

WORLDWIDE CAPACITORS

CORPORATE PROFILE

- 1960 CGE is established in Mexico City as an Electrical Component Manufacturer
- **1970** CGE merges with CentraLab (NA Philips) and expand into electromechanical components
- **1986** CGE is bought back from Philips
- **1999** Aerovox merges with CGE to manufacture Motor Start Capacitors
- **2001** Aerovox enters in bankruptcy and CGE is bought back once more
- 2001 CGE becomes "Nueva Generación Manufacturas" (NGM)
- 2004 NGM buys Barker Microfarads
- 2005 NGM buys assets, trademark and patents from Mallory
- **2006** NGM buys assets of NORCAP and Commonwealth Sprague
- 2006 NGM creates a Joint Venture with Shengda and establishes NGM Yangzhou
- 2008 NGM buys assets of U.K. Cambridge Capacitors and Philips Advance

"Process innovation and customer satisfaction have driven the development of NGM operations."



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GENERAL INFORMATION

PURPOSE

This catalog's purpose is to provide a reference for all of NGM's standard AC motor run motor, start and power factor conection capacitor products. Please consult NGM Sales or Customer service for further information at sales@ngm.com.mx., Tel. (52) (55) 5352-5244.

INTRODUCTION

A motor capacitor, such as a start capacitor or run capacitor, is an electrical capacitor that boosts the current or reduce the power factor to an electric motor, such as air conditioners, water pumps, garage openers, or forced air heat furnaces. A round or oval dual run capacitor is used in some air conditioner compressor units to boost both the fan and compressor motors and reduce the power factor.

Motor Start Capacitors: are commonly used in single-phase motors to boost the value of their starting torque. It is necessary that the start should take in a small fraction of time (seconds) with the input of a high reactive power.

Due to its advantages like size and high capacitance value, the motor start capacitor is the best capacitor for this type of application. Once the motor has been started, the capacitor should be disconnected from the circuit. The capacitor elements are made out of aluminum foil separated by layers of impregnated paper.

Run capacitors: are designed for continuous duty and they are energized the entire time the motor is running. Run capacitors are rated in a range of $1-90 \,\mu\text{F}$ with voltage classifications of 240V to 480V. They are manufactured with a dielectric material that consists of two sheets of polypropylene film. Each one with a thin layer of vacuum deposited metal on one side.

Power factor correction capacitors cells: they are used to reduce the power factor and harmonic filtration in industrial and commercial three-phrase electrical installations also can be used in large motor machines that can affect the rest of the installation during its operation, the range is 1 to 27 Kvar, and in operating voltages from 250VA to 690VAC.

The use of UGM power correction factor capacitors help in reducing substantially the electricity bill.

A.C. MOTOR START CAPACITORS

ELECTRICAL SPECIFICATIONS

Capacitance Range:	21 to 1410
Voltage Ratings:	110, 125, 165, 220, 250
	and 330 VAC
Rated Frequency:	50/60 HZ
Operating Temperatu	re: -40 + 65 °C max.
(-40 +149 °	F max.) 70°C Upon reques
Power Factor:	10% max. after applying
	working voltage for 4 sec.

MECHANICAL SPECIFICATIONS

Case:	Phenolic or Thermoplastic case with a positive pressure safety vent
Terminals:	Designed to accept 1/4"; single,
	double and triple quick female
	connectors with solder lug option.
Marking:	Manufacturer identification,
	capacitance range, rated
	voltage, working frequency,
	maximum operating temperature,
	manufacture week; year, and UL
	marking. (Special marking availabl
	on request).

AGENCY APPROVALS

- CQC. There are 7 certificates, in example : CQC09006034300, CQC09006034299, ETC - UL File No. E348072 (certified under new standard UL 810 applicable to May 21st, 2012 - VDE 220V Approval No: 40016549 and 40016550 260V Approval No: 40016554 and 40016561 250V Approval No: 40016560 330V Approval No: 40018822 and 40016556 - CSA LR 89486-1

NG capacitors meet the requirements of the following international standards: IEC-60252-2, EIA RS-463-B, UL 810, UL 310, directive RoHS



APPLICATIONS

These non-polarized capacitors are widely 250 applicable to start small A. C. monophasic motors. More specifically, they are suitable for washing machines, refrigerators, air conditioning systems, fans, machine tools, garage door openers, etc. All ıest designs meet the EIA dimensional standards.

