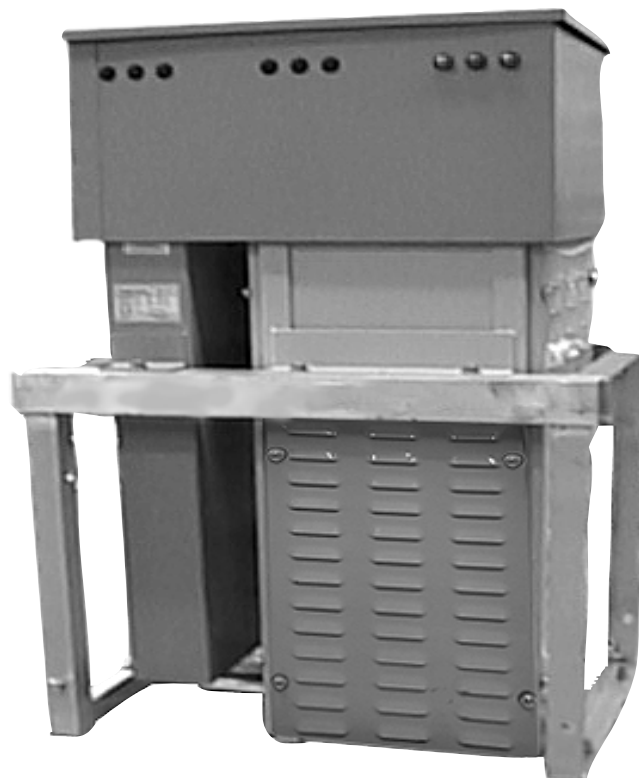




Fixed Power Factor Correction Capacitors & Harmonic Solutions



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Benefits of Power Factor Improvement

Power Cost Reduction

The ratio of working current to total current is called "Power Factor." The function of power factor correction capacitors is to increase the power factor by compensating for inductive electrical equipment loads. Utility companies in many areas include a penalty charge in the electrical rate for low power factor. The installation of power factor capacitors on the user's electrical distribution system eliminates the necessity of paying premium rates to the utility company for poor power factor. The savings the utility company derives in reduced generation, transmission and distribution costs are passed on to the user in the form of lower electrical charges. Three of the more common ways a utility charges a user for poor power factor are based on:

- KW demand with a trigger point typically between 85% and 95% power factor.
- KVA demand
- KVAR demand

When the utility uses either KVA demand or KVAR demand as the basis for its penalty structure, all users pay a penalty, but those with high power factor pay a much lower penalty.

System Capacity Increase

By adding capacitors to the system, the power factor is improved and the KW capacity of the system is increased. For example, a 1,000 KVA transformer with a 70% power factor provides 700 KW of power to the main bus. With the installation of capacitors so that the power factor is improved, say, to 90%, the KW capacity of the system is increased to 900 KW.

Voltage Improvement and Power Loss Reduction

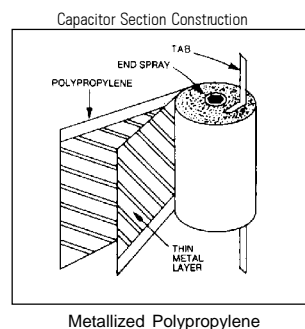
System losses are also reduced through power factor correction by reducing the total current and power in the system. A 20% reduction in current will yield a 36% reduction in distribution system losses. In this situation, an energy savings of as much as 50% will be realized with the installation of power factor capacitors.

In addition, power factor capacitors decrease the distribution system voltage drops and fluctuations.

Characteristics

Construction

The metallized dielectric system employed in the fixed and other automatic systems is constructed of two sheets of polypropylene film, each with a thin layer of vacuum deposited metal, on one side of the dielectric, that serves as the capacitor electrode. Because the electrode is just a few hundred angstroms thick, it has a very limited current carrying capability at any given point. Each end of the capacitor section is bonded with an end spray that has a relatively high current carrying capacity. The end spray serves as a connection between the section and the electrical tabs that are connected to the external connectors. This construction minimizes the current at any point in the section and helps extend capacitor life.



Type GMP Low Voltage Power Factor Correction Capacitors

GMP Series Single-Unit Indoor/Outdoor Assemblies

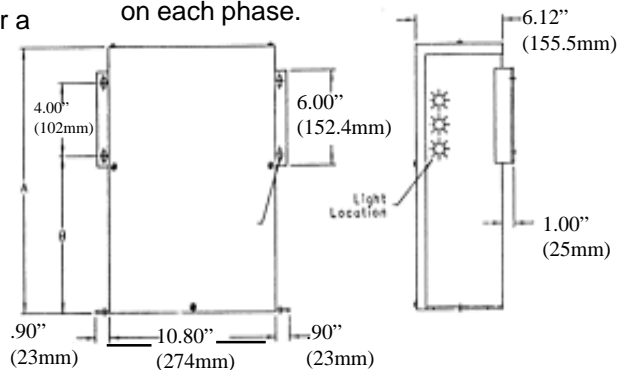
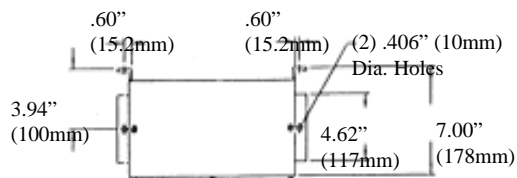
Available Ratings: Not for harmonic applications

- 240 volt, 1-40 kVAR, single and 3-phase, 60 Hz
To determine kVAR at 208 volts, multiply 240 volts kVAR by .75
- 480 volt, 1-100 kVAR, single and 3-phase, 60 Hz
- 600 volt, 1-60 kVAR, 3-phase, 60 Hz
- UL Listed/CSA Approved
- Discharge resistors reduce voltage to 50 volts or less within one minute
- Painted stainless steel enclosure NEMA 3 & 12
- Factory installed fuses and blown fuse indicating lights (Optional)
- Pressure Sensitive Interrupter (PSI) in each cell

GMP assemblies feature multiple capacitor cells with metallized polypropylene film dielectric which provides instantaneous self-healing action and reduced energy. Safety is provided with the patented Ultravar internal Pressure Sensitive Interrupter (PSI) designed to sense the buildup of pressure if a fault occurs and to interrupt the internal electrical connections before the capacitor cell can rupture. GMP cells feature time-proven Dielektrol, a biodegradable NFPA Class IIIB dielectric fluid. GMP cells offer high reliability and long life and is suitable for operation over a temperature range of -40°C to 46°C.

Line Fuse/Blown Fuse Indicating Lights

Ultravar provides 100 kAIC and 200 kAIC interrupting capacity fuses for up to 12.5 kVAR and larger ratings, respectively. Blown fuse indicating lights are also an option. Order by appropriate BASIC CATALOG number plus the appropriate accessory SUFFIX for a complete catalog number.



SIZE CODE	A		B	
	Inch	mm	Inch	mm
1	8.00	203.2	1.88	47.8
2	14.12	358.7	7.50	191.5
3	23.38	593.9	12.38	314.5



Note: NEC Article 460-8B requires capacitors to have over-current protection in all ungrounded conductors (except if connected on the load side of a motor overload protective device). Three-phase capacitors fused only on two phases will not provide adequate protection if a line-to-ground fault should occur in the unfused phase.

Mounting

GMP single units are designed to be mounted upright on any level surface, such as a floor, top of a motor control center, or directly to any wall with brackets provided.

Line Connection and Cable Entrance

Entrance on Size Code 4 units must be made through the right end panel. For all other sizes the entrance may be made through either end panel (after first punching out the appropriate size hole). Solderless connectors are provided on each phase.

Type GMP Low Voltage Power Factor Correction Capacitors

GMP Series Multi-Unit Indoor/Outdoor Assemblies

Available Ratings: Not for harmonic applications

- 240 volt, 42.5 - 200 kVAR, single and 3-phase, 60 Hz
To determine kVAR at 208 volts, multiply 240 volt KVAR by .75
- 480 volt, 110 - 500 kVAR, single and 3-phase, 60 Hz
- 600 volt, 65 - 300 kVAR, 3-phase, 60 Hz
- UL Listed
- Discharge resistors reduce voltage to 50 volts or less within one minute
- Painted stainless steel enclosure NEMA 3 & 12
- Factory installed fuses and blown fuse indicating lights (Optional)
- Pressure Sensitive Interrupter (PSI) in each cell

GMP assemblies feature multiple capacitor cells with metallized polypropylene film dielectric which provides instantaneous self-healing action and reduced energy losses. Safety is provided with the patented GE internal Pressure Sensitive Interrupter (PSI) designed to sense the buildup of pressure if a fault occurs and to interrupt the internal electrical connections before the capacitor cell can rupture. GMP cells feature time proven dielectrol, a biodegradable NFPA Class IIIB dielectric fluid. GMP cells offer high reliability and long life and are suitable for operation over a temperature range of -40°C to 46°C.

Line Fuse/Blown Fuse Indicating Lights

When fuses are specified, Ultravar provides 200,000 amp interrupting capacity fuses. Blown fuse indicating lights are also an option. Order by appropriate BASIC CATALOG number plus the appropriate accessory SUFFIX for a complete catalog number.

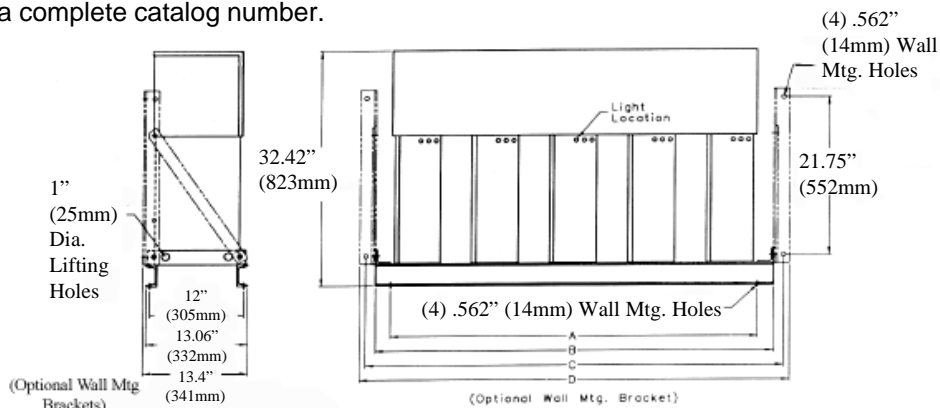


Mounting

GMP series equipments are designed to be mounted upright on any level surface. An adapter kit is required for wall mounting. Order the wall mounting kit by Cat. No.86C3236G5.

Line Connection and Cable Entrance

Entrance may be made through either end panel (after first punching out the appropriate size hole). Lug terminals are provided on each phase.



SIZE CODE	# OF UNITS INCLUDED	A		B		C		D	
		Inch	mm	Inch	mm	Inch	mm	Inch	mm
4	2	17	431.8	21	533.4	23.5	596.9	25	635
5	3	27	685.8	31	787.4	33.5	850.9	35	889
6	4	37	939.8	41	1041.4	43.5	1104.9	45	1143
7	5	47	1193.8	51	1295.4	53.5	1358.9	55	1397

GMP Single-Unit Selection Table:

kVAR	Basic Cat. No. + -->	Size Code (Fig. 3)	Approx. Weight	
			Lbs.	Kg
240 Volt, 3 Phase⁽¹⁾				
1.0	GMP10010D333FL	1	9	4.1
1.5	GMP10015D333FL	1	9	4.1
2.0	GMP10020D333FL	1	9	4.1
2.5	GMP10025D333FL	1	9	4.1
3.0	GMP10030D333FL	1	9	4.1
4.0	GMP10040D333FL	1	10	4.5
5.0	GMP10050D333FL	1	10	4.5
6.0	GMP10060D333FL	1	11	5.0
7.5	GMP10075D333FL	1	15	6.8
10.0	GMP10100D333FL	1	15	6.8
12.5	GMP20125D333FL	2	19	8.6
15.0	GMP20150D333FL	2	19	8.6
17.5	GMP20175D333FL	2	22	10.0
20.0	GMP20200D333FL	2	22	10.0
22.5	GMP30225D333FL	3	32	14.5
25.0	GMP30250D333FL	3	32	14.5
27.5	GMP30275D333FL	3	32	14.5
30.0	GMP30300D333FL	3	32	14.5
32.5	GMP30325D333FL	3	36	16.3
35.0	GMP30350D333FL	3	38	17.2
37.5	GMP30375D333FL	3	38	17.2
40.0	GMP30400D333FL	3	38	17.2

kVAR	Basic Cat. No. + -->	Size Code (Fig. 3)	Approx. Weight	
			Lbs.	Kg
480 Volt, 3-Phase⁽¹⁾				
1.0	GMP10010F333FL	1	9	4.1
1.5	GMP10015F333FL	1	9	4.1
2.0	GMP10020F333FL	1	9	4.1
2.5	GMP10025F333FL	1	9	4.1
3.0	GMP10030F333FL	1	9	4.1
4.0	GMP10040F333FL	1	9	4.1
5.0	GMP10050F333FL	1	9	4.1
6.0	GMP10060F333FL	1	9	4.1
7.5	GMP10075F333FL	1	10	4.5
10.0	GMP10100F333FL	1	10	4.5
12.5	GMP10125F333FL	1	10	4.5
15.0	GMP10150F333FL	1	13	5.9
17.5	GMP10175F333FL	1	13	5.9
20.0	GMP10200F333FL	1	13	5.9
22.5	GMP10225F333FL	1	13	5.9
25.0	GMP10250F333FL	1	13	5.9
27.5	GMP20275F333FL	2	19	8.6
30.0	GMP20300F333FL	2	19	8.6
32.5	GMP20325F333FL	2	19	8.6
35.0	GMP20350F333FL	2	19	8.6
37.5	GMP20375F333FL	2	19	8.6
40.0	GMP20400F333FL	2	22	10.0
42.5	GMP20425F333FL	2	22	10.0
45.0	GMP20450F333FL	2	22	10.0
47.5	GMP20475F333FL	2	22	10.0
50.0	GMP20500F333FL	2	22	10.0
55.0	GMP30550F333FL	3	32	14.5
60.0	GMP30600F333FL	3	32	14.5
65.0	GMP30650F333FL	3	32	14.5
70.0	GMP30700F333FL	3	33	15.0
75.0	GMP30750F333FL	3	33	15.0
80.0	GMP30800F333FL	3	38	17.2
85.0	GMP30850F333FL	3	38	17.2
90.0	GMP30900F333FL	3	38	17.2
95.0	GMP30950F333FL	3	38	17.2
100.0	GMP31000F333FL	3	38	17.2

kVAR	Basic Cat. No. + -->	Size Code (Fig. 3)	Approx. Weight	
			Lbs.	Kg
600 volt, 3-phase				
1.0	GMP10010H333FL	1	9	4.1
1.5	GMP10015H333FL	1	9	4.1
2.0	GMP10020H333FL	1	9	4.1
2.5	GMP10025H333FL	1	9	4.1
3.0	GMP10030H333FL	1	9	4.1
4.0	GMP10040H333FL	1	9	4.1
5.0	GMP10050H333FL	1	10	4.5
6.0	GMP10060H333FL	1	10	4.5
7.5	GMP10075H333FL	1	10	4.5
10.0	GMP10100H333FL	1	12	5.4
12.5	GMP10125H333FL	1	12	5.4
15.0	GMP10150H333FL	1	12	5.4
17.5	GMP20175H333FL	2	19	8.6
20.0	GMP20200H333FL	2	19	8.6
22.5	GMP20225H333FL	2	19	8.6
25.0	GMP20250H333FL	2	21	9.5
27.5	GMP20275H333FL	2	21	9.5
30.0	GMP20300H333FL	2	21	9.5
32.5	GMP30325H333FL	3	31	14.1
35.0	GMP30350H333FL	3	31	14.1
37.5	GMP30375H333FL	3	31	14.1
40.0	GMP30400H333FL	3	31	14.1
42.5	GMP30425H333FL	3	32	14.5
45.0	GMP30450H333FL	3	32	14.5
47.5	GMP30475H333FL	3	36	16.3
50.0	GMP30500H333FL	3	36	16.3
55.0	GMP30550H333FL	3	36	16.3
60.0	GMP30600H333FL	3	36	16.3

