

### BIPOLAR AND UNIPOLAR OPERATION

All Thomson Airpax stepper motors are available with either 2-coil *Bipolar*, or 4-coil *Unipolar* windings.

The stator flux with a Bipolar winding is reversed by reversing the current in the winding. It requires a push-pull Bipolar drive as shown in Fig. 14. Care must be taken to design the circuit so that the transistors in series do not short the power supply by coming on at the same time. Properly operated, the Bipolar winding gives the optimum motor performance at low-to-medium step rates.

A Unipolar winding has two coils wound on the same bobbin (one bobbin resides in each stator half) per stator half. Flux is

reversed in each coil bobbin assembly by sequentially grounding ends of each half of the coil winding. The use of a Unipolar winding, sometimes called a *bifilar winding*, allows the drive circuit to be simplified. Not only are half as many power switches required (4 vs. 8), but the timing is not as critical to prevent a current short through two transistors as is possible with a Bipolar drive.

For a Unipolar motor to have the same number of turns per winding as a Bipolar motor, the wire diameter must be decreased and the resistance increased. As a result, Unipolar motors have 30% less torque at low step rates. However, at higher rates the torque outputs are equivalent.

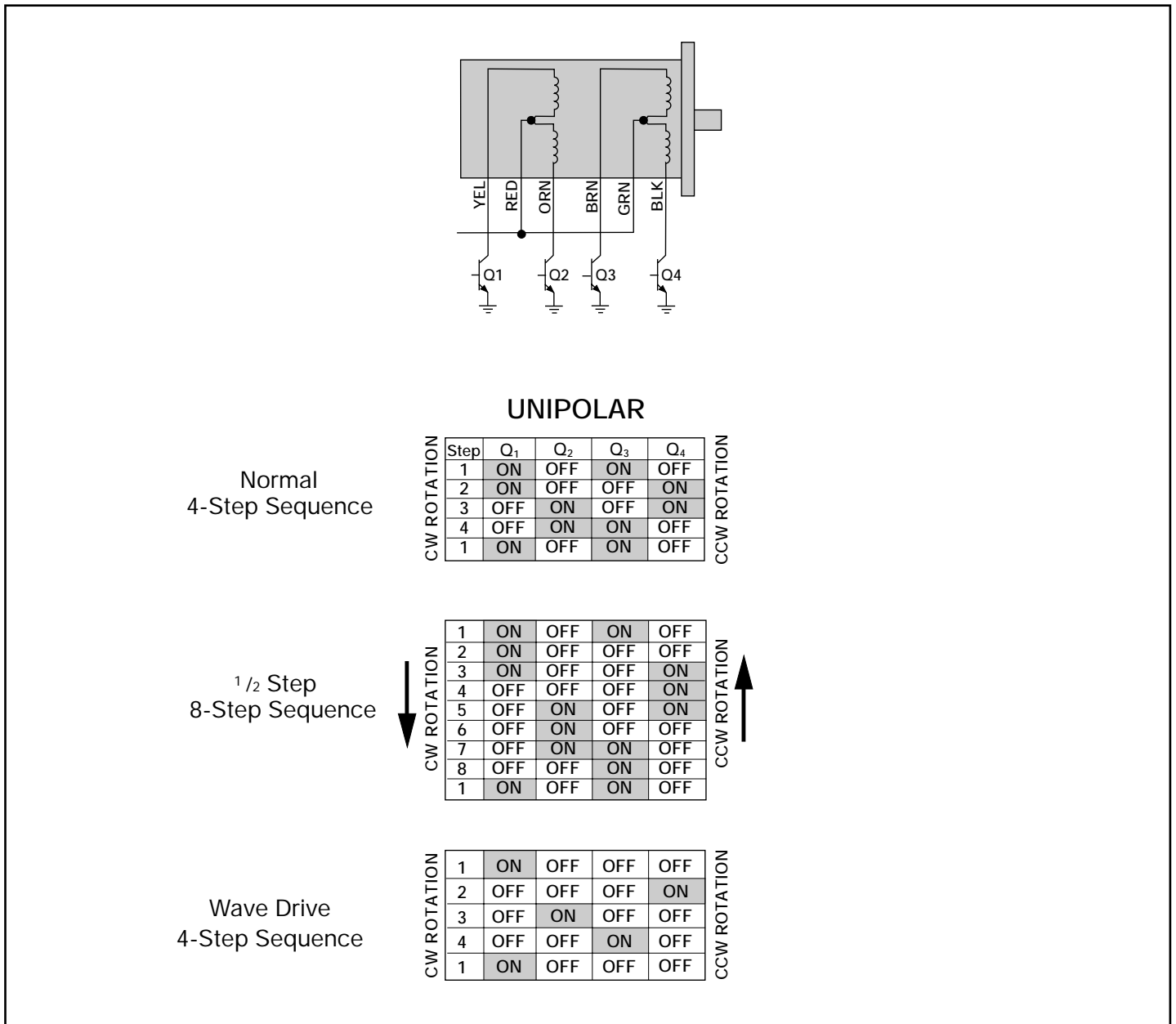


Figure 14: Schematic Bipolar and Unipolar Switching Sequence. Direction of Rotation Viewed from Shaft End.