> **PROCEDURE FOR CAPACITANCE AND POWER** FACTOR MEASUREMENT

The capacitance and power factor of AC motor start capacitors are calculated by applying 60 Hz, rated voltage to the capacitor and recording, from the circuit below, the voltage within 2 seconds, the current within 3 seconds, and the wattage within 4 seconds.



CAPACITANCE AND POWER FACTOR ARE CALCULATED WITH THE BELOW EQUATIONS:

le

 $C = I \times 10^{6}$ 2π fV

C=Capacitance I = Corrent (A) f = Frequency (Hz)TT = 3.1416

 $PF = W \times 100$ VI

V = Volts (Vac) W = Power(W)PF = Power Factor

VOLTAGE RATING

The rated voltage of the capacitor must be greater than or equal to the average voltage



across the capacitor terminals during the motor starting cycle. This is not necessarily the same as the motor line voltage. In addition, the cut-off voltage rating of the capacitor must be greater than or equal to the maximum voltage attained across the terminals of the capacitor in actual service. The maximum recommended cut-off voltages for the six standard voltage ratings are as follows:

Rated Voltage	Maximum Voltage
(RMS)	(RMS)
110	130
125	150
165	200
220	265
250	300
330	395

FREQUENCY

These capacitors are engineered for 60 Hz application but may be operated between 47 Hz and 66 Hz without damage provided that voltage limitations stated above are observed. (For other variations in frequency, contact NG).

CAPACITANCE RATING

The capacitance is chosen to give the necessary starting torque to the motor. The minimum capacitance value is the minimum designed capacitance. The maximum capacitance is defined by the tolerance chosen.

DUTY CYCLE

The duty cycle should be calculated for each application. It is the ratio of the time the capacitor

has applied voltage to the total time of one cycle. The duty cycles for the normal performance of Type I and Type II are in accordance with the standards in EIA RS-463-B.

SAFETY

Because the watt-second value of these capacitors is high, precautions should be taken during the testing and application of these devices. Discharge resistors should be specified when there is a possibility of a residual charge left on the capacitor or to protect contacts. Misapplication, such as exceeding design limits or applying continuous AC voltage, may result in destruction of capacitors.

CASE INSULATION TEST

The capacitors shall be capable of withstanding the application of 1500 volts AC RMS 60 Hz for 5 seconds between the terminals and a metal foil tightly surrounding the lateral surface of the plastic case or insulating sleeve without breakdown or flashover.

A.C. MOTOR START CAPACITORS

VENT TEST

Capacitors shall be capable of releasing an excessive internal pressure without violen expulsion of capacitor element or cover of emission of flame, when rated AC RMS voltag 60 Hz is applied continuously to a capacitor. Can should be taken to shield the capacitor from observers to prevent injury.

ACCELERATED LIFE TEST

Capacitors shall be capable of withstanding life test conditions per EIA 463-B in a 65°C ±3°C ambient at rated sinusoidal voltage and frequency with current limiting and discharge resistors. A resistance equivalent to approximately 10% of the capacitor impedance shall be connected in series with each capacitor and a resistor of approximately 1000 ohms shall be connected in parallel with each capacitor. Life test shall be conducted in a test chamber with capacitors separated by at least 1 inch of air and with sufficient circulation so that the ambient temperature remains within the above temperature limits and does not vary more than 1°C. Also, capacitors shall not be exposed to direct radiation from heating elements. Test voltage is applied to the capacitor resistor combination. At the conclusion of the life test, at room temperature, the capacitance shall not differ from the initial measured value by more than ±25% and the power factor shall not exceed 20%.