GMP Multi-Unit Selection Table:

kVAR	Basic Cat. No. + -->	Size Code (Fig. 4)	Approx. Weight	
			Lbs.	Kg
240 Volt, 3-phase⁽¹⁾				
42.5	GMP40425D333FL	4	87	39.5
45.0	GMP40450D333FL	4	87	39.5
47.5	GMP40475D333FL	4	87	39.5
50.0	GMP40500D333FL	4	87	39.5
55.0	GMP40550D333FL	4	87	39.5
60.0	GMP40600D333FL	4	87	39.5
65.0	GMP40650D333FL	4	93	42.2
70.0	GMP40700D333FL	4	99	44.9
75.0	GMP40750D333FL	4	99	44.9
80.0	GMP40800D333FL	4	99	44.9
85.0	GMP50850D333FL	5	136	61.7
90.0	GMP50900D333FL	5	130	59.0
95.0	GMP50950D333FL	5	136	61.7
100.0	GMP51000D333FL	5	136	61.7
110.0	GMP51100D333FL	5	148	67.1
120.0	GMP51200D333FL	5	148	67.1
125.0	GMP61250D333FL	6	178	80.7
130.0	GMP61300D333FL	6	178	80.7
140.0	GMP61400D333FL	6	184	83.5
150.0	GMP61500D333FL	6	196	88.9
160.0	GMP61600D333FL	6	196	88.9
170.0	GMP71700D333FL	7	233	105.7
175.0	GMP71750D333FL	7	245	111.1
180.0	GMP71800D333FL	7	233	105.7
190.0	GMP71900D333FL	7	236	107.1
200.0	GMP72000D333FL	7	245	111.1

kVAR	Basic Cat. No. + -->	Size Code (Fig. 4)	Approx. Weight	
			Lbs.	Kg
480 Volt, 3-phase⁽¹⁾				
110.0	GMP41100F333FL	4	87	39.5
120.0	GMP41200F333FL	4	87	39.5
125.0	GMP41250F333FL	4	87	39.5
130.0	GMP41300F333FL	4	87	39.5
140.0	GMP41400F333FL	4	89	40.8
150.0	GMP41500F333FL	4	89	40.8
160.0	GMP41600F333FL	4	99	44.9
170.0	GMP41700F333FL	4	99	44.9
175.0	GMP41750F333FL	4	99	44.9
180.0	GMP41800F333FL	4	99	44.9
190.0	GMP41900F333FL	4	99	44.9
200.0	GMP42000F333FL	4	99	44.9
210.0	GMP52100F333FL	5	136	61.7
220.0	GMP52200F333FL	5	136	61.7
230.0	GMP52300F333FL	5	136	61.7
240.0	GMP52400F333FL	5	138	62.6
250.0	GMP52500F333FL	5	138	62.6
260.0	GMP52600F333FL	5	142	64.4
270.0	GMP52700F333FL	5	143	64.9
280.0	GMP52800F333FL	5	148	67.1
290.0	GMP52900F333FL	5	148	67.1
300.0	GMP53000F333FL	5	148	67.1
325.0	GMP63250F333FL	6	181	82.1
350.0	GMP63500F333FL	6	186	84.4
375.0	GMP63750F333FL	6	191	86.6
400.0	GMP64000F333FL	6	196	88.9
425.0	GMP74250F333FL	7	230	104.3
450.0	GMP74500F333FL	7	235	106.6
475.0	GMP74750F333FL	7	240	108.9
500.0	GMP75000F333FL	7	245	111.1

kVAR	Basic Cat. No. + -->	Size Code (Fig. 4)	Approx. Weight	
			Lbs.	Kg
600 Volt, 3-phase				
65.0	GMP40650F333FL	4	87	39.5
70.0	GMP40700F333FL	4	87	39.5
75.0	GMP40750F333FL	4	87	39.5
80.0	GMP40800F333FL	4	87	39.5
85.0	GMP40850H333FL	4	87	39.5
90.0	GMP40900H333FL	4	87	39.5
95.0	GMP40950H333FL	4	95	43.1
100.0	GMP41000H333FL	4	95	43.1
110.0	GMP41100H333FL	4	95	43.1
120.0	GMP41200H333FL	4	95	43.1
125.0	GMP51250H333FL	5	134	60.8
130.0	GMP51300H333FL	5	134	60.8
140.0	GMP51400H333FL	5	134	60.8
150.0	GMP51500H333FL	5	134	60.8
160.0	GMP51600H333FL	5	138	62.6
170.0	GMP51700H333FL	5	142	64.4
175.0	GMP51750H333FL	5	142	64.4
180.0	GMP51800H333FL	5	142	64.4
190.0	GMP61900H333FL	6	180	81.6
200.0	GMP62000H333FL	6	180	81.6
210.0	GMP62100H333FL	6	180	81.6
220.0	GMP62200H333FL	6	184	83.5
230.0	GMP62300H333FL	6	188	85.3
240.0	GMP62400H333FL	6	188	85.3
250.0	GMP72500H333FL	7	227	103.0
260.0	GMP72600H333FL	7	227	103.0
270.0	GMP72700H333FL	7	227	103.0
280.0	GMP72800H333FL	7	231	104.8
290.0	GMP72900H333FL	7	235	106.6
300.0	GMP73000H333FL	7	235	106.6

Notes: (1) For no lights, remove suffix L, i.e. **GMP10030D333F**
 (2) For no fuses replace suffix 3FL with NF, i.e. **GMP10030D33NF**
 (3) For 208 volt application, use 240 volt capacitors. Multiply the 240 volt KVAR rating by 0.75 to obtain the 208 volt rating

Low Losses

All capacitors consume a certain amount of electrical energy. Capacitors with metallized polypropylene will consume less energy than capacitors utilizing other dielectric systems. The loss of energy is manifested in the form of heat. Reduced heat dissipation results in lower operating temperatures, which in turn contributes to extended capacitor life. Ultravar capacitors have watt loss as low as 0.25 watt/kVAR to 0.2 watt/kVAR.

Self Healing

All Ultravar low voltage power factor correction capacitors are self healing (or self clearing), which is a property of the capacitor to restore the dielectric to an acceptable condition should a breakdown occur during operation. The thin metal layer around the fault point will act like a fuse with a very low current rating. Under a fault condition, the current will vaporize the metal around the fault point and clear (heal) the fault. The self healing activity further restricts the maximum current that can pass through the fault. Typically, the current spikes due to a fault in a metallized design capacitor are less than 200 amps and a few microseconds, regardless of the available fault current.

Dielectric Fluid

All Ultravar power factor correction capacitors are filled with a biodegradable dielectric fluid. It is a non-toxic and non-irritating fluid requiring no special handling and is not regulated by the Department of Transportation.

Listed below are some of the advantages that the Ultravar dielectric fluid offers over competitive products employing metallized designs and dielectric fluids.

- Low film swelling
- High thermal stability
- High resistance to oxidation
- High resistance to gas evolution under electrical stress
- Non-flammable

Pressure Activated Circuit Interrupters

Incorporated into each capacitor is a pressure sensitive circuit interrupter. This UL and CSA listed device safely removes the capacitor from service at end-of-life or under heavy fault conditions, maintaining case integrity. Due to the design and acceptance of the pressure interrupter, Ultravar capacitors are listed for use with or without line fuses at 10,000 AFC rating.

External Fusing

In addition to the pressure sensitive interrupter, three current-limiting fuses are available for the Ultravar delta-connected capacitors. Interrupting ampacity for static (fixed) assemblies is as follows:

- A.M.P., MVA 100 kaic
- ICS, HSICS 200 kaic

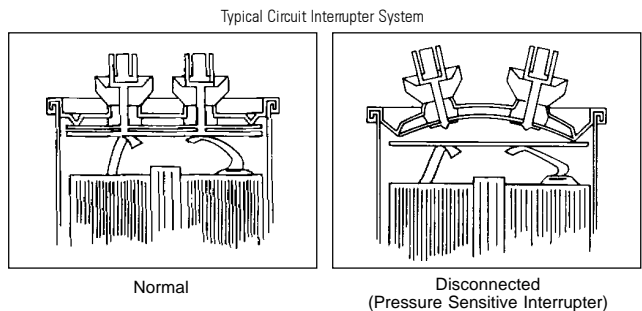
All low voltage fuses are 600 volt rated.

True Loss-of-KVAR

Blown fuse lights are a time and labor saving device when performing routine maintenance on fixed-bank capacitors. Ultravar type A.M.P. and MVA capacitors are equipped with a true loss-of-KVAR feature. Self clearing capacitors fail open, seldom causing related fuse operation. It is possible to have a failed cell and a good fuse and not know of the failure until it's too late. The Ultravar true loss-of-KVAR feature connects the capacitor as part of the "blown fuse light" circuit. If either the fuse or capacitor pressure interrupter operates, the indicating light will illuminate, reducing the risk of penalty charges. Ultravar ICS capacitor banks are also available with this optional feature.

Quality

All Ultravar power factor correction capacitors are 100% tested prior to shipment. They meet or exceed applicable industry standards, offering the highest product quality available.



A.M.P.

Low Voltage Assemblies

Features

Capacitor Unit

Each UL and CSA listed capacitor used in the A.M.P. and MVA assemblies is built as an internally connected three phase unit (not as single phase cells, externally connected). Each capacitor is hermetically sealed in a steel case and incorporates a pressure-activated interrupter that minimizes the possibility of case rupture and removes all three phases from the line so as not to contribute to phase voltage unbalance.

Case

The A.M.P. and MVA assemblies have an 18 gauge steel enclosure. Keyhole mounting eyes allow for quick and easy installation for either floor or wall mounting. The assembly is completely gasketed, providing for indoor or outdoor use, and is finished in a UL recognized indoor/outdoor paint system that provides superior corrosion resistance. As a special option, the enclosure is also available in stainless steel.

Indicating Lights (Optional)

Glowing neon lights indicate loss-of-KVAR due to activation of either the capacitor pressure interrupter or a blown fuse. This option is highly recommended to aid in maintenance and to prevent any penalty charges due to activated safety features.

Fuses

Each three (3) phase capacitor cell is protected with three current limiting replaceable fuses rated at 100,000 amps interrupting capacity.

Environmental Parameters

Operating temperatures between -40°C and $+46^{\circ}\text{C}$ (-40°F to $+115^{\circ}\text{F}$) are permissible. Operation at temperatures above $+46^{\circ}\text{C}$ will shorten capacitor life.

Ground Terminal

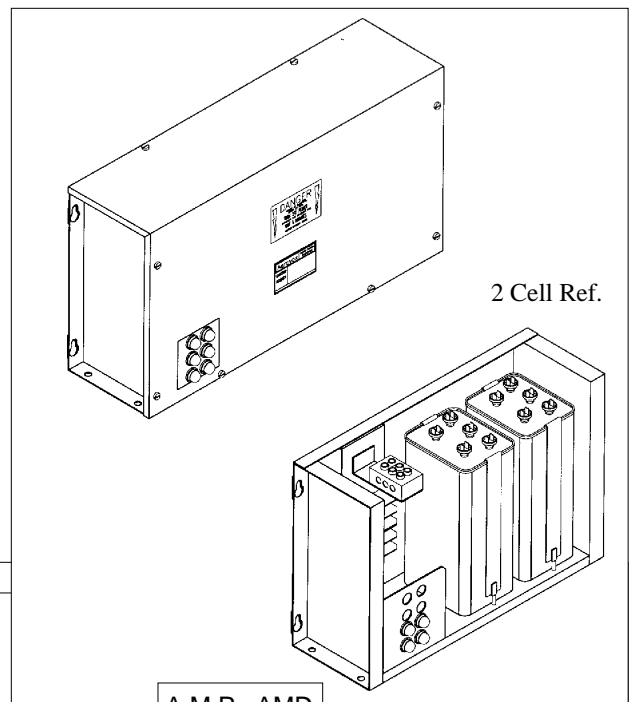
To facilitate proper grounding of the unit, a ground terminal is provided.

