

Motor Capacitors

V1.2 3/4/2021, V1.3 14/1/2026

Two types

1. Run Capacitors
2. Start Capacitors

Run Capacitors for Sale

Voltage rating. These capacitors are rated for 240V AC motors and similar applications. The rating may be stated as 450VAC OR 400V~ 10000h /cl.B, etc The caps fail due to overheating due to too much electrical current, see service notes/best life above.

The brand of the capacitor may vary

Dimensions: Approximate and may vary. If size is critical, confirm dimensions before buying.

The bolt may or may not be present. Can be gently cut off if space is limited

Variation: Capacitors have only two connections; each connection is a double spade connector. The pair of connectors is joined; some are visible on the top, and others have the join under the plastic casing. (Illustration 8)

Round Capacitors

Plus 15mm for spade connectors, Plus 20mm for mounting bolt (may be gently cut off if required)

Size	Diameter	Length	Weight.	
1uF	25mm	58mm	40g	
2.5uF	20mm	55mm	45g	Also see square capacitors below.
4uF	30mm	60mm	60g	Smaller dishwasher wash pumps
5uF	30mm	60mm	60g	
6uF	30mm	60mm	60g	
7uF	30mm	60mm	60g	F/P dryer motors
8uF	30mm	60mm	60g	Dryer motors, old dishwasher wash pumps
10uF	35mm	60mm	70g	washing machine motors
12uF	35mm	70mm	85g	Large washing machine motors
14uF	35mm	75mm	90g	Large washing machine motors
16uF	35mm	70mm	105g	Large washing machine motors
20uF	40mm	70mm	110g	Large Motor

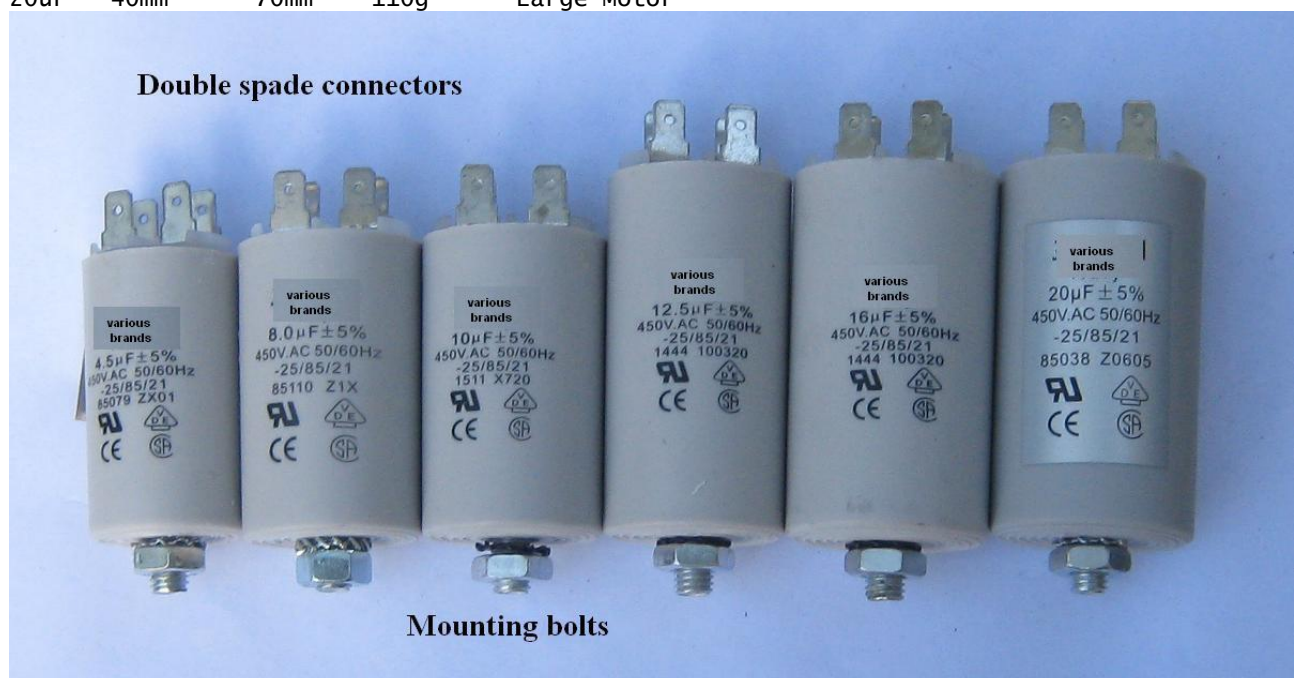


Illustration 1: Some Run Capacitors 1uF to 20uF

Rectangle Capacitors (Square Capacitors)

Size	Dimensions	Weight
1uF	37 x 13 x 24mm	30g
1.5uF	37 x 14 x 25mm	30g
2uF	37 x 15 x 27mm	30g
3uF	37 x 15 x 27mm	30g

Capacitors have double-spade connectors at each end. They are 4.7mm (mostly 1uF caps) and 6.4mm (others), but this can vary and is not part of the specifications.