MECHANICAL CHARACTERISTICS PLASTIC SIZE CHART

ny ent	CASE SIZE	DØ	F	L	
or	1	1.437 (36.50)	0.500 (12.70)	2.750 (69.85)	
qe	2	1.437 (36.50)	0.500 (12.70)	3.375 (85.72)	
re	4	1.812 (46.02)	0.630 (16.00)	3.375 (85.72)	
m	5	1.812 (46.02)	0.630 (16.00)	4.375 (111.12)	



RELIABLE CAPACITORS



PHENOLIC SIZE CHART

CASE SIZE	А	В	С	D
1	1.437 (36.50)	0.500 (12.70)	2.750 (69.85)	
2	1.437 (36.50)	0.500 (12.70)	3.375 (85.72)	See NOTE
4	1.812 (46.02)	0.630 (16.00)	3.375 (85.72)	0.110 (2.79)
5	1.812 (46.02)	0.630 (16.00)	4.375 (111.12)	0.110 (2.79)
6	2.062 (52.37)	0.881 (22.37)	3.375 (85.72)	0.235 (5.97)
7	2.062 (52.37)	0.881 (22.37)	4.375 (111.12)	0.235 (5.97)
8	2.562 (65.07)	0.881 (22.37)	4.375 (111.12)	0.485 (12.31)

С

DIM: in (mm)





General notes:

• All capacitors are available larger case sizes than indicated in the chart. NOTE: This dimension is 0.080 (2.03) but the center line of the 0.375 (9.52) diameter protection is on the opposite side of the center line of the case from what is shown.

PLASTIC CASE WITH MOUNTING STUD



DIMS: in (mm)

General notes:

All capacitors are available in larger case sizes than indicated in the chart.
All capacitors are available with M8-1.25 x 10.0mm mounting stud.

• Standard sizes are 1, 4 and 5.

A.C. MOTOR START CAPACITORS

HARDWARE ACCESSORIES

PHENOLIC END CAP

FOR CASE	А	В	С
1,2&3	1.437 (36.50)	1.241 (31.52)	1.093 (27
4 & 5	1.812 (46.02)	1.611 (40.92)	1.468 (37
6& 7	2.062 (52.37)	1.866 (47.40)	1.718 (43
8	2.562 (65.07)	2.366 (60.09)	2.218 (56

DIM: in (mm) TOL: 0.010 (0.25)



MOUNTING BRACKET FOR PLASTIC & PHENOLIC

FOR CASE	F	G	Ι
1	3.015 (76.59)	1.110 (28.25)	2.570 (65.27)
2,4&6	3.656 (92.86)	1.732 (44.00)	3.090 (78.70)
3, 5, 7 & 8	4.720 (119.80)	2.780 (70.54)	4.180 (106.04

DIM: in (mm) TOL: 0.010 (0.38)





PLASTIC END CAP

FOR CASE	А	В	С	D
1&2	1.437 (36.50)	1.348 (34.25)	1.0240 (31.50)	
4 & 5	1.812 (46.02)	1.710 (43.45)	1.594 (40.50)	0.110 (2.79)

DIM: in (mm) TOL: 0.010 (0.25)





Mounting hardware, wire terminals, and discharge resistor available upon request.



PLASTIC SIZE / RATING CHART

TYPE I MAX START CAPACITOR (EIA)

VOLTAGE	110	125	165	220	250	330
CAPACITANCE VALUE	CASE SIZE					
21 - 25						1
25 - 30						1
30 - 36					1	1
36 - 43				1	1	1
43 -52				1	1	2
47 - 56			1	1	1	2
53 - 64			1	1	1	4
64 - 77		1	1	1	1	4
72 - 86	1	1	1	1	1	4
88 - 106	1	1	1	1	2	4
108 - 130	1	1	1	1	4	5
130 - 156	1	1	1	2	4	5
145 - 175	1	1	1	4	4	5
161 -193	1	1	1	4	4	5
189 -227	1	1	1	4	5	
216 - 259	1	1	1	5	5	
233 - 280	1	1	2	5	5]
243 - 292	1	1	2	5	5	
270 - 324	1	1	2	5	5]
324 - 389	1	1	2			-
340 -389	1	1	2]		
378 - 454	1	2	4			
400 -480	2	2	4	1		
430 - 516	2	4	4			
460 -552	2	4	4	1		
540 - 648	4	4	4			
590 - 708	4	4	4			
708 - 850	4	4	5]		
829 - 995	4	5	5]		
1000 - 1200	5	5		-		
1020 -1224	5	5				
1175 - 1410	5					