Discharge Resistors

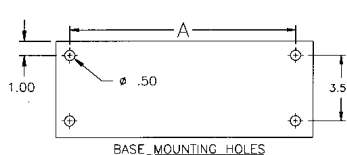
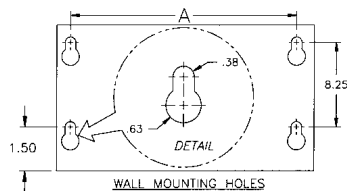
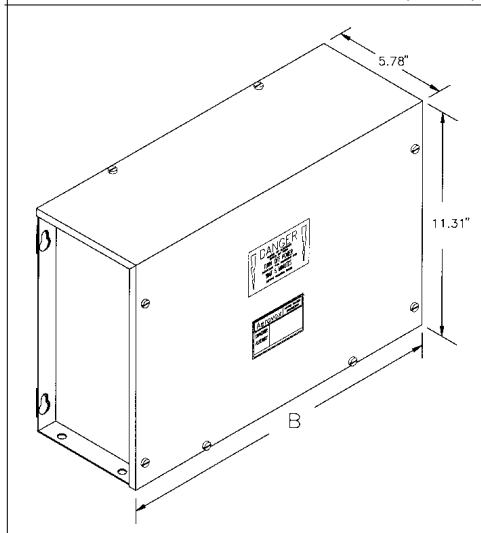
Each capacitor cell employs a resistor network to reduce residual voltage to 50 volts or less within one minute after removal from an energized circuit.

Terminal Block

Each internal capacitor is pre-wired to a heavy duty terminal block for easy accessibility and installation.



Outline Dimensions (inches)



Size	A	B
	inches	inches
1 cell	11.69	12.68
2 cell	15.69	16.68
3 cell	19.69	20.68
4 cell	24.69	25.68

A.M.P.

30 KVAR maximum at 240 volts
60 KVAR maximum at 480 volts
60 KVAR maximum as 600 volts

Design

A.M.P. units incorporate the most advanced design technology available for metallized polypropylene capacitors. Losses due to heat are as low as 0.25 watts per KVAR. Volumetric efficiency is also improved allowing for smaller sized capacitors which reduces shipping weight. Extensive field use has proven A.M.P. capacitors will withstand today's electrical environment with a (continuous duty) life expectancy of twenty years.

Features

Capacitor Life

Incorporating a well proven compact enclosure with the latest design parameters of metallized polypropylene capacitors ensures a long service life. This is an industrial design, rated for the 20 year continuous duty life criteria customers expect from Ultravar.

A.M.P. Capacitor Assemblies

Volts	KVAR	Catalog No.	Size	Approx. Weight (Lbs)
240	0.5	AMP10005D333FL	1	10.25
	1	AMP1001D333FL	1	10.25
	1.5	AMP10015D333FL	1	10.50
	2	AMP1002D333FL	1	11.00
	2.5	AMP10025D333FL	1	11.25
	3	AMP1003D333FL	1	11.50
	4	AMP1004D333FL	1	12.75
	5	AMP1005D333FL	1	13.50
	6	AMP1006D333FL	1	15.00
	7.5	AMP10075D333FL	1	16.50
	10	AMP2010D333FL	2	21.00
	12.5	AMP20125D333FL	2	23.50
	15	AMP2015D333FL	2	28.50
	17.5	AMP30175D333FL	3	34.25
	20	AMP3020D333FL	3	37.00
	22.5	AMP30225D333FL	3	41.75
25	AMP4025D333FL	4	43.50	
27.5	AMP40275D333FL	4	45.00	
30	AMP4030D333FL	4	47.00	

- Notes: (1) For no lights, remove suffix L, i.e. **AMP1003F333F**
 (2) For no fuses replace suffix 3FL with NF, i.e. **AMP1003F33NF**.
 (3) For 208 volt application, use 240 volt capacitors. Multiply the 240 volt KVAR rating by 0.75 to obtain the 208 volt rating.

A.M.P. Capacitor Assemblies

Volts	KVAR	Catalog No.	Size	Approx. Weight (Lbs)
480	0.5	AMP10005F333FL	1	10.25
	1	AMP1001F333FL	1	10.75
	1.5	AMP10015F333FL	1	10.75
	2	AMP1002F333FL	1	10.75
	2.5	AMP10025F333FL	1	11.25
	3	AMP1003F333FL	1	11.25
	4	AMP1004F333FL	1	12.00
	5	AMP1005F333FL	1	12.75
	6	AMP1006F333FL	1	13.25
	7.5	AMP10075F333FL	1	14.50
	10	AMP1010F333FL	1	15.75
	12.5	AMP10125F333FL	1	17.00
	15	AMP1015F333FL	1	18.00
	17.5	AMP20175F333FL	2	22.00
	20	AMP2020F333FL	2	24.00
	22.5	AMP20225F333FL	2	25.50
	25	AMP2025F333FL	2	27.00
	27.5	AMP20275F333FL	2	28.25
	30	AMP2030F333FL	2	29.00
	32.5	AMP30325F333FL	3	33.75
	35	AMP3035F333FL	3	35.50
	37.5	AMP30375F333FL	3	37.00
	40	AMP3040F333FL	3	39.00
	45	AMP3045F333FL	3	40.50
50	AMP4050F333FL	4	47.00	
55	AMP4055F333FL	4	49.75	
60	AMP4060F333FL	4	51.25	
600	1.5	AMP10015H333FL	1	10.75
	2	AMP1002H333FL	1	10.75
	2.5	AMP10025H333FL	1	11.25
	3	AMP1003H333FL	1	11.25
	4	AMP1004H333FL	1	12.00
	5	AMP1005H333FL	1	12.75
	6	AMP1006H333FL	1	13.25
	7.5	AMP10075H333FL	1	14.50
	10	AMP1010H333FL	1	15.75
	12.5	AMP10125H333FL	1	17.00
	15	AMP1015H333FL	1	18.00
	17.5	AMP20175H333FL	2	22.00
	20	AMP2020H333FL	2	24.00
	22.5	AMP20225H333FL	2	25.00
	25	AMP2025H333FL	2	27.00
	27.5	AMP20275H333FL	2	28.50
	30	AMP2030H333FL	2	29.00
	32.5	AMP30325H333FL	3	33.75
	35	AMP3035H333FL	3	35.50
	37.5	AMP30375H333FL	3	37.00
	40	AMP3040H333FL	3	39.00
	45	AMP3045H333FL	3	40.50
	50	AMP4050H333FL	4	47.00
	55	AMP4055H333FL	4	49.75
60	AMP4060H333FL	4	51.25	



MVA

25 KVAR maximum at 240 volts
 60 KVAR maximum at 480 volts
 60 KVAR maximum at 600 volts

Design

MVA capacitors are designed for restricted space applications. Housed in a single enclosure, the assemblies can be configured to provide power factor correction independently for two to four, three phase motors. The single enclosure assembly requires less space than separate capacitor equipment.

NOTE: all capacitor cells within the enclosure must be of the same voltage rating. Equipment will always be three phase and have three fuses. Blown fuse lights are optional.

Features

Capacitor Cells

Assembly employs the use of A.M.P. capacitor cells, all with the Ultravar five year warranty and 20 year continuous duty life expectancy.

Customer Connections

UL Listed Cu/Al. Three pole fuse block provided.

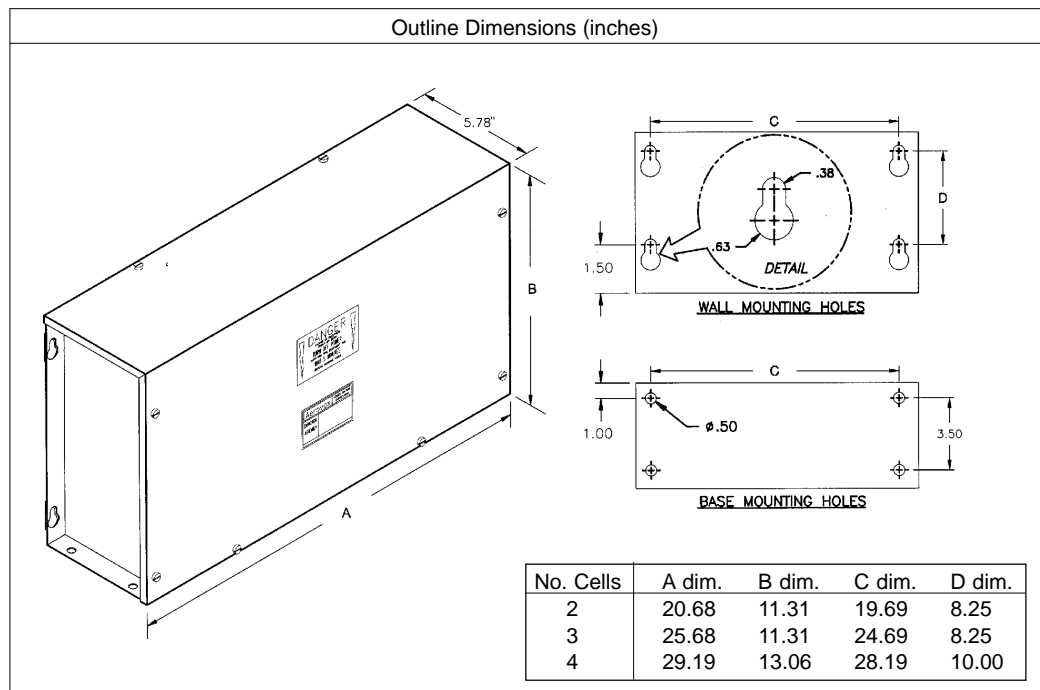
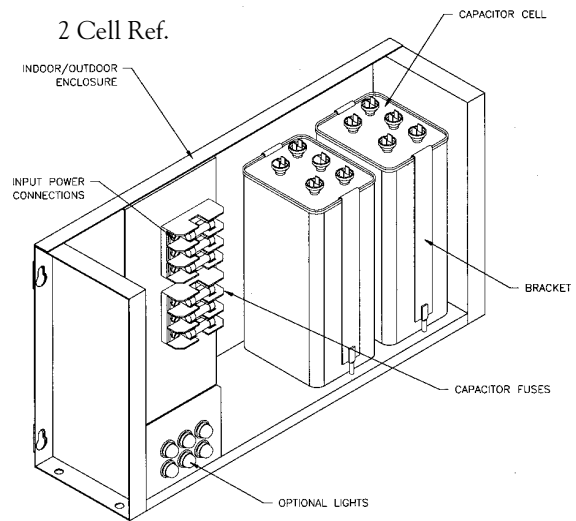
Part Numbering System for Multi-Var (MVA) Assemblies

Assign KVAR values from smallest to largest.

Example: Multi-Var assembly with 4 (A.M.P.) cells; 5 KVAR; 7.5 KVAR; 10 KVAR; 12.5 KVAR @ 480 VAC with Blown Fuse lights.

MVA	4	P	05	7N	10	12	F	L
Series Designator for Multi-Var Assembly	Number of Cells	*Letter Designator for Cell Type P=A.M.P.	KVAR 1st Cell 2 digits 05=5	KVAR 2nd Cell 2 digits 7N=7.5	KVAR 3rd Cell 2 digits 10=10	KVAR 4th Cell 2 digits 12=12.5	Voltage Code D=240 F=480 H=600	L=Lights Blank=No Lights

KVAR	Part # designation
0.5	0N
1	01
1.5	1N
2	02
2.5	2N
3	03
4	04
5	05
6	06
7	07
7.5	7N
10	10
12.5	12
13.5	13
15	15



OFG

Available Ratings: Not for harmonic applications

- 240 volt, 1-15 kVAR, 3-phase, 60 Hz
To determine kVAR at 208 volts, multiply 240 volt kVAR by .75
- 480 volt, 1-30 kVAR, 3-phase, 60 Hz
- 4-ft., 4-conductor flexible cable
- Watertight connector
- UL Recognized Pressure Sensitive Interrupter (PSI) in each cell
- Discharge resistors reduce voltage to 50 volts or less within 1 minute
- Enclosure NEMA 3

OFG assemblies feature multiple capacitor cells with metallized polypropylene film dielectric which provides instantaneous self-healing action and reduced energy losses. Safety is provided with the patented internal Pressure Sensitive Interrupter (PSI) designed to sense the buildup of pressure if a fault occurs and to interrupt the internal electrical connections before the capacitor cell can rupture. OFG cells feature time-proven Dielektrol, a biodegradable NFPA Class IIIB dielectric fluid. OFG offers high reliability and long life and is suitable for operation over a temperature range of -40°C to +46°C.

Mounting

OFG series units are designed for outdoor pole or wall mounting. Their application, however, may be extended to other motor applications installed indoor or outdoor.

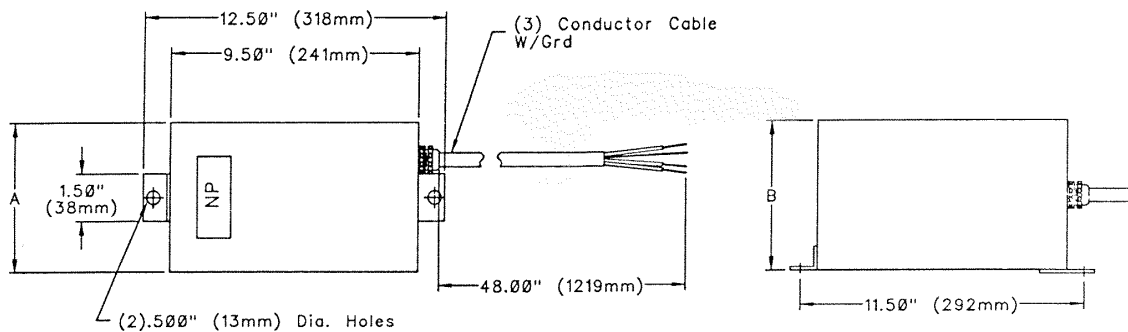
Line Connection and Cable Entrance

A 4 ft. 4-conductor flexible cable with watertight connector is provided for easy installation.



