Dual run capacitors: are commonly used for air conditioning, to help in the starting of the compressor and the condenser fan motor and compensate the inductance of the winding. It can also support two electric motors, such as in a large air conditioner unit with both a fan motor and a compressor motor in the outdoor heat pump.

The dual capacitor has 3 terminals, labeled "C" or "FAN" or "HERM" for the common, fan, and hermetic electric lines.

SAFETY PROTECTION

Degree of safety protection (according to the IEC-60252-1) is identifed by one of three codes to be marked on the capacitor:

(S3) indicates that the capacitor is of segmented film construction and is protected against fire and shock hazard

(S2) indicates that the capacitor type has been designed to fail in the open-circuit mode only and is protected against fire or shock hazard.

(S1) indicates that the capacitor type **may** fail in the open-circuit or short-circuit mode and is protected against fire or shock hazard.

(S0) indicates that the capacitor type has no specific failure protection.

By UL810 the degree of safety protection is internally protected 10,000 AFC

SHELF LIFE

Motor run capacitors may be stored for periods up to 7 years without detriment. After this time is the preferable to test the capacitor before putting them to service to confirm that the capacitance rated within tolerance rage.

MOUNTING

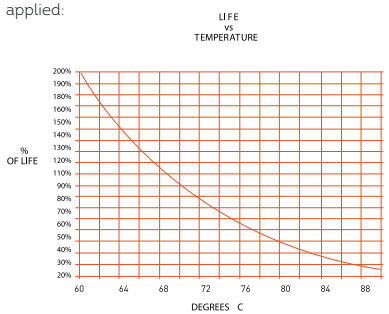
The mounting position of the capacitors will not affect the operation of the interrupter. To ensure proper operation, capacitors must be installed with a minimum of 0.5 inches (12.7 mm) of clearance between terminals or cover and any external restriction.

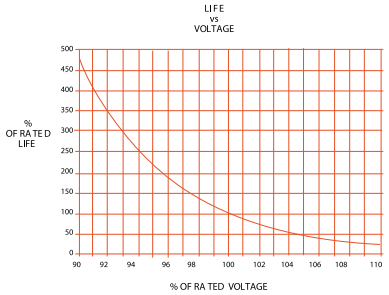
PERFORMANCE AND SERVICE LIFE

Rated Life. NG Capacitors are designed to have a life expectancy of 60,000 hours per EIA 456.

The useful life of a capacitor will be shortened by exceeding the rated voltage and/or temperature limits. Acceleration voltage are now under extensive study.

The next graphs illustrate the variation of life expectancy regarding the voltage and temperature applied:





NG Capacitors shall be capable of stable operation with decreased life at 110% of rated voltage at frequencies up to 66 Hz (Sinusoidal) provided the case temperature does not exceed the maximum rated case temperature.

High transient of voltage, frequency, temperature or any combination of the three may be encountred in some applications therefore, the complete information regarding to magnitude, duration and frequency should be provided to NG in order to design and recommend the proper capacitor for a particular application.

Capacitance and Tolerance: the capacitance of all capacitors are within specified tolerance limits when measured at a temperature of +25°C without changes above -5% to 2% (capacitance value, 60Hz)

Dissipation Factor The dissipation factor does not exceed 0.1% when measured at a frequency of 60 Hz and a case temperature of +25oC.

Leakage Current. When 115 VAC 60 Hz is applied between the shorted capacitor terminals and the bare case, the leakage current will not exceed the values shown on the following table:

NOMINAL CAPACITANCE (µF)	LEAK AGE CURRENT (µA)
0 - 14	60
14.1 - 20	70
20.1 - 35	100
35 1 up	150

Technical standards of reference to design and evaluate the performance of the NG AC Capacitors are the following: EIA-456, IEC 60252, UL 310, UL 810, C22.2 No.190,IEC 60831 and GBT 3667-1

NG Capacitors are RoHS compliant. Reference to the Directive 2011/65/EU

NG Capacitors are REACH Articule 67 compliant in hardware, electrical and electronic equipment.

NG participates in the Conflict - Free Sourcing initiative and provides CFSI conflict report.

VOLTAGE TEST

Between Terminals. Capacitors are capable of withstanding the applications of 1.75 times for 10 seconds at rated alternating voltage.

Terminals to Case. Capacitors are capable of withstanding the application of two times the rated alternating voltage plus 1000 volts for a period of 1 minute.