A.C. MOTOR START CAPACITORS

PLASTIC SIZE / RATING CHART

TYPE II MAX START CAPACITOR (EIA)

VOLTAGE	110	125	165	220	250	330
CAPACITANCE VALUE	CASE SIZE					
21 - 25						
25 - 30						1
30 - 36						1
36 - 43					1	1
43 -52				1	1	1
47 - 56				1	1	1
53 - 64			1	1	1	2
64 - 77			1	1	1	2
72 - 86		1	1	1	1	4
88 - 106	1	1	1	4	4	4
108 - 130	1	1	1	4	4	4
130 - 156	1	1	1	4	4	4
145 - 175	1	1	1	4	4	5
161 -193	1	1	1	4	4	5
189 -227	1	1	1	4	4	5
216 - 259	1	1	1	4	5	5
233 - 280	1	1	1	5	5	
243 - 292	1	1	1	5	5	1
270 - 324	1	1	2	5	5	1
324 - 389	1	1	2	5		-
340 -389	1	1	4	5		
378 - 454	1	1	4		-	
400 -480	1	2	4			
430 - 516	2	2	4]		
460 -552	2	2	4			
540 - 648	4	4	4	1		
590 - 708	4	4	4]		
708 - 850	4	4	5]		
829 - 995	4	4	5]		
1000 - 1200	5	5	5]		
1020 -1224	5	5	5]		
1175 - 1410	5	5		-		



SMALLEST CASE SIZE ACCORDING TO EIA RS-463-B



PHENOLIC SIZE / RATING CHART

TYPE I CAPACITOR (EIA)

VOLTAGE	110	125	165	220	250	330
CAPACITANCE VALUE	CASE SIZE					
21 - 25						
25 - 30						1
30 - 36				1	1	2
36 - 43				1	1	4
43 -52			1	1	1	4
47 - 56			1	1	2	4
53 - 64			1	1	2	4
64 - 77		1	1	2	2	4
72 - 86	1	1	1	2	4	4
88 - 106	1	1	1	2	4	5
108 - 130	1	1	1	4	4	5
130 - 156	1	1	1	4	4	7
145 - 175	1	1	2	5	5	7
161 -193	1	1	2	5	5	7
189 -227	1	1	4	5	5	8
216 - 259	1	1	4	5	5	8
233 - 280	1	1	4	5	7	8
243 - 292	1	2	4	7	7	8
270 - 324	1	2	4	7	7	8
324 - 389	2	4	4	7	8	8
340 -389	2	4	4	7	8	8
378 - 454	2	4	4	8	8	
400 -480	4	4	5	8	8]
430 - 516	4	4	5	8	8	
460 -552	4	4	5	8	8	
540 - 648	4	4	5	8	8	1
590 - 708	4	4	5	8		•
708 - 850	4	4	7		-	
829 - 995	4	5	7	1		
1000 - 1200	5	5	8	1		
1020 -1224	5	7	8	1		
1175 -1410	5	7	8	1		

A.C. MOTOR START CAPACITORS

PHENOLIC SIZE / RATING CHART

TYPE II CAPACITOR (EIA)