OFG

kVAR	Catalog Number	Cable Size	Dimensions (Fig. 6)				Approx. Weight	
			A		B		Lbs	Kg
			Inch	mm	Inch	mm		
240 Volt								
1	OFG10010D33NFW	12	5.90	150	3.18	81	7.5	3.4
1.5	OFG10015D33NFW	12	5.90	150	3.18	81	7.5	3.4
2	OFG10020D33NFW	12	5.90	150	3.18	81	7.5	3.4
2.5	OFG10025D33NFW	12	5.90	150	3.18	81	7.8	3.5
3	OFG10030D33NFW	12	5.90	150	3.18	81	7.8	3.5
4	OFG10040D33NFW	12	5.90	150	3.18	81	8.5	3.9
5	OFG10050D33NFW	12	5.90	150	3.18	81	8.5	3.9
6	OFG20060D33NFW	8	5.94	151	5.54	141	10.2	4.6
7.5	OFG20075D33NFW	8	5.94	151	5.54	141	11.7	5.3
10	OFG20100D33NFW	8	5.94	151	5.54	141	11.7	5.3
12.5	OFG20125D33NFW	8	5.94	151	8.15	207	14.9	6.8
15	OFG20150D33NFW	8	5.94	151	8.15	207	14.9	6.8
480 Volt								
1	OFG10010F33NFW	12	5.90	150	3.18	81	7.5	3.4
1.5	OFG10015F33NFW	12	5.90	150	3.18	81	7.5	3.4
2	OFG10020F33NFW	12	5.90	150	3.18	81	7.5	3.4
2.5	OFG10025F33NFW	12	5.90	150	3.18	81	7.5	3.4
3	OFG10030F33NFW	12	5.90	150	3.18	81	7.5	3.4
4	OFG10040F33NFW	12	5.90	150	3.18	81	7.5	3.4
5	OFG10050F33NFW	12	5.90	150	3.18	81	7.5	3.4
6	OFG10060F33NFW	12	5.90	150	3.18	81	7.8	3.5
7.5	OFG10075F33NFW	12	5.90	150	3.18	81	8.5	3.9
10	OFG10100F33NFW	12	5.90	150	3.18	81	8.5	3.9
12.5	OFG10125F33NFW	12	5.90	150	3.18	81	8.5	3.9
15	OFG20150F33NFW	8	5.94	151	5.54	141	11.7	5.3
17.5	OFG20175F33NFW	8	5.94	151	5.54	141	11.7	5.3
20	OFG20200F33NFW	8	5.94	151	5.54	141	11.7	5.3
22.5	OFG20225F33NFW	8	5.94	151	5.54	141	11.7	5.3
25	OFG20250F33NFW	8	5.94	151	5.54	141	11.7	5.3
27.5	OFG30275F33NFW	8	5.94	151	8.15	207	14.9	6.8
30	OFG30300F33NFW	8	5.94	151	8.15	207	14.9	6.8



ICS

180 KVAR maximum at 240 volts
600 KVAR maximum at 480 and 600 volts

Design

ICS heavy duty power factor correction assemblies are industrial rated, metallized electrode, rack mounted (industry standard 13.5" wide) premium grade capacitors. As an option they are available with a true-loss-of-KVAR feature; consult the factory for details concerning this feature.

Discharge Resistors

Each capacitor cell incorporates discharge resistors designed to reduce capacitor voltage to 50 volts or less within one minute after removal from an energized circuit, per NEC, NEMA, IEEE, UL, and CSA.

Features

Capacitor Life

Each ICS assembly provides sufficient air space between the MMP style capacitor(s) to allow convection cooling of the cells. This reduces heat transfer and enhances capacitor life. MMP capacitors have a field proven 20 year continuous duty life expectancy.

Capacitor Unit

The ICS single cell enclosure is 18 gauge jig-welded steel. Each assembly is painted with a UL listed ANSI #70 light gray corrosion-resistant paint for indoor or outdoor placement. Each capacitor cell is hermetically sealed. Each capacitor multi-cell assembly is supported by a jig welded, heavy steel angle frame with a grounding lug attached. It is suitable for indoor and outdoor use, either floor, ceiling or wall mounted.

Indicating Lights (Optional)

Blown fuse or "Loss-of-KVAR" neon indicating lights are an available option. A glowing light indicates blown fuse or loss-of-KVAR.

Fuses

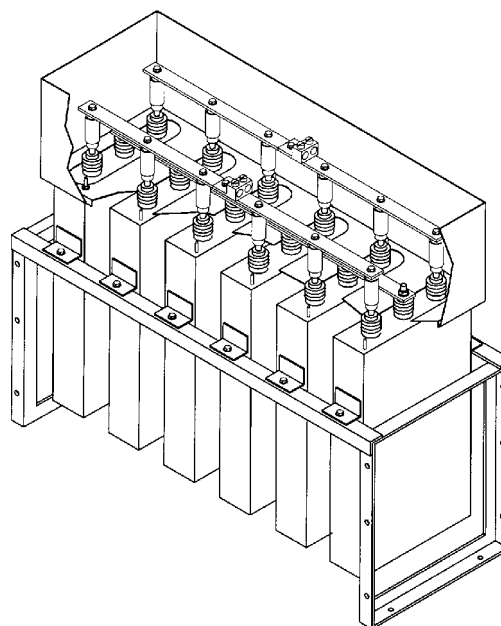
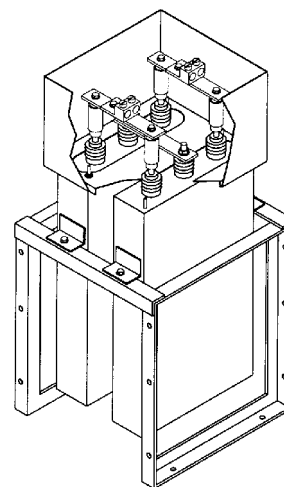
Each capacitor assembly has three indicating type 600 volt fuses with an interrupting capacity of 200,000 amps. UL and CSA listed assemblies are also available with no fuses.

Environmental Parameters

Operating temperatures between -40°C and $+46^{\circ}\text{C}$ (-40°F to $+115^{\circ}\text{F}$) are permissible. Operation at temperatures above $+46^{\circ}\text{C}$ will shorten capacitor life.

Bus Bar

Solid aluminum bus bars with electroplated aluminum connectors are provided for both internal and external interconnections. Phase connections on individual units incorporate an integral solderless connector on each fuse or terminal. Multiple units include properly sized electro-plated aluminum connectors securely bolted to the bus bar.



ICS

180 KVAR maximum at 240 volts
600 KVAR maximum at 480 and 600 volts

ICS Indoor/Outdoor Gasketed Single Unit Capacitor Assemblies

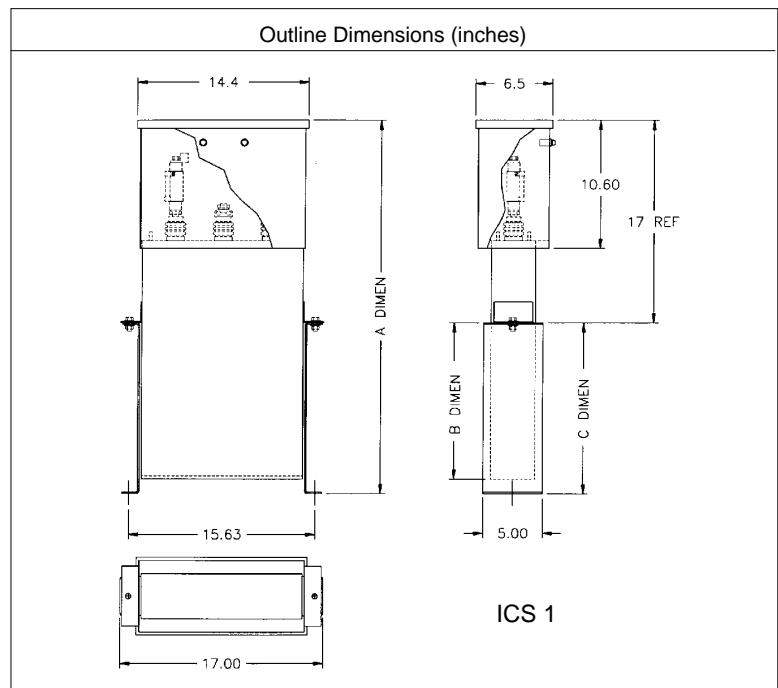
Volts	KVAR	Catalog No.	Approx. Weight (Lbs)	Dimensions (in)		
				A	B	C
240	5	ICS1005D333F	28	17.0	**	**
	10	ICS1010D333F	33	24.6	0.63	7.63
	15	ICS1015D333F	38	24.6	2.63	7.63
	20	ICS1020D333F	43	24.6	4.63	7.63
	25	ICS1025D333F	48	24.6	6.63	7.62
	30	ICS1030D333F	54	29.0	8.63	12.00
480	5	ICS1005F333F	25	17.0	**	**
	10	ICS1010F333F	28	17.0	**	**
	15	ICS1015F333F	30	17.0	*	*
	20	ICS1020F333F	33	24.6	0.63	7.63
	25	ICS1025F333F	35	24.6	1.63	7.63
	30	ICS1030F333F	38	24.6	2.63	7.63
	35	ICS1035F333F	40	24.6	4.63	7.63
	40	ICS1040F333F	43	24.6	4.63	7.63
	45	ICS1045F333F	45	24.6	6.63	7.63
	50	ICS1050F333F	48	24.6	6.63	7.63
	60	ICS1060F333F	54	29.0	8.63	12.00
	75	ICS1075F333F	61	29.0	11.63	12.00
	80	ICS1080F333F	67	37.5	12.63	20.50
	90	ICS1090F333F	70	37.5	13.13	20.50
100	ICS1100F333F	76	37.5	17.13	20.50	
600	10	ICS1010H333F	28	17.0	**	**
	15	ICS1015H333F	30	17.0	*	*
	20	ICS1020H333F	33	24.6	0.63	7.63
	25	ICS1025H333F	35	24.6	1.63	7.63
	30	ICS1030H333F	38	24.6	2.63	7.63
	35	ICS1035H333F	40	24.6	4.63	7.63
	40	ICS1040H333F	43	24.6	4.63	7.63
	45	ICS1045H333F	48	24.6	4.63	7.63
	50	ICS1050H333F	54	24.6	6.63	7.63
	60	ICS1060H333F	61	29.0	8.63	12.00
75	ICS1075H333F	67	29.0	11.63	12.00	
100	ICS1100H333F	76	37.5	17.13	20.50	

* No optional floor bracket required.
Capacitor bracket extends 0.38" below case.

** No optional floor bracket required.
Capacitor bracket extends 1.38" below case.

Note: Consult factory for single phase units.

- Notes: (1) For Loss-of-KVAR option, add suffix L to the catalog number, i.e. **ICS11003F333FL**
 (2) For no fuses replace suffix 3F with NF, i.e. **ICS11003F33NF**
 (3) For 208 volt application, use 240 volt capacitors. Multiply the 240 volt KVAR rating by 0.75 to obtain the 208 volt rating.

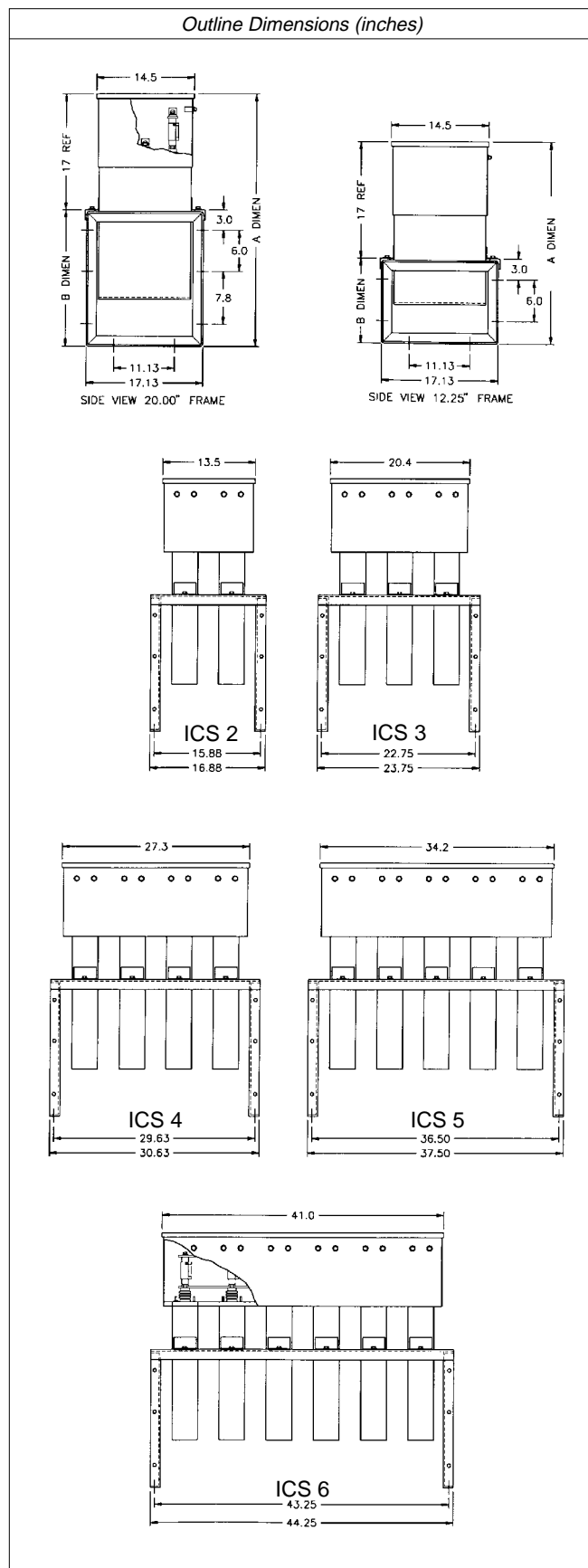


ICS

180 KVAR maximum at 240 volts
600 KVAR maximum at 480 and 600 volts

ICS Indoor/Outdoor Gasketed Multiple Unit Capacitor Assemblies

Volts	KVAR	Catalog No.	Approx. Weight (Lbs)	Dimensions (in)		
				A	B	
240	35	ICS2035D333F	117	29.3	12.25	
	40	ICS2040D333F	122	29.3	12.25	
	45	ICS2045D333F	127	29.3	12.25	
	50	ICS2050D333F	133	29.3	12.25	
	60	ICS2060D333F	143	29.3	12.25	
	75	ICS3075D333F	181	29.3	12.25	
	80	ICS3080D333F	186	29.3	12.25	
	90	ICS3090D333F	197	29.3	12.25	
	100	ICS4100D333F	229	29.3	12.25	
	120	ICS4120D333F	250	29.3	12.25	
	125	ICS5125D333F	278	29.3	12.25	
	150	ICS5150D333F	304	29.3	12.25	
	180	ICS6180D333F	357	29.3	12.25	
	480	120	ICS2120F333F	143	29.3	12.25
		125	ICS2125F333F	146	29.3	12.25
150		ICS2150F333F	158	29.3	12.25	
175		ICS2175F333F	173	37.0	20.00	
200		ICS2200F333F	187	37.0	20.00	
225		ICS3225F333F	220	29.3	12.25	
250		ICS3250F333F	234	37.0	20.00	
275		ICS3275F333F	248	37.0	20.00	
300		ICS3300F333F	263	37.0	20.00	
325		ICS4325F333F	298	37.0	20.00	
350		ICS4350F333F	309	37.0	20.00	
375		ICS4375F333F	324	37.0	20.00	
400		ICS4400F333F	338	37.0	20.00	
425		ICS5425F333F	373	37.0	20.00	
450		ICS5450F333F	385	37.0	20.00	
475		ICS5475F333F	399	37.0	20.00	
500		ICS5500F333F	414	37.0	20.00	
600		ICS6525F333F	449	37.0	20.00	
600	120	ICS2120H333F	143	29.3	12.25	
	125	ICS2125H333F	146	29.3	12.25	
	150	ICS2150H333F	158	29.3	12.25	
	175	ICS2175H333F	173	37.0	20.00	
	200	ICS2200H333F	187	37.0	20.00	
	225	ICS3225H333F	220	29.3	12.25	
	250	ICS3250H333F	234	37.0	20.00	
	275	ICS3275H333F	248	37.0	20.00	
	300	ICS3300H333F	263	37.0	20.00	
	325	ICS4325H333F	298	37.0	20.00	
	350	ICS4350H333F	309	37.0	20.00	
	375	ICS4375H333F	324	37.0	20.00	
	400	ICS4400H333F	338	37.0	20.00	
	425	ICS5425H333F	373	37.0	20.00	
	450	ICS5450H333F	385	37.0	20.00	
	475	ICS5475H333F	399	37.0	20.00	
	500	ICS5500H333F	414	37.0	20.00	
	525	ICS6525H333F	449	37.0	20.00	
550	ICS6550H333F	460	37.0	20.00		
575	ICS6575H333F	475	37.0	20.00		
600	ICS6600H333F	489	37.0	20.00		