Surge Voltage. The maximum peak transient surge voltage will not exceed 315% of the nominal 60 Hz rms voltage.

ACCELERATED LIFE TEST

The accelerated life test may be performed by capacitor users to confirm life expectancy.

Room Temperature Life Test Capacitor shall be operated at 135% of rated voltage at room temperature for a period of 120 hours.

High Temperature Life Test Capacitor shall be capable of withstanding the accelerated life test, by applying 125%.

CERTIFICATIONS AND APPROVALS

SERIES	AGENCY APPROVALS	VOLTAGE	NO.FILE
325P	UL and CUL	Up to 660	E229850
	VDE	370	134246
		440	135494
		480	135492
	CE	180 to 660	N/A
	QCQ	440	19006211545
			19006211547
315P & 319P	UL	Up to 660	E229850
	CE	Up to 660	N/A
33 (PFC Cells)	UL and CUL	180 to 660	E229850
	CSA	180 to 660	89486
	CE	180 to 660	N/A
28 (Segmented film)	UL and CUL	Up to 440	E229850
	CE	Up to 440	N/A
28P	UL	150 to 450	E130758
	CE	150 to 450	N/A
27 (Segmented film)	UL and CUL	180 to 600	E229850
	CE	180 to 600	N/A
27	UL and CUL	200 to 480	E130758
	CE	200 to 480	N/A

WET METAL CASE
CAPACITORS

WET METAL CASE FEATURES

- Maximum Fault current 10,000 Amps.
- Internally Protected (Pressure Interrupter)
- Meets EIA -456 ,UL310,UL810 GBT3767, IEC 60252, C-22.2.N190 standards
- Integral mounting options available for easy installation.
- Casing: Round or Oval
- Type: Single / Dual
- 60,000 hours of operational life
- Self-healing metallized polypropylene film
- 100% end of line tested
- 100% serialized and end of line data captured

ELECTRICAL TESTING

Test programs are run continuously at NG and at third party laboratories to monitor production and for design improvements. These tests confirm the 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, trade name, trademark or file number
- Manufacturer's type designation
- The date or other dating period of manufacture
- A distinctive part number or the equivalent
- The rated capacitance in microfarads and tolerance as percentage
- The voltage rating
- The frequency in Hertz
- The temperature rating
- The maximum fault current
- Marked Internally Protected or Protected
- Approval Mark if applicable
- Discharge device if applicable
- Class of Safety Protection
- Filling Material
- Class of Operation
- Self Healing (SH)

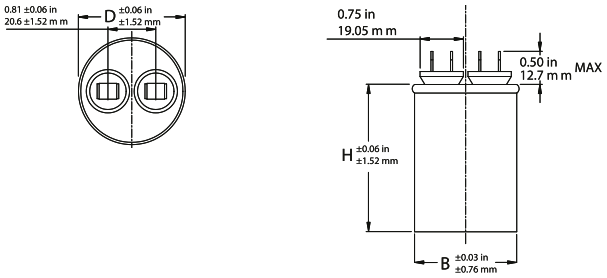
WET METAL CAPACITORS ROUND CASE ELECTRICAL SPECIFICATIONS

Capacitance Range	From 1 to 200 µF
Voltage Range	Up to 660Vac at 50/60Hz Other voltages upon request
Tolerance:	6% Standard. Other tolerances upon request
Dissipation Factor:	0.1% Max. at 60Hz and 25°C, 1% at 1kHz and 25°C
Operating Temperature:	-40°C +70°C. (Upon request and certified by UL up to +90°C) Other temperatures upon request.
100% end of line tested:	Terminal to Terminal = 1.41x[1.75 x VAC (rated)] as a DC voltage Terminal to Case = 1.41x[2 x VAC (rated) + 1 KVAC] as a DC voltage D.F. measured at 120Hz at 25°C ±5°C Other measured frequencies upon request
100% serialized and 100% end of line data capture:	Capacitance measured at 120Hz and 25°C ±5°C D.F. measured at 120Hz and 25° ± 5°C Capacitance end of life is = -3% loss of capacitance