Add 15mm height for spade connectors, moulded lug for mounting bolting bolt (may be gently cut off if required)



Illustration 2: Some rectangle Run Capacitors

Large Capacitors

Size	Diameter	Length	Weight.
25uF	45mm	92mm	160g
30uF	45mm	70mm	110g
40uF	51mm	106mm	200g
45uF	51mm	, 106mm	200g
50uF	50mm	120mm	230g
60uF	55mm	130mm	270g
80uF	50mm	115mm	245g
80uF	55mm	120mm	300g
100uF,	55mm	120mm	315g/270g

Some with a plastic case, some with an aluminium case, some with or without a mounting bolt.



Illustration 3: Some Large Capacitors 25uF to 100uF

Start Capacitors

Voltage Rating 330V AC

Can use run capacitor if size allows, start capacitors are much smaller dimensions.

PartNo.	Size uF	Dia	Length	Weight	Applications
CAP053S	53-64uF	56mm	85mm	145g	whirlpool motor
CAP064S	64-77uF	45mm	85mm	145g	
CAP073S	72-83uF	56mm	85mm	145g	
CAP088S	88-106uF	45mm	85mm	145g	
CAP108S	108-136uF	50mm	110mm	230g	
CAP130S	130-156uF	52mm	110mm	145g	
CAP145S	145-174uF	50mm	110mm	230g	
CAP161S	161-193uF	50mm	110mm	230g	
CAP216S	216-260uF	50mm	110mm	230g	
CAP233S	233-280uF	52mm	112mm	230g	
CAP243S	243-292uF	50mm	110mm	230g	
CAP324S	324-388uF	50mm	110mm	230g	



Illustration 4: Some Start Capacitors

Service Notes

Use this information at your own risk. See Fair Warning

Run Capacitors

These capacitors are used in capacitor-run motors in pressure pumps, washing machines, dryers, dishwashers, etc., with capacitor-run motors (3 power wires to motor A1, A2, C) plus an earth (see Illustration 5). The larger the capacitor (μF), the more current flows through the winding and the more power it consumes.

Start Capacitors

Not stated, but start capacitors generally have the following features. These caps are 'Electrolytic' and are suitable only for short-term use in starting motors and are rated for only a small number of starts per hour. The start cap must be in series with the centrifugal switch. They are not suitable for cap-run motors, as they are only rated for intermittent use. Electrolytic start caps are much smaller in physical size than run capacitors. Run capacitors can be used as start capacitors, but are much larger and may not fit in the capacitor box.

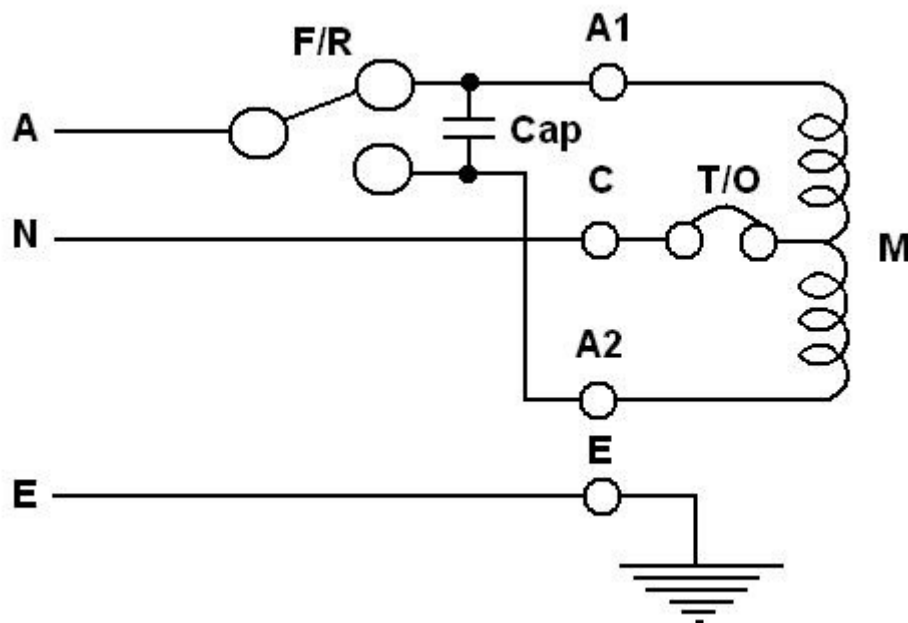


Illustration 5: Capacitor Run Motor Wiring

Illustration 6 shows a motor with a start capacitor (C1) and a run capacitor (C2). A motor may have no capacitors, or only a start capacitor (C1), which improves starting and protects the start winding. Sometimes, on larger motors, a run capacitor (C2) is added to get a little extra power from the motor.

Motor Faults.

If the motor is not starting or starting slowly, then check the capacitor and the motor winding resistance. (Illustration 6)

Some large electric motors may have 2 capacitors: a start capacitor and a run capacitor.

The replacement capacitor should be within 10% of the manufacturer's specification. The size is printed on the side.