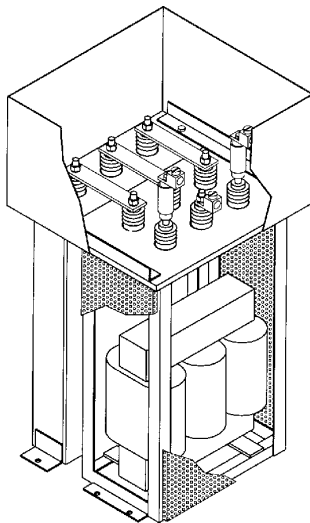
HSICS

Fixed Power Factor Correction Capacitor System Tuned for Harmonic Suppression

Application

The proliferation of electronic equipment used to improve efficiencies and provide more reliable performance causes harmonics on power systems. Equipment such as variable speed AC and DC drives, uninterruptible power supplies, switch mode power supplies and other solid state controls or devices inject non linear components into what was a linear system. The application of power factor correction capacitor systems can create unwanted increases in harmonic voltage and current unless the capacitors are properly applied with reactors, in series with the capacitor, to suppress harmful harmonics.

Ultravar's line of fixed, harmonically suppressed capacitors permits the installation of power factor correction capacitors on systems with non-linear components. The HSICS system can be tuned to any desired frequency but is normally tuned for the fifth harmonic.



Ref. View

50 KVAR maximum at 240 volts
200 KVAR maximum at 480 and 600 volts

Design

The installation of this system is application specific. Contact your local, trained representative or Ultravar's Application Engineering Department to ensure the proper combination of capacitors and reactors are used. Misapplication may result without proper guidance.

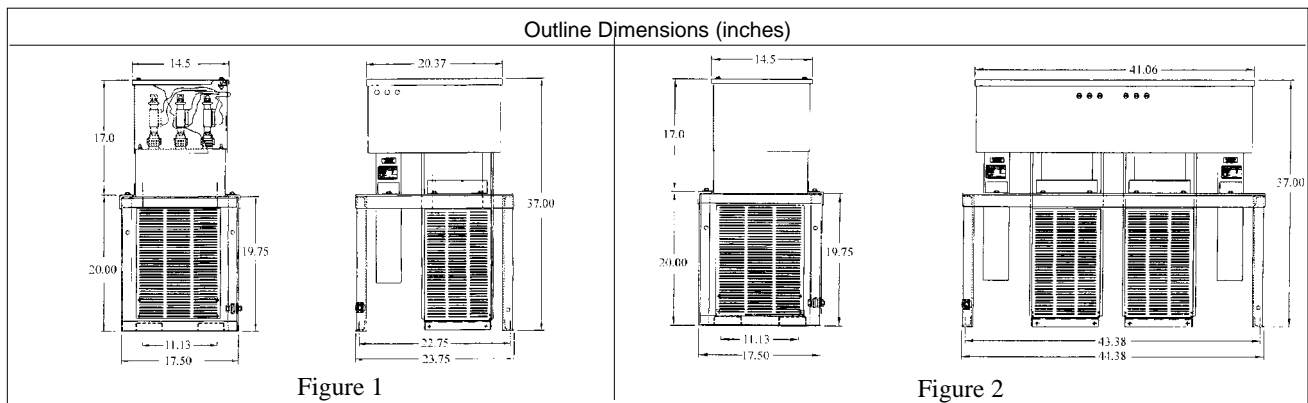
Typical assemblies are presented below. Consult factory for other application specific assemblies.

HSICS - Harmonic Suppression Capacitor Assemblies

Volts	KVAR	Catalog No.	Figure	Estimated Dimension	
				Weight (Lbs)	A (in)
240	30	HSICS1030D333F	1	148	28.63
	35	HSICS2035D333F	2	185	28.63
	40	HSICS2040D333F	2	198	28.63
	45	HSICS2045D333F	2	214	28.63
	50	HSICS2050D333F	2	224	28.63
480	25	HSICS1025F333F	1	138	28.63
	30	HSICS1030F333F	1	169	28.63
	40	HSICS1040F333F	1	175	28.63
	50	HSICS1050F333F	1	181	28.63
	75	HSICS1075F333F	1	214	28.63
	80	HSICS1080F333F	1	218	28.63
	100	HSICS1100F333F	1	264	34.13
	120	HSICS2120F333F	2	334	28.63
	125	HSICS2125F333F	2	335	28.63
	140	HSICS2140F333F	2	352	28.63
	150	HSICS2150F333F	2	366	28.63
600	175	HSICS2175F333F	2	418	34.13
	200	HSICS2200F333F	2	465	34.13
	25	HSICS1025H333F	1	138	28.63
	30	HSICS1030H333F	1	169	28.63
	40	HSICS1040H333F	1	174	28.63
	50	HSICS1050H333F	1	178	28.63
	75	HSICS1075H333F	1	206	28.63
	80	HSICS1080H333F	1	216	28.63
	100	HSICS1100H333F	1	256	34.13
	120	HSICS2120H333F	2	334	28.63
	125	HSICS2125H333F	2	335	28.63
140	HSICS2140H333F	2	352	28.63	
150	HSICS2150H333F	2	366	28.63	
175	HSICS2175H333F	2	418	34.13	
200	HSICS2200H333F	2	451	34.13	

Note: Consult factory for larger KVAR values.

For blown fuse lights add suffix L, i.e. **HSICS1003F333FL**



ICC

Application

This capacitor assembly design, rated at 2400V, 4160V or 4800V, is intended for use in plants where the operation of heavy inductive loads and correction on the high voltage side of the system is the preferred method of power factor correction. It should be remembered that capacitors relieve electrical loads from their point of installation back toward the power source.

Design

The ICC assembly employs an all-film dielectric system which contributes to a small physical size and reduced watt loss. The electrodes are aluminum foil construction. All capacitor units are hermetically sealed in a stainless steel case suitable for outdoor use. Molded phenolic bushings are utilized to provide maximum protection against flash over and breakage hazards. The bushing terminals are 0.500-13 thread, plated copper. 75 and 95 kVBIL bushings are also available for outdoor, exposed applications. The three phase units are internally delta connected and only require two current limiting fuses for protection. A third fuse can also be added as an option. Ultravar recommends the use of three fuses for the most complete protection against terminal-to-terminal and terminal-to-ground failures on grounded systems. Two fuses are sufficient to provide protection against terminal-to-terminal failures on ungrounded systems. Each fuse incorporates a blown fuse indicator and has an interrupting capacity of 50,000 symmetrical amps. Ultravar also offers blown fuse lights on these capacitors as an option; consult factory for specific information. ICC capacitors are designed to operate in an ambient temperature range from -40°C to +45°C. All capacitors perform best in a location that allows convection cooling. Excess heat can reduce operational life of the capacitor.

**25-900 KVAR maximum at 2400, 4160, and 4800 volts
3 Phase, 60 Hz**

Features

Bus Bar

1/4" x 1 1/2" aluminum bus provides connections between capacitors. Copper bus is available as an option; consult factory.

Phase Connectors

Plated solderless connectors provide customer service connections.

Indicating Fuses

Each capacitor assembly has two 50,000 symmetrical amps-interrupting, current-limiting fuses. The fuses incorporate a spring-loaded indicating pin which projects from the top portion of the fuses after fuse operation.

Blown Fuse Lights

This unique Ultravar innovation provides a positive indication of an operating fuse. A glowing neon light makes inspection of capacitors easy, effective and safe. 120 VAC must be supplied from an external source.

Hermetically Sealed Terminal Bushings

The bushings are molded phenolic utilizing a gasketed seal to provide maximum protection against flashover and fluid leakage.

Capacitor

All capacitor seams are heli-arc welded and pressure tested to assure a strong and consistent seal. All capacitors contain less than 3 gallons of dielectric fluid. The epoxy/urethane ANSI #70 gray finish is suitable for indoor and outdoor installations.

Terminal Enclosure

Constructed of .062 thick steel, the cover is tightly secured with bolts to the enclosure and sealed with rubber gaskets thus assuring a dustproof and weatherproof seal.

Frame

Multiple capacitor assemblies are supported by a structured aluminum support rack suitable for floor mounting.

Ground Connector

A convenient ground connector is provided as a standard feature.

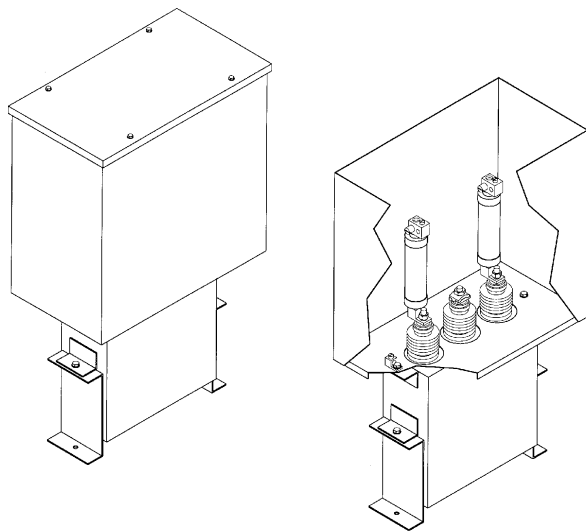
ICC

25 to 900 KVAR maximum at 2400, 4160, and 4800 volts
3 Phase, 60 Hz

Single Unit Assembly

A single unit consists of:

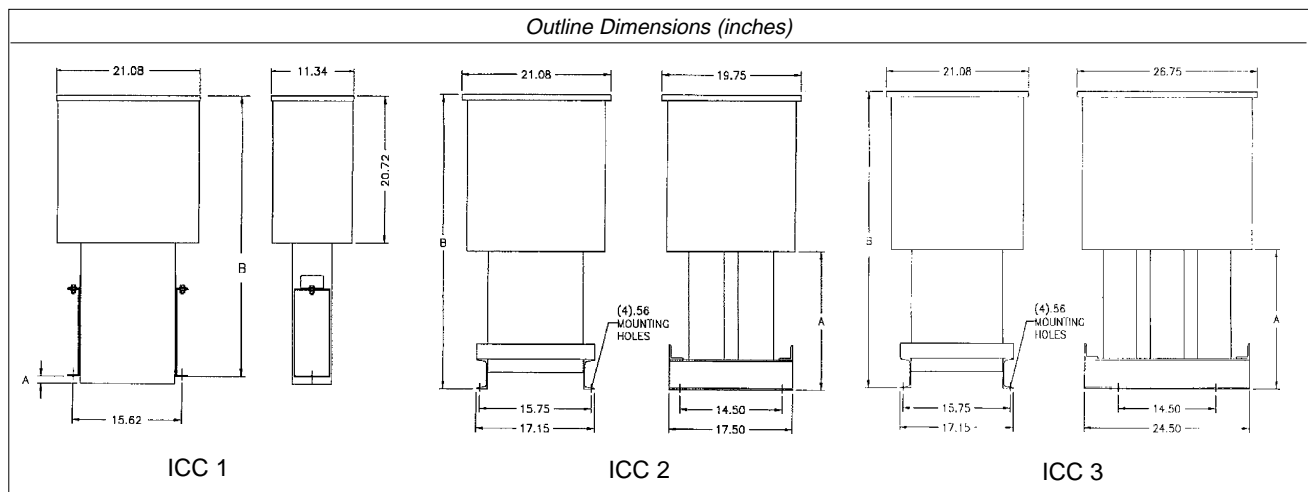
1. Individual capacitor, with each containing less than three (3) gallons of oil.
2. Internal discharge resistors which reduce residual voltage to 50 volts within five minutes after removal from service.
3. Enclosure for indoor dustproof / outdoor weather proof applications.
4. Individual current fuses. (Indicating type with 50,000 ampere interrupting capacity.)
5. Solderless connectors for phase connections.
6. Floor mounting brackets.
7. Blown fuse lights optional.
8. Consult factory for single phase units.