WET METAL CASE CAPACITORS
SINGLE CAPACITORS

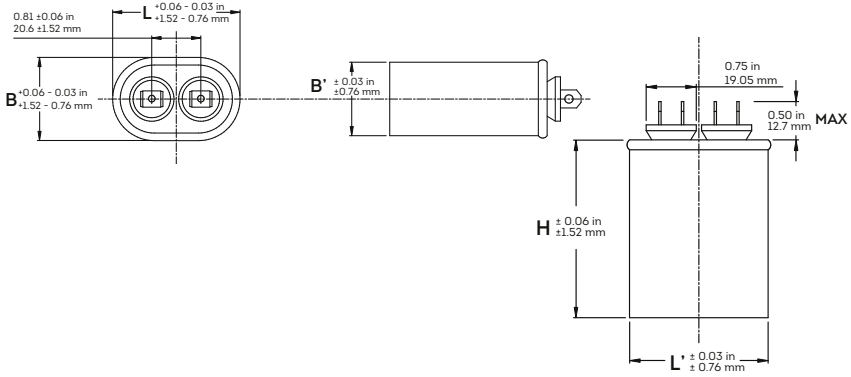
MECHANICAL SPECIFICATIONS / MAXIMUM CAPACITANCE PER ROUND CAN

MAXIMUM CAPACITANCE PER CAN [µF]								
Diameter	Can Height (H)		240	300	370	440	480	660
	in	mm	[Vac]	[Vac]	[Vac]	[Vac]	[Vac]	[Vac]
Ø 1 3/4" [44.5mm] (Size M)	2.000	50.80	33	21	14	10	8	3.5
	2.375	60.32	47	30	20	15	11	
	2.625	66.67	54	34	23	17	13	5.5
	2.750	69.85	61	39	26	19	14	
	3.000	76.20	67	43	29	21	16	7
	3.375	85.72	81	52	35	26		
	3.750	95.25	95	61	41	30	23	10
	4.000	101.60	100	65	44	32	25	
Ø 2.0" [50.8mm] (Size N)	2.375	60.32	64	41	27	20	15	
	2.625	66.67	74	47	32	23	18	8
	3.000	76.20	93	59	40	29	22	10
	3.375	85.72	111	71	48	35		
	3.750	95.25	130	83	57	42	32	14
	4.000	101.60	139	89	61	45	34	
	4.250	107.95		101	69	51		
	4.750	120.65			78	57	43	19.5
Ø 2.5" [63.5mm] (Size P)	2.625	66.67	123	78	53	39	29	13
	3.000	76.20	154	98	67	49	37	16.5
	3.375	85.72	185	118	80			
	3.750	95.25	216	138	94	67	53	23.5
	4.000	101.60	232	148	100	74	57	
	4.250	107.95		168	115	84		
	4.750	120.65		188	129	95	72	32



MECHANICAL SPECIFICATIONS / MAXIMUM CAPACITANCE PER OVAL CAN

MAXIMUM CAPACITANCE PER CAN [µF]								
Diameter	Can Height (H)		240	300	370	440	480	660
	in	mm	[Vac]	[Vac]	[Vac]	[Vac]	[Vac]	[Vac]
1 1/4" [31.75mm] (30.73 X 52.32) (1.21X 2.06) (Size A)	1.5(14)	38.100	12	7.5	5	3.5	3	1
	1.625(15)	41.275	15	10	6	5	3.5	1.5
	2.000	50.800	15	10	7	5	3.5	
	2.375	60.325	22	14	9	7	5	
	2.625	66.675	25	16	11	8	6	2.5
	2.750	69.850	29	18	12	9	7	
	3.000	76.200	32	20	14	10	7	3.5
	3.375	85.725	38	24	16	12		
	3.750	95.250	45	28	19	14	11	4.5
	4.000	101.600	48	31	21	15	11	
	4.250	107.950		35	24	17		
	4.750	120.650			27	19	15	6.5
1 3/4" " [44.45mm] (45.87 x 71.27) (1.806 x 2.806) (Size C)	2.375	60.32	63	40	27	19	15	
	2.625	66.67	72	46	31	22	17	7
	3.000	76.20	90	57	39	28	22	9
	3.375	85.72	108	69	47	34		
	3.750	95.25	126	81	55	40	31	13
	4.000	101.60	136	87	59	43	33	
	4.250	107.95		98	67	49		
	4.750	120.65			75	55	42	18
2" [50.8mm] (47.75 x 90.42) (1.88 x 3.56) (Size D)	2.625	66.67	116	74	50	36	28	12
	3.000	76.20	145	93	63	46	35	15
	3.375	85.72	175	112	76	56		
	3.750	95.25	200	130	89	65	50	22
	4.000	101.60	219	140	96	70	54	
	4.250	107.95		159	109	80		
	4.750	120.65			122	89	68	30
	5.125	130.18	290	186	126	92	70	



