 1).

Fig. 1 - Single phase fan motor



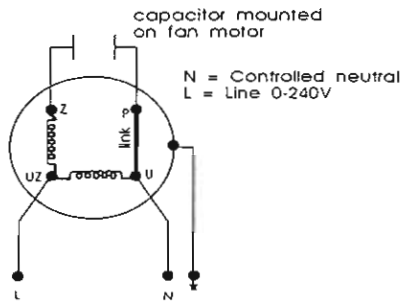
2 Wire Control v 3 Wire Control: What's the difference?

With 2 wire control the existing circuit is simply connected to the variable voltage output of a controller.

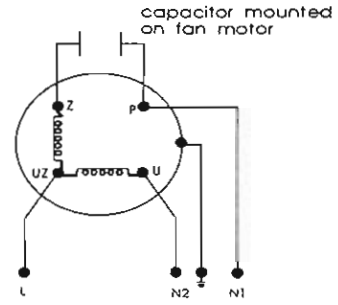
With 3 wire control the 'start' and 'run' windings are connected together at one end but the link is removed and only the 'main' winding takes the variable voltage from the controller. The 'start' winding and capacitor are supplied at mains voltage, irrespective of speed (Fig 2).



Fig 2. - 2 and 3 wire control



2 wire control



3 wire control

THREE GOOD REASONS FOR USING THREE WIRE CONTROL

1. Lower Running Costs

At reduced speed, fans on three wire control systems use less energy than fans on 2 wire control.

At 60% speed, up to 25% savings in running cost were apparent with one make of fan.

2. Longer Fan life

The extra energy absorbed by the 2 wire controlled fan at a reduced speed goes into heating up the motor windings. This can ultimately lead to break down of insulation and fan failure.

3. Better Speed Stability

Fig 3 gives an indication of the relative speed characteristics of a fan with both types of control and shows that the two wire system is very sensitive to voltage fluctuations; a small change in voltage can mean a significant change in fan speed.

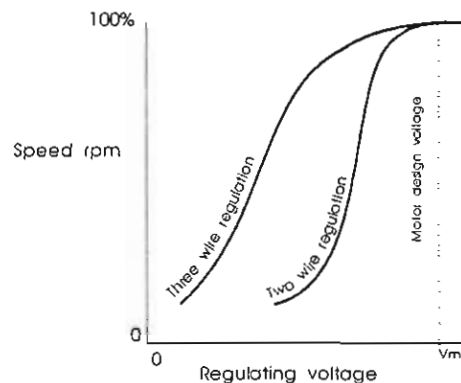


Fig. 3 - Regulating characteristics of a single phase fan motor

Is 3 Wire Control More Expensive?

Most control manufacturers will supply 3 wire controllers at a small extra charge, usually only a few pounds. The main additional cost associated with 3 wire control is the extra wire which has to be taken to each fan. When the potential benefits of three wire control are taken into account this extra installation cost can easily be justified.

Fig 4. - Speed control characteristics of a Woods 450mm fan
2 and 3 wire control