ICC Single Unit Indoor/Outdoor Capacitor Assemblies

	kVAR	Catalog Number	A (in.)	B (in.)	Wt. (lbs.)
2400 volts	25	ICC1025J33	-	27.68	64
	50	ICC1050J33	-	27.68	64
	75	ICC1075J33	-	27.68	64
	100	ICC1100J33	-	29.44	69
	125	ICC1125J33	0.75	30.18	76
	150	ICC1150J33	0.50	32.68	81
	175	ICC1175J33	0.17	33.35	86
	200	ICC1200J33	0.17	33.35	92
	225	ICC1225J33	0.88	36.06	103
	250	ICC1250J33	0.88	36.06	103
4160 volts	275	ICC1275J33	0.12	39.06	114
	300	-	-	-	-
	25	ICC1025L33	-	27.68	64
	50	ICC1050L33	-	27.68	64
	75	ICC1075L33	-	27.68	64
	100	ICC1100L33	-	29.44	69
	125	ICC1125L33	0.75	30.18	76
	150	ICC1150L33	0.50	32.68	81
	175	ICC1175L33	0.17	33.35	86
	200	ICC1200L33	0.17	33.35	92
4800 volts	225	ICC1225L33	0.88	36.06	103
	250	ICC1250L33	0.88	36.06	103
	275	ICC1275L33	0.12	39.06	114
	300	ICC1300L33	0.12	39.06	114
	25	ICC1025M33	-	27.68	64
	50	ICC1050M33	-	27.68	64
	75	ICC1075M33	-	27.68	64
	100	ICC1100M33	-	29.44	69
	125	ICC1125M33	0.75	30.18	76
	150	ICC1150M33	0.50	32.68	81
4800 volts	175	ICC1175M33	0.17	33.35	86
	200	ICC1200M33	0.17	33.35	92
	225	ICC1225M33	0.88	36.06	103
	250	ICC1250M33	0.88	36.06	103
	275	ICC1275M33	0.12	39.06	114
	300	ICC1300M33	0.12	39.06	114

Note: Add Suffix 3F for 3rd Fuse.
Add Suffix L for Blown Fuse Lights.



ICC

900 KVAR maximum at 2400, 4160, and 4800 volts
3 Phase, 60 Hz

Multiple Unit Assembly

An assembly consists of:

1. Individual capacitor cells.
2. Resistors and fuses.
3. Enclosure suitable for indoor dustproof / outdoor weatherproof.
4. Solid aluminum bus arrangement with solderless connectors for phase connections.
5. Frame which may be floor mounted.
6. Blown fuse lights optional.

ICC Two Unit Indoor/Outdoor Capacitor Assemblies

	kVAR	Catalog Number	A (in.)	B (in.)	Wt. (lbs.)
2400 volts	300	ICC2300J33	12.70	33.43	149
	325	ICC2325J33	12.70	33.43	154
	350	ICC2350J33	18.45	39.18	159
	375	ICC2375J33	18.45	39.18	165
	400	ICC2400J33	18.45	39.18	171
	425	ICC2425J33	18.45	39.18	181
	450	ICC2450J33	18.45	39.18	192
	475	ICC2475J33	18.45	39.18	192
	500	ICC2500J33	18.45	39.18	192
	525	ICC2525J33	18.45	39.18	203
550	ICC2550J33	18.45	39.18	214	
4160 volts	325	ICC2325L33	12.70	33.43	154
	350	ICC2350L33	12.70	33.43	159
	375	ICC2375L33	18.45	39.18	165
	400	ICC2400L33	18.45	39.18	171
	425	ICC2425L33	18.45	39.18	181
	450	ICC2450L33	18.45	39.18	192
	475	ICC2475L33	18.45	39.18	192
	500	ICC2500L33	18.45	39.18	192
	525	ICC2525L33	18.45	39.18	203
	550	ICC2550L33	18.45	39.18	214
4800 volts	325	ICC2325M33	12.70	33.43	154
	350	ICC2350M33	12.70	33.43	159
	375	ICC2375M33	18.45	39.18	165
	400	ICC2400M33	18.45	39.18	171
	425	ICC2425M33	18.45	39.18	181
	450	ICC2450M33	18.45	39.18	192
	475	ICC2475M33	18.45	39.18	192
	500	ICC2500M33	18.45	39.18	192
	525	ICC2525M33	18.45	39.18	203
	550	ICC2550M33	18.45	39.18	214
575	ICC2575M33	18.45	39.18	214	
600	ICC2600M33	18.45	39.18	214	

ICC Three Unit Indoor / Outdoor Capacitor Assemblies

	kVAR	Catalog Number	A (in.)	B (in.)	Wt. (lbs.)	
2400 volts	575	ICC3575J33	12.70	33.43	248	
	600	ICC3600J33	12.70	33.43	254	
	625	ICC3625J33	18.45	39.18	265	
	650	ICC3650J33	18.45	39.18	276	
	675	ICC3675J33	18.45	39.18	287	
	700	ICC3700J33	18.45	39.18	298	
	725	ICC3725J33	18.45	39.18	298	
	750	ICC3750J33	18.45	39.18	298	
	775	ICC3775J33	18.45	39.18	309	
	800	ICC3800J33	18.45	39.18	320	
	825	ICC3825J33	18.45	39.18	331	
	4160 volts	625	ICC3625L33	18.45	39.18	265
		650	ICC3650L33	18.45	39.18	276
675		ICC3675L33	18.45	39.18	287	
700		ICC3700L33	18.45	39.18	298	
725		ICC3725L33	18.45	39.18	298	
750		ICC3750L33	18.45	39.18	298	
775		ICC3775L33	18.45	39.18	309	
800		ICC3800L33	18.45	39.18	320	
825		ICC3825L33	18.45	39.18	331	
850		ICC3850L33	18.45	39.18	331	
875		ICC3875L33	18.45	39.18	331	
900		ICC3900L33	18.45	39.18	331	
4800 volts		625	ICC3625M33	18.45	39.18	265
	650	ICC3650M33	18.45	39.18	276	
	675	ICC3675M33	18.45	39.18	287	
	700	ICC3700M33	18.45	39.18	298	
	725	ICC3725M33	18.45	39.18	298	
	750	ICC3750M33	18.45	39.18	298	
	775	ICC3775M33	18.45	39.18	309	
	800	ICC3800M33	18.45	39.18	320	
	825	ICC3825M33	18.45	39.18	331	
	850	ICC3850M33	18.45	39.18	331	
	875	ICC3875M33	18.45	39.18	331	
	900	ICC3900M33	18.45	39.18	331	

Note: Add Suffix 3F for 3rd Fuse.

Add suffix L for Blown Fuse Lights.

Special Service Capacitors

300 KVAR maximum at 1040 and 1200 volts

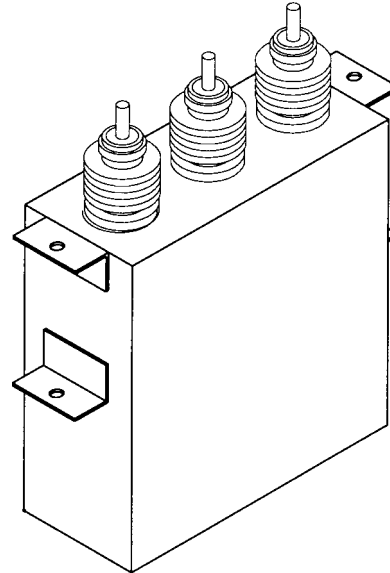
Application

This style capacitor cell is designed for specific applications, primarily in the mining industry.

Design

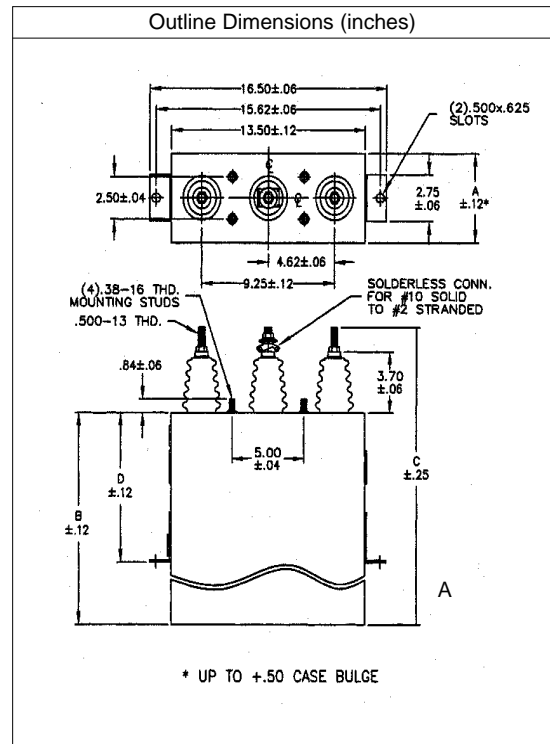
The design is based on the well proven polypropylene dielectric design. The robust nature of the design allows use under stress, without sacrifice of longevity. The design is based on a twenty-year life expectancy.

The following is a list of "standard" part numbers; these are for bare cells only. Contact the factory for details and prices, and if it is necessary to employ a cover and fuses, or for other kVAR values.



1040 VOLTS						
KVAR	CAT. NO.	A	B	C	D	WT
		(IN.)	(IN.)	(IN.)	(IN.)	(LBS)
60	16L0223WH3	4	9.25	14.45	9.25	30
75	16L0224WH3	4.38	10	15.2	9.25	38
100	16L0218WH3	4.88	13.18	18.38	9.25	51
150	16L0203WH3	5.12	15.88	21.08	15	61
200	16L0204WH3	5.12	24	29.2	15	100
300	16L0201WH3	5.88	26.25	31.45	15	120

1200 VOLTS						
KVAR	CAT. NO.	A	B	C	D	WT
		(IN.)	(IN.)	(IN.)	(IN.)	(LBS)
25	16L0172WH3	4	7.5	12.7	7.5	24
50	16L0173WH3	4	9.25	14.45	9.25	30
60	16L0225WH3	4	9.25	14.45	9.25	30
75	16L0177WH3	4.38	10	15.2	9.25	35
90	16L0226WH3	4	12.5	17.7	9.25	42
100	16L0174WH3	4.38	13.18	18.38	9.25	47
125	16L0178WH3	5.12	13.18	18.38	9.25	51
150	16L0205WH3	5.12	15.88	21.08	15	61
200	16L0216WH3	5.12	18.88	24.08	15	73
250	16L0175WS3	5.12	24	29.2	15	100
300	16L0202WS3	5.5	26.25	31.45	15	117



Capacitor Cell Dimensions: A.M.P.

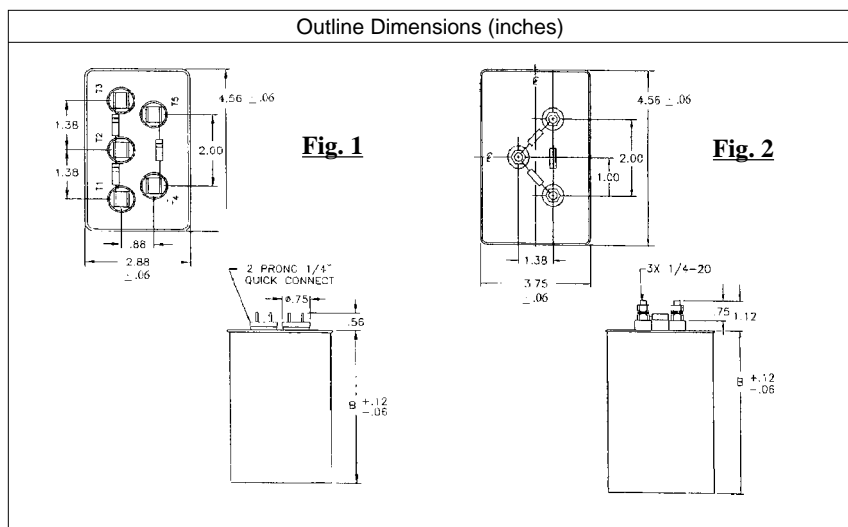
Volts	Catalog No.	Dimensions (in)			
		KVAR	A	B	C
240	AMP00005D35	.5	2.88	3.03	.880
	AMP0001D35	1	2.88	3.03	.880
	AMP00015D35	1.5	2.88	3.50	.880
	AMP0002D35	2	2.88	4.00	.880
	AMP00025D35	2.5	2.88	4.50	.880
	AMP0003D35	3	2.88	5.00	.880
	AMP0004D35	4	2.88	5.25	.880
	AMP0005D35	5	2.88	6.00	.880
	AMP0006D35	6	2.88	6.72	.880
	AMP00075D35	7.5	2.88	7.53	.880
AMP0010D33S	10	3.75	8.60	.880	
480	AMP00005F35	.5	2.88	3.03	.880
	AMP0001F35	1	2.88	3.03	.880
	AMP00015F35	1.5	2.88	3.03	.880
	AMP0002F35	2	2.88	3.50	.880
	AMP00025F35	2.5	2.88	4.00	.880
	AMP0003F35	3	2.88	4.00	.880
	AMP0004F35	4	2.88	4.50	.880
	AMP0005F35	5	2.88	5.00	.880
	AMP0006F35	6	2.88	5.25	.880
	AMP00075F35	7.5	2.88	6.00	.880
	AMP0010F35	10	2.88	6.72	.880
	AMP0011F35	11	2.88	7.00	.880
	AMP00125F35	12.5	2.88	7.38	.880
	AMP00135F35	13.5	2.88	7.53	.800
	AMP0015F35	15	2.88	8.12	.880
AMP0020F33S	20	3.75	7.00	.880	
AMP0025F33S	25	3.75	9.00	.880	
600	AMP0001H35	1	2.88	3.03	.880
	AMP00015H35	1.5	2.88	3.03	.880
	AMP0002H35	2	2.88	3.50	.880
	AMP00025H35	2.5	2.88	4.00	.880
	AMP0003H35	3	2.88	4.00	.880
	AMP0004H35	4	2.88	4.50	.880
	AMP0005H35	5	2.88	5.00	.880
	AMP0006H35	6	2.88	6.00	.880
	AMP00075H35	7.5	2.88	6.00	.880
	AMP0010H35	10	2.88	6.72	.880
	AMP00125H35	12.5	2.88	7.38	.880
	AMP0015H35	15	2.88	8.13	.880
	AMP0020H33S	20	3.75	7.00	.880
AMP0025H33S	25	3.75	9.00	.880	

Options

- 1/4" stud terminals (consult factory) **Fig. 2**
- Custom designs

Construction:

- Manufactured with the latest technology in low-loss metallized polypropylene film dielectric with a typical watts loss less than .2 watts per kVAR.
- Self-clearing technology
- Non-PCB, environmentally-safe biodegradable dielectric fluid.
- Three-phase internal Delta connected
- UL-recognized, pressure-activated interruptor rated 10,000 AFC
- Integral discharge resistors to reduce voltage to 50V or less in 1 min.
- Loss of kVAR standard (indicates when the internal pressure interruptor has operated at end of life, when combined with blown fuse lights) **Fig. 1**
- Temperature: -40°C to +46°C (-40°F to +115°F)
- Terminals: 1/4" male quick connect lugs **Fig. 1**
- Torque limit for 1/4" x 20 stud is 20 inch-pounds.