PART NUMBERING SYSTEM FOR WET METAL CASE SINGLE RUN CAPACITORS

NOMENCLATURE BREAKDOWN

325P 505 H 37 M 25 N 4 X NG

SERIES
Identifies the basic capacitor design

CAPACITANCE.
Expressed in picofarads.
The first two digits are the significant figures.
The third digit is the number of zeros to follow.
The letter "D" indicates 1/2 µF for capacitors 19.5 µF and above.
For example: 7.5µF = 755, 12.5 µF = 12D and 30 µG = 306

CAPACITANCE TOLERANCE

W = ±3%
H = ±6%
K = ±10%
J = ±'0%-6%
Y = ±'0% +10%
L = ± 5%

VOLTAGE RATING
24 = 240VAC
25 = 250VAC
33 = 330VAC
37 = 370VAC
44 = 440VAC
48 = 480VAC
66 = 660VAC

BASE CODE
A = 2.156"x 1.312" OVAL
C = 2.906"x 1.906" OVAL
D = 3.656"x 1.968" OVAL
M = 1 3/4" ROUND
N = 2" ROUND
P = 2 1/2" ROUND

CASE HEIGHT
First digit expressed in inches and the second expressed in number 1/8"
Example: 30 = 3"
33 = 3.375"
36 = 3.75"
37 = 3.875"

MATERIAL CAN
N = Tin plated steel
A = Aluminum
P = Painted steel

TERMINAL
3 = 1/4" Triple QCT
4 = 1/4" Quadruple QCT
5 = 1/4" Combinations (DOUBLE, TRIPLE, QUADRUPLE)
7 = 1/4" Forked Solder Lug QCT

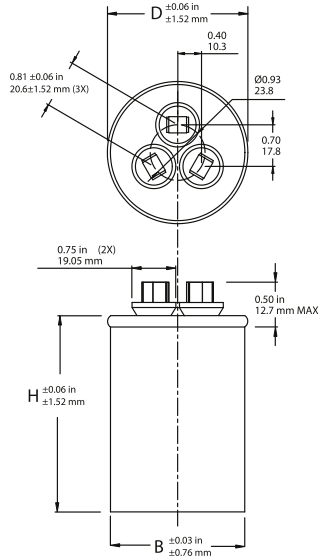
ACCESORIES
A = Screw and resistor
B = Plastic boot
C = Screw and ground lugterminal
D = Stud can, rubber boot and harness
F = Heat Shrink Sleeve
G = Ground lug
R = Resistor
S = Stud can
W = Bracket
X = Without accesories
Y = Screw, resistor and ground lug
Z = Individual box

Relates to Customer name
NG is standard

MECHANICAL SPECIFICATIONS / MAXIMUM CAPACITANCE PER ROUND CAN

MAXIMUM CAPACITANCE PER CAN [µF]								
Diameter	Can Height (H)		240	300	370	440	480	660
	in	mm	[Vac]	[Vac]	[Vac]	[Vac]	[Vac]	[Vac]
Ø 2.0" [50.08 mm] Size N	3.125	79.375	93	59	40	29	22	10
	3.875	98.425	130	83	57	42	32	14
	4.750	120.65			78	57	43	19.5
Ø2.5" [66.5mm] Size P	3.125	79.375	154	98	67	49	37	16.5
	3.750	98.425	216	138	94	67	53	23.5
	4.750	120.65		188	129	95	72	32

To determinate the size of the round can, add both capacitances (Capacitance Herm + Capacitance Fan). For example a dual capacitor rated at 50 + 10µF/440 Vac = 60µF/440 Vac and it can use the can P37 (2.5" x 3.875 height).