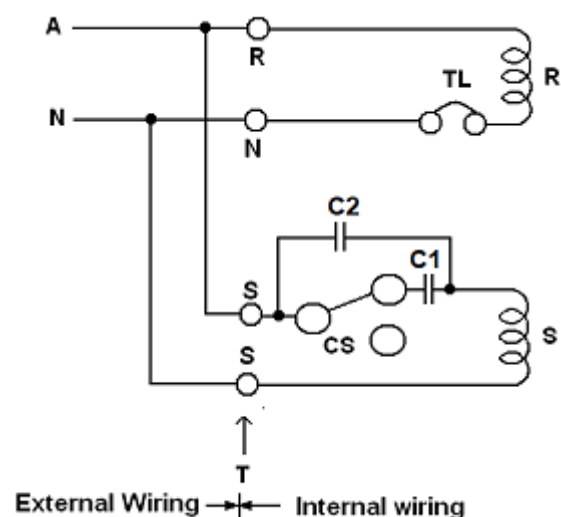


Illustration 6: Induction Motor with Start Capacitor and Run Capacitor

CS Centrifugal Switch C1 Start Cap. C2 Run Cap.

Inspect the original capacitor for any bulges or leakage; they need to be replaced

Some capacitors fail without any visual sign; measure the insulation resistance with a digital multimeter.

Measure the Capacitance with a digital meter (more expensive meters) on a capacitance range. Start capacitors do not give reliable results with the meter.

Replace a suspect faulty capacitor with a good one.

How to get the best service life from the capacitor

Capacitor-run motors are simple in construction but have low starting torque. The motor current increases with load. When the motor is running below rated speed due to a heavy load or during starting with a load, more current flows through the windings and the capacitor. This generates heat, leading to the capacitor failure.

1. Do not overload the motor.
2. Try to start the motor with no load.
3. Avoid repeated starts with a heavy load.
4. Air Compressors: Start the air compressor with the compressor's on/off switch, not the power point. The compressor switch bleeds air out to reduce the starting load.
5. Water pumps: These start from no load but quickly reach full load. Avoid repeated stop-starts. Fix leaking taps, etc.

Dryer Motor Capacitors.

Current model Fisher & Paykel, Simpson, and Electrolux dryers have capacitor-run motors. They forward and reverse the motor for tangle-free drying. The motor repeatedly draws a larger surge current. The capacitor heats up, and being inside a hot box has little cooling. The capacitor then fails.

Some original capacitor that need replacing

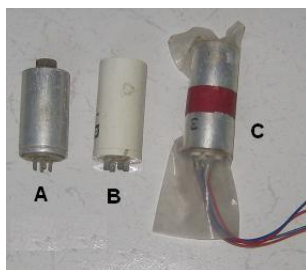


Illustration 7: Some Capacitor to Replace

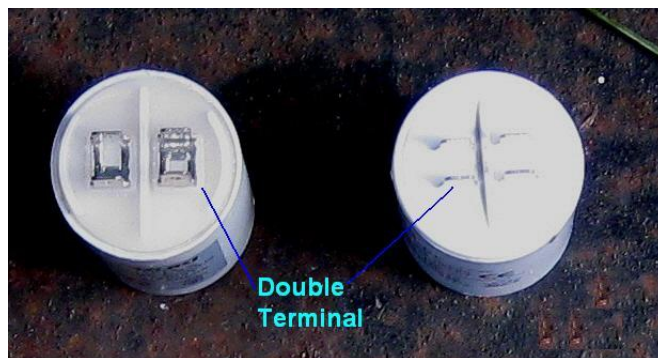


Illustration 8: Capacitor Double Terminals

Illustration 7 A: Aluminium case capacitor, B: Plastic case capacitor, C: Capacitor with leads instead of spade terminals.

Illustration 8: They sometimes have double terminals, sometimes exposed, sometimes hidden below the plastic.

Cannot read the capacitor's size?

The following was found from a web search.

Start Capacitor for 240V AC motor. Suggested size in the table from the web. A Whirlpool washing machine

motor is marked 1/2 HP and uses a 64 μF start capacitor. The table shows a larger capacitor. The Whirlpool motor is a bit unusual as it has a split run winding.

Use the table as a guide; I cannot guarantee this information. The start capacitor limits the current flowing through the start winding. The larger the capacitor, the more current. If too much current flows, the winding will overheat and fail. The start capacitor is only in the circuit for a very short time, so it is not as critical as the run capacitor. If the motor starts too hard, use a smaller capacitor; if it starts too slowly, use a bigger one.

Start Capacitor Size Estimation

HP	HP	kW	μF
1/8	0.125	0.093	20-30
1/6	0.166	0.125	30-40
1/4	0.250	0.185	40-70
1/3	0.330	0.249	60-80
1/2	0.500	0.373	80-100
3/4	0.750	0.560	108-140
1	1.000	0.746	138-182

Note 1HP = 0.746kW = 746W.

Run Capacitor Estimation. The table shows the size of the run capacitor (illustration 6: capacitor C2). The capacitor provides a little extra power from the start winding when the motor is operating. Need to check if the motor is not getting too hot. Also measure and check the data plate for the current used by the motor

HP	μF
1/8	4-5
1/2	10
1 - 2	4 - 5
3	20
5	Max 40