Capacitor Cell Dimensions: MMP

1 Phase (omit center terminal)

Volts	KVAR	Catalog No.	Height (in)	Weight (Lbs)
240	20	MMP0020D12	11.50	32.1
	25	MMP0025D12	13.50	37.3
	30	MMP0030D12	15.50	42.5
480	20	MMP0020F12	7.50	21.7
	25	MMP0025F12	8.50	24.3
	30	MMP0030F12	9.50	26.9
	35	MMP0035F12	11.50	32.1
	40	MMP0040F12	11.50	32.1
	45	MMP0045F12	13.50	37.3
	50	MMP0050F12	13.50	37.3
	60	MMP0060F12	15.50	42.5
	75	MMP0075F12	18.50	50.2
	80	MMP0080F12	19.50	53.0
600	90	MMP0090F12	20.00	54.5
	100	MMP0100F12	24.00	64.5
	20	MMP0020H12	7.50	21.7
	25	MMP0025H12	8.50	24.3
	30	MMP0030H12	9.50	26.9
	35	MMP0035H12	11.50	32.1
	40	MMP0040H12	11.50	32.1
	50	MMP0050H12	13.50	37.3
	60	MMP0060H12	15.50	42.5
	75	MMP0075H12	18.50	50.2
80	MMP0080H12	19.50	53.0	
100	MMP0100H12	24.00	64.5	

3 Phase

Volts	KVAR	Catalog No.	Height (in)	Weight (Lbs)
240	20	MMP0020D33	11.50	32.1
	25	MMP0025D33	13.50	37.3
	30	MMP0030D33	15.50	42.5
480	20	MMP0020F33	7.50	21.7
	25	MMP0025F33	8.50	24.3
	30	MMP0030F33	9.50	26.9
	35	MMP0035F33	11.50	32.1
	40	MMP0040F33	11.50	32.1
	45	MMP0045F33	13.50	37.3
	50	MMP0050F33	13.50	37.3
	60	MMP0060F33	15.50	42.5
	75	MMP0075F33	18.50	50.2
	80	MMP0080F33	19.50	53.0
600	90	MMP0090F33	20.00	54.5
	100	MMP0100F33	24.00	64.5
	20	MMP0020H33	7.50	21.7
	25	MMP0025H33	8.50	24.3
	30	MMP0030H33	9.50	26.9
	35	MMP0035H33	11.50	32.1
	40	MMP0040H33	11.50	32.1
	50	MMP0050H33	13.50	37.3
	60	MMP0060H33	15.50	42.5
	75	MMP0075H33	18.50	50.2
80	MMP0080H33	19.50	53.0	
100	MMP0100H33	24.00	64.5	

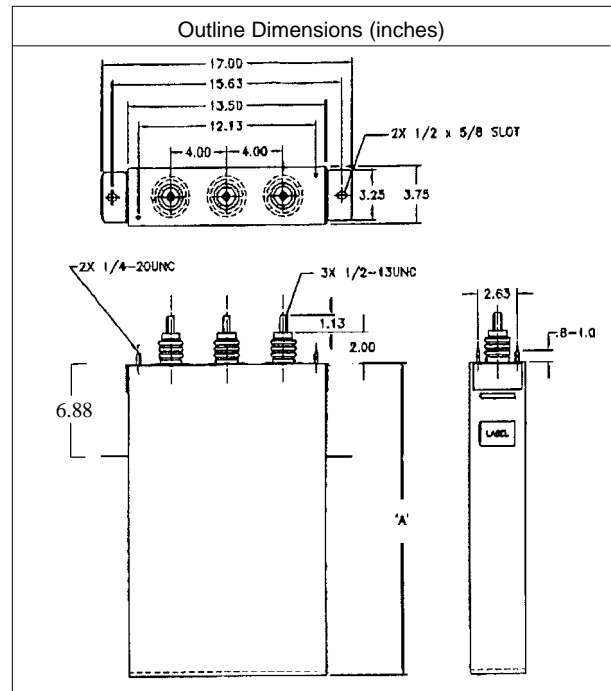
NOTE: Table part number for fixed as shown.

Options:

- Single and two-phase designs.
- Different terminal configurations for single and two-phase
- Loss of kVAR terminals

Construction:

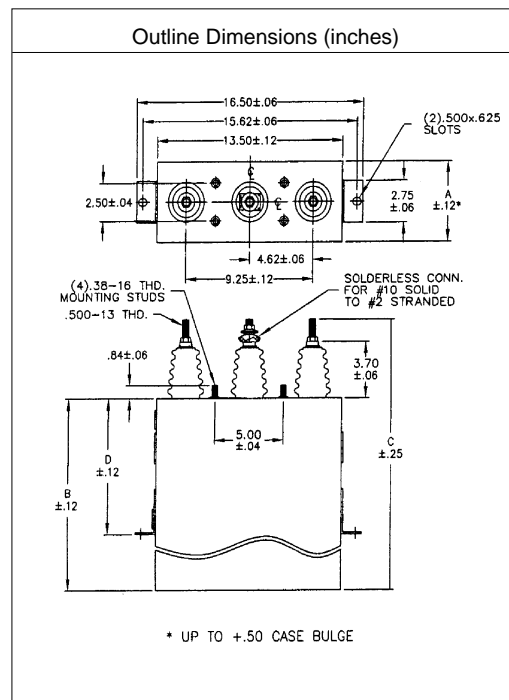
- Manufactured with the latest technology in low-loss metallized polypropylene film dielectric with a typical value of .2 watts per kVAR
- Self-clearing technology
- Non-PCB, environmentally-safe, biodegradable dielectric fluid
- Heavy-gauge, cold-rolled steel welded case for the industrial environment
- UL-recognized ANSI #70 enamel overcoat with zinc rich primer
- Integral discharge resistors to reduce voltage to 50V or less in 1 minute.
- Temperature: -40°C to +46°C (-40°F to +115°F)
- Terminals: Heavy duty 1/2-13 solid brass threaded studs for power connections, plated for corrosion resistance
- 30KV BIL (2.18" creep) fluted ceramic bushing, resilient mounted
- Torque: 1/4-20 studs to 20 inch-pounds and 1/2-13 studs to 160 inch-pounds maximum



Capacitor Cell Dimensions

3 Phase *

	KVAR	CAT. NO.	A (in.)	B (in.)	C (in.)	D (in.)	WT. (lbs.)
2400 VOLTS	25	52L301WS60	4	7.5	12.7	7.5	23
	50	51L301WS60	4	7.5	12.7	7.5	23
	75	51L304WS60	4	7.5	12.7	7.5	23
	100	54L303WS60	4	9.25	14.45	9.25	28
	125	54L306WS60	4.38	10	15.2	9.25	35
	150	54L308WS60	4	12.5	17.7	9.25	40
	175	54L317WS60	4.38	13.18	18.38	9.25	45
	200	58L302WS60	4.88	13.18	18.38	9.25	51
	225	16L0153WS3	5.12	15.88	21.08	15	61
4160 VOLTS	25	52L302WS60	4	7.5	12.7	7.5	23
	50	51L302WS60	4	7.5	12.7	7.5	23
	75	51L305WS60	4	7.5	12.7	7.5	23
	100	54L304WS60	4	9.25	14.45	9.25	28
	125	54L307WS60	4.5	10	15.2	9.25	35
	150	54L309WS60	4.25	12.5	17.7	9.25	40
	175	54L313WS60	4.5	13.18	18.38	9.25	45
	200	58L303WS60	5.12	13.18	18.38	9.25	51
	225	16L0156WS3	5.12	15.88	21.08	15	61
4800 VOLTS	25	52L303WS60	4	7.5	12.7	7.5	23
	50	51L303WS60	4	7.5	12.7	7.5	23
	75	51L306WS60	4	7.5	12.7	7.5	23
	100	54L305WS60	4	9.25	14.45	9.25	30
	125	54L310WS60	4.5	10	15.2	9.25	35
	150	54L403WS60	4	12.5	17.7	9.25	40
	175	54L311WS60	4.38	13.18	18.38	9.25	45
	200	58L424WS60	4.88	13.18	18.38	9.25	51
	225	16L0160WS3	5.12	15.88	21.08	15	61
	250	16L0161WS3	5.12	15.88	21.08	15	61
	275	16L0162WS3	5.12	18.88	24.08	15	73
	300	16L0163WS3	5.12	18.88	24.08	15	73



* NOTE: Omit center terminal for 1 Phase capacitors

Applicable standards:

NEMA standards publication CP 1-1988 (Shunt Capacitor) or latest revision.
 IEEE Standard for Shunt Power Capacitors, Std 18-1992, or latest revision.
 IEC Publication 871-1 (1987) or latest revision.

Capacitor Construction

- Capacitor case material is type ANSI 409 stainless steel suitable for outdoor service.
- Capacitor bushings utilize a gasket sealing assembly to provide a mechanical and electrical seal to the capacitor cover. The bushing terminals are 0.500-13 thread tin plated copper.
- The capacitor case is ANSI #70 grey. The paint system is a durable Epoxy/Urethane composition which meets the requirements of ANSI C57.12.31 (Pole Mounted Transformer Enclosure Coating Integrity). A portion of the bottom of the mounting bracket will be left unpainted to allow proper grounding of unit to the capacitor bank.

Internal Construction

- Capacitor units are of the "all film" design using multiple sheets of Hazy™ Polypropylene Film as the solid dielectric material.
- Each capacitor is provided with an internal discharge resistor assembly to reduce the residual voltage to 50 volts or less within 5 minutes after the capacitor is disconnected from rated voltage.
- The insulating liquid is a Non-PCB Synthetic Aromatic Hydrocarbon suitable for use in outdoor shunt capacitors and complies with all the current environmental standards.

Application Notes - Low Voltage

Suggested Maximum Capacitor Ratings for T-Frame NEMA Class B. Motors:

Applies to three-phase, 60 HZ motors when switched with capacitors as a single unit.

Induction Motor Rating (HP)	Nominal Motor Speed											
	3600 RPM		1800 RPM		1200 RPM		900 RPM		720 RPM		600 RPM	
	Capacitor Rating (kVAR)	Line Current Reduction (%)	Capacitor Rating (kVAR)	Line Current Reduction (%)	Capacitor Rating (kVAR)	Line Current Reduction (%)	Capacitor Rating (kVAR)	Line Current Reduction (%)	Capacitor Rating (kVAR)	Line Current Reduction (%)	Capacitor Rating (kVAR)	Line Current Reduction (%)
2	1	14	1	24	1.5	30	2	42	2	40	3	50
3	1.5	14	1.5	23	2	28	3	38	3	40	4	49
5	2	14	2.5	22	3	26	4	31	4	40	5	49
7.5	2.5	14	3	20	4	21	5	28	5	38	6	45
10	4	14	4	18	5	21	6	27	7.5	36	8	38
15	5	12	5	18	6	20	7.5	24	8	32	10	34
20	6	12	6	17	7.5	19	9	23	10	29	12.5	30
25	7.5	12	7.5	17	8	19	10	23	12.5	25	17.5	30
30	8	11	8	16	10	19	15	22	15	24	20	30
40	12.5	12	15	16	15	19	17.5	21	20	24	25	30
50	15	12	17.5	15	20	19	22.5	21	22.5	24	30	30
60	17.5	12	20	15	22.5	17	25	20	30	22	35	28
75	20	12	25	14	25	15	30	17	35	21	40	19
100	22.5	11	30	14	30	12	35	16	40	15	45	17
125	25	10	35	12	35	12	40	14	45	15	50	17
150	30	10	40	12	40	12	50	14	50	13	60	17
200	35	10	50	11	50	11	70	14	70	13	90	17
250	40	11	60	10	60	10	80	13	90	13	100	17
300	45	11	70	10	75	12	100	14	100	13	120	17
350	50	12	75	8	90	12	120	13	120	13	135	15
400	75	10	80	8	100	12	130	13	140	13	150	15
450	80	8	90	8	120	10	140	12	160	14	160	15
500	100	8	120	9	150	12	160	12	180	13	180	15

Use for High Efficiency motors:

Induction Motor Rating (HP)	Nominal Motor Speed and Number of Poles											
	3600 RPM 2		1800 RPM 4		1200 RPM 6		900 RPM 8		720 RPM 10		600 RPM 12	
	KVAR	% AR	KVAR	% AR	KVAR	% AR	KVAR	% AR	KVAR	% AR	KVAR	% AR
3	1.5	14	1.5	15	1.5	20	2	27	2.5	35	3	41
5	2	12	2	13	2	17	3	25	4	32	4	37
7.5	2.5	11	2.5	12	3	15	4	22	5	30	6	34
10	3	10	3	11	3	14	5	21	6	27	7.5	31
15	4	9	4	10	5	13	6	18	8	23	9	27
20	5	9	5	10	6	12	7.5	16	9	21	12.5	25
25	6	9	6	10	7.5	11	9	15	10	20	15	23
30	7	8	7	9	9	11	10	14	12.5	18	17.5	22
40	9	8	9	9	10	10	12.5	13	15	16	20	20
50	12.5	8	10	9	12.5	10	15	12	20	15	25	19
60	15	8	15	8	15	10	17.5	11	22.5	15	27.5	19
75	17.5	8	17.5	8	17.5	10	20	10	25	14	35	18
100	22.5	8	20	8	25	9	27.5	10	35	13	40	17
125	27.5	8	25	8	30	9	30	10	40	13	50	16
150	30	8	30	8	35	9	37.5	10	50	12	50	15
200	40	8	37.5	8	40	9	50	10	60	12	60	14
250	50	8	45	7	50	8	60	9	70	11	75	13
300	60	8	50	7	60	8	60	9	80	11	90	12
350	60	8	60	7	75	8	75	9	90	10	95	11
400	75	8	60	6	75	8	85	9	95	10	100	11
450	75	8	75	6	80	8	90	9	100	9	110	11
500	75	8	75	6	85	8	100	9	100	9	120	10

Application Notes - Low Voltage

Percent AR is the percent reduction in full-load line current due to capacitors. A capacitor located on the motor side of the overload relay reduces current through the relay. Therefore, a smaller relay may be necessary. The motor-overload relay should be selected on the basis of the motor full-load nameplate current reduced by the percent reduction in line current (percent AR) due to capacitors.

The capacitor size specified on page 18 for T-Frame NEMA Class B Motors will increase the full load power factor to 95% and larger sizes should not be used without consulting Ultravar.