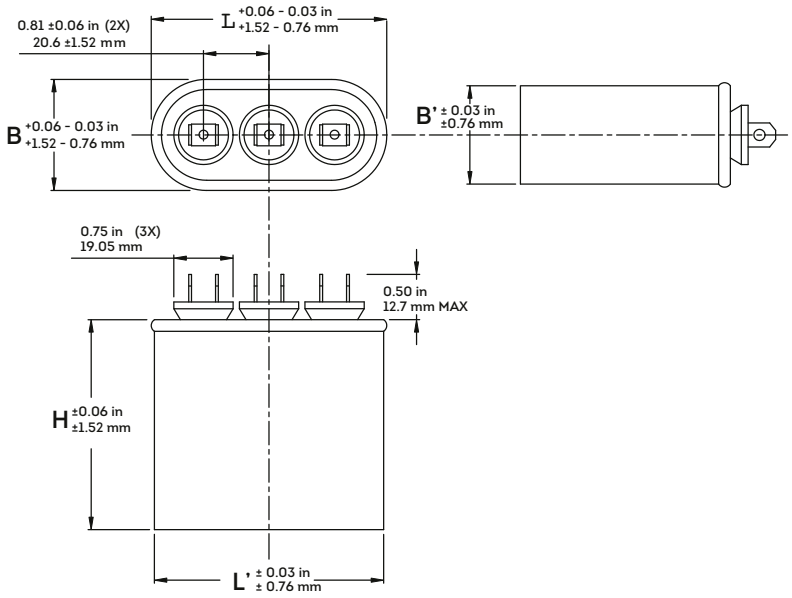


MAXIMUM CAPACITANCE PER OVAL CAN / MECHANICAL SPECIFICATIONS

MAXIMUM CAPACITANCE PER CAN [µF]

Diameter	Can Height		240Vac		300 Vac		370 Vac		440 Vac		480 Vac		660 Vac	
	in	mm	Herm [µF]	Fan [µF]	Herm [µF]	Fan [µF]	Herm [µF]	Fan [µF]	Herm [µF]	Fan [µF]	Herm [µF]	Fan [µF]	Herm [µF]	Fan [µF]
(B x L) 1.9" x 2.9" [48.51 x 73.91 mm] (Size C)	2.625	66.675	36	36	23	23	15.5	15.5	11	11	8.5	8.5	3.5	3.5
	3.000	76.20	45	45	28.5	28.5	19.5	19.5	14	14	11	11	4.5	4.5
	3.750	95.25	63	63	40.5	40.5	27.5	27.5	20	20	15.5	15.5	6.5	6.5
	4.750	120.65					37.5	37.5	27.5	27.5	21	21	9	9
(B x L) 1.968" x 3.656" [49.99 x 92.86 mm] (Size D)	3.000	76.200	72.5	72.5	46.5	46.5	31.5	31.5	23	23	17.5	17.5	7.5	7.5
	3.750	95.250	100	100	65	65	44.5	44.5	32.5	32.5	25	25	11	11
	4.750	120.65					61	61	44.5	44.5	35	35	15	15

(2.5" x 3.875 height).



PART NUMBERING SYSTEM FOR WET METAL CASE DUAL RUN CAPACITORS

NOMENCLATURE BREAKDOWN

328P 25 10 H 44 N 31 A 4 NG

SERIES
Identifies the basic capacitor model 328P Rounds and 325P ovals

CAPACITANCE
Expressed in microfarads for the compressor section, for example:
20 = 20 µF,
25 = 25 µF

CAPACITANCE
Expressed in microfarads for the Fan section, for example:
05 = 5 µF
1Z = 12.5 µF
7D = 7.5 µF

CAPACITANCE TOLERANCE
W = ±3%
H = ±6%
K = ±10%
J = ±'0%-6%
Y = ±'0% +10%
L = ± 5%

VOLTAGE RATING
24 = 240 VAC
25 = 250 VAC
33 = 330 VAC
37 = 370 VAC
44 = 440 VAC
48 = 480 VAC
66 = 660 VAC

BASE CODE
N = 2" ROUND
P = 2 1/2" ROUND
C = 1 3/4" OVAL
D = 2.0" OVAL

CASE HEIGHT
First digit expressed in inches and the second expressed in number 1/8"
EXAMPLE:
31 = 3.125"
37 = 3.875"

MATERIAL CASE
A = Aluminum

TERMINAL
3 = 1/4" Triple QCT
4 = 1/4" Quadruple QCT
5 = 1/4" Combinations (DOUBLE, TRIPLE, QUADRUPLE).

Relates to Customer name
NG is standard, the 17 digit is used when the customer requires accesories