VOLTAGE	110	125	165	220	250	330
CAPACITANCE VALUE	CASE SIZE					
21 - 25						
25 - 30						1
30 - 36					1	1
36 - 43				1	1	1
43 -52				1	1	2
47 - 56				1	1	2
53 - 64				1	1	4
64 - 77			1	1	1	4
72 - 86		1	1	1	2	4
88 - 106	1	1	1	1	4	4
108 - 130	1	1	1	2	4	5
130 - 156	1	1	1	4	4	5
145 - 175	1	1	1	4	4	5
161 - 193	1	1	1	4	5	5
189 -227	1	1	1	5	5	7
216 - 259	1	1	2	5	5	7
233 - 280	1	1	4	5	5	7
243 - 292	1	1	4	5	5	7
270 - 324	1	2	4	5	7	8
324 - 389	1	4	4	7	8	8
340 - 389	1	4	4	7	8	8
378 - 454	2	4	4	7	8	8
400 - 480	2	4	4	7	8	8
430 - 516	4	4	4	8	8	
460 -552	4	4	4	8	8	
540 - 648	4	4	5	8	8	
590 - 708	4	4	5	8	8	
708 - 850	4	5	5	8		-
829 - 995	4	5	5		-	
1000 - 1200	5	5	7	1		
1020 -1224	5	5	7	1		
1175 - 1410	5	5	8]		





DRY CAPACITORS



FEATURES

- Non-corrosive, flame-retardant UL 94V-2 ٠
- Meets all EIA standards ٠
- Integral mounting options available for easy • installation
- 60,000 hours operational life ٠
- Self-clearing metallized polypropylene film ٠
- Automated assembly for consistent results
- Light weight and cost effective •

APPLICATIONS

NG dry A.C. motor run capacitors are designed to be used in various types of applications like electric motors and HID ballasts. They are used as part of the current limiting circuit for power factor correction. The A.C. capacitors provide direction by shifting the current in the windings so that the motor simulates the operation of a two-phase motor. These motor run capacitors are designed specifically to be used with permanent split-phase capacitor motors in swimming pool, whirlpool, and spa applications where strict form and fit restrictions are required.

ELECTRICAL TESTING

NG dry motor run capacitors are designed to meet performance testing outlined in the EIA-456 standard. Test programs are run continuously at NG and at third party laboratories to monitor production and for design improvements. These tests confirm reliable performance of NG capacitors used within rated conditions. Ongoing tests include: accelerated life, over voltage, mechanical, terminal to terminal voltage, and terminal to case voltage tests.

MARKING

- Manufacturer's name, file number, authorized trade name, or trademark
- The catalog number or the equivalent
- The capacitance in microfarads (uF)
- Voltage rating
- The frequency in HERTZ
- Temperature rating
- Date

ELECTRICAL SPECIFICATIONS (for Round Phenolic and Plastic Cans)

Capacitance Range:	1 to 130 µF		
Capacitance Tolerance:	± 3%, ±5%, -5% + 10%, ±10 %		
Voltage Range:	180 VAC to 480 VAC		
	-40° ~ + 70° C (-40° ~ 158° F)		
Operating Temperature: (under special requests)	-40° ~ + 85° C (-40° ~ 185° F)		
	-40° ~ + 90° C (-40° ~ 194° F)		
Dissipation Factor:	0.1% maximum at 25° C, 60 H		
Rated Frequency:	50, 60 HZ		
Dielectric Strength:	Terminals to case: Capacitors plus 1,000 volts for one secor Between terminals: Capacito voltage for one second.		

ELECTRICAL SPECIFICATIONS (for Plastic Boxes)

Capacitance Range:	1 to 25 μF (Up to 32 μF under 250 VAC)					
Capacitance Tolerance:	± 3%, ±5%, -5% + 10%, ±10 %					
Voltage Range:	Higher voltages without UL recognition 180 VAC to 450 VAC					
	-40° ~ + 70° C (-40° ~ 158° F) (Standard)					
Operating Temperature: (under special requests)	-40° ~ + 85° C (-40° ~ 185° F)					
(,	-40° ~ + 90° C (-40° ~ 194° F)					
Dissipation Factor:	0.1% maximum at 25° C, 60 Hz					
Rated Frequency:	50, 60 HZ					
Dielectric Strength:	Terminals to case: Capacitors shall be capable of withstanding the application of 2 x rated ac voltage plus 1,000 volts for one second. Between terminals: Capacitors shall be capable of withstanding the application of 1.75 x rated ac voltage for one second.					

ROUND PLASTIC SIZES

	VOLTAGE		240, 250 & 300 Vac	330 & 370 Vac	400, 440 & 450 Vac	480 Vac
	Capacitor Height			0 Mar (uE)		0 Mar (115)
Commercial Size	in	mm	С. мах. (µF)	С. мах. (µF)	С. мах. (µF)	С. мах. (µF)
1.18 " (30mm)	(0) 2.535	65	13	8.5	6.5	4.5
1 (27" (2 (50mm)	(1N) 2.75	69.85	22	15	11	8.5
1.437 (36.50mm)	(2N) 3.365	85.72	29	19.5	14.5	11
1.812" (46.02mm)	(4N) 3.365	85.72	55	37.5	27.5	21
	(5N) 4.365	111.12	63.5	43.5	32	24.5

*The above table is based on operating temperaturas of 70C. *Higher temperatures will require larger case sizes than shown



(Standard)

shall be capable of withstanding the application of 2 x rated ac voltage rs shall be capable of withstanding the application of 1.75 x rated ac



ROUND PHENOLIC SIZES

VOLTAGE						240, 250 & 300 Vac	330 & 370 Vac	400, 440 & 450 Vac	480 Vac
Commercial Size	code	DIAMETER		HEIGHT		0 Mar. (E)		0 Mars (115)	0 Mar (115)
		in	mm	in	mm	ГС. Max. (µF)	с. мах. (µF)	с. мах. (µF)	С. мах. (µF)
	74037	(1R) 2.75	69.85	(1R) 2.75	69.85	16	11	8	6
1.437 " (36.5)	74008	(2R) 3.317	85.07	(2R) 3.365	85.72	22	15	11	8.5
	74007	(3R) 4.334	111.13	(3R) 4.365	111.12	25.5	18	13	10
1.812" (46.02)	74001	(4R) 3.343	85.72	(4R) 3.365	85.72	39	26.5	19.5	15
	74033	(5R) 4.334	111.13	(5R) 4.365	111.12	53.5	36.5	27	20
2.062" (52.37)	74034	(6R) 3.343	85.73	(6R) 3.365	85.72	55	37	28	21
	74035	(7R) 4.323	110.87	(7R) 4.365	111.12	82	56	41	31.5
2.562" (65.07)	74006	(8R) 4.333	111.12	(8R) 4.365	111.12	130	90	67	51

Potting: Polyurethane Resin

*The above table is based on operating temperaturas of 70C.

*Higher temperatures will require larger case sizes than shown



PART NUMBERING SYSTEM

NOMENCLATURE BREAKDOWN

<u>27 / 28</u>	<u>A T/C</u>	1	37	005
Product line :	■ Presentation			
AC Metalized Polypropylene Capacitors 28 =	T= Thermoplasti C= Phenolic Cas F= With Shrinkal R= Rectangular S= Waxed Dipped	Working volt 22 = 220 23 = 230 24 = 240 25 = 250	age	
Plastic Box Capacitor	0= Bare Capacito	or	33 = 330 37 = 370 44 = 440	
Capacitor Ty A = General B = Small El C = Lighting	pe Application ectric Motors		Utners	
D = Refriger E = Special	ation Temperature			Capa
P = Protecte	$\begin{array}{llllllllllllllllllllllllllllllllllll$	ase Size 0 mm - 65 m 5 mm - 69.85 5 mm - 85.72 0 mm - 111.1 Case 5 mm - 70 m 5 mm - 86 m 5 mm - 86 m 0 mm - 111 r 5 mm - 111 r 5 mm - 111 r	m Height 5 mm Height 2 mm Height 12 mm Height 12 mm Height 13 mm Height 14 m Height 15 m Height 16 m Height 17 m Height 18 m Height 18 m Height	cant the m Exam 5 μF 10 μF Wher 0 = 1 7 = '0 9 = '0 3 = '0
	Plastic B 1, 2, 3, 4, See Size	ox Case 6, 7, 8, 9, A, Rating Char	B, D, E, F, G, H t For Dimensio	, J, L, S, I ns



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