To calculate required kvar for energy efficient motors (or any motor) use the following formula:

$$\text{KVAR} = \frac{\text{H.P.} \times .746}{\% \text{ efficiency}} \left(\sqrt{\frac{1 - \text{PF}_0^2}{\text{PF}_0^2}} - \sqrt{\frac{1 - \text{PF}_1^2}{\text{PF}_1^2}} \right)$$

PF₀ Original Power Factor (supplied by manufacturer)

PF₁ Target Power Factor

H.P. Motor Horsepower from nameplate

% efficiency Motor manufacturer nameplate

Points to Consider when Sizing Capacitors

Two limiting factors must be considered when capacitors are to be switched with a motor as a unit. The first is overvoltage due to self-excitation, and the second is transient torques.

Self excitation voltage: When a motor is disconnected from the line, it will normally rotate for a short time before coming to rest. A capacitor connected to this motor will still be supplying magnetizing current, which will excite the motor. Under these conditions, the motor and capacitor act like a generator and produce a certain voltage because of this “self-excitation.” The magnitude of the voltage that can be produced is determined by two things—the rating of the capacitor being used and the speed of the motor involved. It is not uncommon for this “self excitation” voltage to reach 150% of rated voltage if too large a capacitor is being used.

Transient torques: Perhaps even more important than overvoltage is the transient torques that can occur if the motor happens to close back into the line before coming to a complete rest. If the motor is still rotating and acting as a generator, the resulting transient torque may be as much as 20 times the full load torque. Because of transient torque and overload

considerations, most motor manufacturers provide recommendations concerning the maximum capacitor KVAR that should be switched with a given motor. These recommendations are conservative enough to avoid endangering the motor, and will ordinarily result in a corrected power factor of approximately 95–98% at full load.

To avoid nuisance blowing of fuses when capacitors are connected directly across the motor terminals:

1. Motors should not be subject to plugging or reversing duty.
2. Motors should not be operated such that rapid restarting occurs.

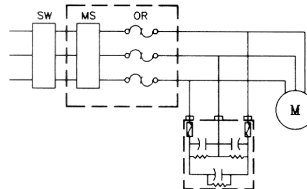


Fig. 1: For new motor installation

Capacitors are connected on motor side of thermal-overload relay. Relay should be selected with rating less than motor nameplate full-load current, commensurate with reduced line current effected by the capacitors. This reduction in line current, if not available from tables, may be determined by measuring line current with and without capacitors, or by calculation.

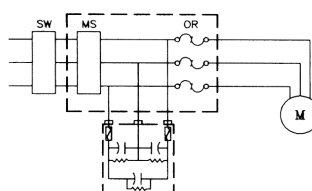


Figure 2: For existing motor installation

Capacitors are connected to line side of thermal-overload relay. In this case the overload relay does not have to be resized.

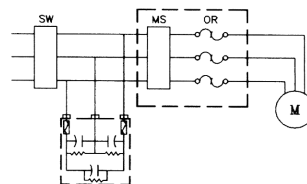


Figure 3:

Capacitors are permanently connected to line, but with protection of a fusible safety switch or circuit breaker which eliminates separate capacitor switch. To avoid nuisance blowing of the capacitor fuses, install the capacitors at this location when the motors are multiple speed, reversing, jogging, inching, or reduced voltage start.

Legend:

SW = fusible safety switch or breaker

MS = motor starter

OR = motor thermal-overload relay

M = motor

Application Notes

Suggested Wire Sizes for Capacitor Installations

The cable sizes indicated in this table are based on 135% of rated current in accordance with NEC 460.

240 Volt, 3 Phase					480 Volt, 3 Phase					600 Volt, 3 Phase				
Cap. Rating KVAR	75°C Min.Cable Sizes k	90°C Min.Cable Sizes k	Safety Switch		Cap. Rating KVAR	75°C Min.Cable Sizes k	90°C Min.Cable Sizes k	Safety Switch		Cap. Rating KVAR	75°C Min.Cable Sizes k	90°C Min.Cable Sizes k	Safety Switch	
			Rating AMPS	Fuse AMPS				Rating AMPS	Fuse AMPS				Rating AMPS	Fuse AMPS
0.5	14	14	30	3	0.5	14	14	30	1	0.5	14	14	30	1
1	14	14	30	5	1	14	14	30	3	1	14	14	30	3
2	14	14	30	10	1.5	14	14	30	3	1.5	14	14	30	3
2.5	14	14	30	10	2	14	14	30	6	2	14	14	30	3
3	14	14	30	15	2.5	14	14	30	6	2.5	14	14	30	5
4	12	12	30	20	3	14	14	30	6	3	14	14	30	5
5	12	12	30	20	4	14	14	30	10	4	14	14	30	6
6	10	10	30	25	5	14	14	30	10	5	14	14	30	10
7.5	10	10	30	30	6	14	14	30	15	6	14	14	30	10
8	8	8	60	35	7.5	14	14	30	15	7.5	14	14	30	15
10	8	8	60	40	8	12	12	30	20	8	14	14	30	15
12.5	8	8	60	50	10	12	12	30	20	10	12	12	30	20
15	6	6	60	60	12.5	10	10	30	25	12.5	12	12	30	20
17.5	4	6	100	75	15	10	10	30	30	15	10	10	30	25
20	4	4	100	80	17.5	8	8	60	35	17.5	10	10	30	30
22.5	3	4	100	90	20	8	8	60	40	20	8	8	60	35
25	3	3	100	100	22.5	8	8	60	50	22.5	8	8	60	40
27.5	1	2	200	125	25	8	8	60	50	25	8	8	60	40
30	1	2	200	125	27.5	6	6	60	60	27.5	8	8	60	45
35	1/0	1	200	150	30	6	6	60	60	30	8	8	60	50
40	2/0	2/0	200	175	35	4	6	100	70	35	6	6	60	60
45	3/0	3/0	200	200	40	4	4	100	80	40	4	6	100	70
50	3/0	3/0	200	200	45	3	4	100	90	45	4	4	100	80
60	250	4/0	400	250	50	3	3	100	100	50	4	4	100	80
75	350	300	400	300	60	3	3	200	110	60	3	3	100	100
100	2x3/0	2x3/0	400	400	75	1/0	1	200	150	75	1	2	200	125
125	2x250	2x4/0	600	500	100	3/0	2/0	200	200	100	1/0	1	200	150
150	2x350	2x300	600	600	125	250	4/0	400	250	125	3/0	3/0	200	200
175	2x500	2x350	800	700	150	350	300	400	300	150	250	4/0	400	250
200	2x600	2x500	800	800	175	500	350	400	350	175	350	300	400	300
225	3x350	3x300	1,200	900	200	2x3/0	2x3/0	400	400	200	500	350	400	350
250	3x350	3x350	1,200	1,000	225	2x3/0	2x3/0	400	400	225	2x3/0	2x3/0	400	400
275	4x300	3x400	1,200	1,100	250	2x250	2x4/0	600	500	250	2x3/0	2x3/0	400	400
300	4x350	3x500	1,200	1,250	275	2x250	2x4/0	600	500	275	2x4/0	2x3/0	600	450
					300	2x350	2x300	600	600	300	2x250	2x4/0	600	500
					325	2x500	2x350	800	700	325	2x250	2x4/1	600	500
					350	2x500	2x350	800	700	350	2x350	2x300	600	600
					375	2x600	2x500	800	800	375	2x350	2x300	600	600
					400	2x600	2x500	800	800	400	2x500	2x350	800	700
					425	3x350	3x300	1,200	900	425	2x500	2x350	800	700
					450	3x350	3x300	1,200	900	450	2x500	2x400	800	750
					475	3x350	3x300	1,200	900	475	2x500	2x400	800	750
					500	3x400	3x350	1,200	1,000	500	2x600	2x500	1,200	800
					525	3x400	3x350	1,200	1,000	525	2x600	2x500	1,200	800
					550	4x300	3x400	1,200	1,100	550	3x350	2x600	1,200	900
					575	4x350	3x500	1,200	1,200	575	3x350	2x600	1,200	900
					600	4x350	3x500	1,200	1,200	600	3x400	3x350	1,200	1,000

* No more than three single conductors are allowed in a raceway with 30°C ambient. For higher ambient temperatures, consult the National Electrical Code Table 310-16 (correction factor for ambients over 30°C). Rated current is based on operation at rated voltage, frequency, and KVAR.

Application Notes

Sizing Capacitors for Electrical Systems

This table gives multipliers for KW to get the capacitor KVAR needed to increase from original to desired corrected power factor. Use the multipliers to size auto-switched or fixed capacitors for large loads.

		DESIRED CORRECTED POWER FACTOR (%)																				
		80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
ORIGINAL POWER FACTOR (%)	50	0.982	1.008	1.034	1.060	1.086	1.112	1.139	1.165	1.192	1.220	1.248	1.276	1.306	1.337	1.369	1.403	1.440	1.481	1.529	1.590	1.732
	51	0.937	0.963	0.989	1.015	1.041	1.067	1.093	1.120	1.147	1.174	1.202	1.231	1.261	1.291	1.324	1.358	1.395	1.436	1.484	1.544	1.687
	52	0.893	0.919	0.945	0.971	0.997	1.023	1.049	1.076	1.103	1.130	1.158	1.187	1.217	1.247	1.280	1.314	1.351	1.392	1.440	1.500	1.643
	53	0.850	0.876	0.902	0.928	0.954	0.980	1.007	1.033	1.060	1.088	1.116	1.144	1.174	1.205	1.237	1.271	1.308	1.349	1.397	1.458	1.600
	54	0.809	0.835	0.861	0.887	0.913	0.939	0.965	0.992	1.019	1.046	1.074	1.103	1.133	1.163	1.196	1.230	1.267	1.308	1.356	1.416	1.559
	55	0.768	0.794	0.820	0.846	0.873	0.899	0.925	0.952	0.979	1.006	1.034	1.063	1.092	1.123	1.156	1.190	1.227	1.268	1.315	1.376	1.518
	56	0.729	0.755	0.781	0.807	0.834	0.860	0.886	0.913	0.940	0.967	0.995	1.024	1.053	1.084	1.116	1.151	1.188	1.229	1.276	1.337	1.479
	57	0.691	0.717	0.743	0.769	0.796	0.822	0.848	0.875	0.902	0.929	0.957	0.986	1.015	1.046	1.079	1.113	1.150	1.191	1.238	1.299	1.441
	58	0.655	0.681	0.707	0.733	0.759	0.785	0.811	0.838	0.865	0.892	0.920	0.949	0.979	1.009	1.042	1.076	1.113	1.154	1.201	1.262	1.405
	59	0.618	0.644	0.670	0.696	0.723	0.749	0.775	0.802	0.829	0.856	0.884	0.913	0.942	0.973	1.006	1.040	1.077	1.118	1.165	1.226	1.368
	60	0.583	0.609	0.635	0.661	0.687	0.714	0.740	0.767	0.794	0.821	0.849	0.878	0.907	0.938	0.970	1.005	1.042	1.083	1.130	1.191	1.333
	61	0.549	0.575	0.601	0.627	0.653	0.679	0.706	0.732	0.759	0.787	0.815	0.843	0.873	0.904	0.936	0.970	1.007	1.048	1.096	1.157	1.299
	62	0.515	0.541	0.567	0.593	0.620	0.646	0.672	0.699	0.726	0.753	0.781	0.810	0.839	0.870	0.903	0.937	0.974	1.015	1.062	1.123	1.265
	63	0.483	0.509	0.535	0.561	0.587	0.613	0.639	0.666	0.693	0.720	0.748	0.777	0.807	0.837	0.870	0.904	0.941	0.982	1.030	1.090	1.233
	64	0.451	0.477	0.503	0.529	0.555	0.581	0.607	0.634	0.661	0.688	0.716	0.745	0.775	0.805	0.838	0.872	0.909	0.950	0.998	1.058	1.201
	65	0.419	0.445	0.471	0.497	0.523	0.549	0.576	0.602	0.629	0.657	0.685	0.714	0.743	0.774	0.806	0.840	0.877	0.919	0.966	1.027	1.169
	66	0.388	0.414	0.440	0.466	0.492	0.519	0.545	0.572	0.599	0.626	0.654	0.683	0.712	0.743	0.775	0.810	0.847	0.888	0.935	0.996	1.138
	67	0.358	0.384	0.410	0.436	0.462	0.488	0.515	0.541	0.568	0.596	0.624	0.652	0.682	0.713	0.745	0.779	0.816	0.857	0.905	0.966	1.108
	68	0.328	0.354	0.380	0.406	0.432	0.459	0.485	0.512	0.539	0.566	0.594	0.623	0.652	0.683	0.715	0.750	0.787	0.828	0.875	0.936	1.078
	69	0.299	0.325	0.351	0.377	0.403	0.429	0.456	0.482	0.509	0.537	0.565	0.593	0.623	0.654	0.686	0.720	0.757	0.798	0.846	0.907	1.049
70	0.270	0.296	0.322	0.348	0.374	0.400	0.427	0.453	0.480	0.508	0.536	0.565	0.594	0.625	0.657	0.692	0.729	0.770	0.817	0.878	1.020	
71	0.242	0.268	0.294	0.320	0.346	0.372	0.398	0.425	0.452	0.480	0.508	0.536	0.566	0.597	0.629	0.663	0.700	0.741	0.789	0.849	0.992	
72	0.214	0.240	0.266	0.292	0.318	0.344	0.370	0.397	0.424	0.452	0.480	0.508	0.538	0.569	0.601	0.635	0.672	0.713	0.761	0.821	0.964	
73	0.186	0.212	0.238	0.264	0.290	0.316	0.343	0.370	0.396	0.424	0.452	0.481	0.510	0.541	0.573	0.608	0.645	0.686	0.733	0.794	0.936	
74	0.159	0.185	0.211	0.237	0.263	0.289	0.316	0.342	0.369	0.397	0.425	0.453	0.483	0.514	0.546	0.580	0.617	0.658	0.706	0.766	0.909	
75	0.132	0.158	0.184	0.210	0.236	0.262	0.289	0.315	0.342	0.370	0.398	0.426	0.456	0.487	0.519	0.553	0.590	0.631	0.679	0.739	0.882	
76	0.105	0.131	0.157	0.183	0.209	0.235	0.262	0.288	0.315	0.343	0.371	0.400	0.429	0.460	0.492	0.526	0.563	0.605	0.652	0.713	0.855	
77	0.079	0.105	0.131	0.157	0.183	0.209	0.235	0.262	0.289	0.316	0.344	0.373	0.403	0.433	0.466	0.500	0.537	0.578	0.626	0.686	0.829	
78	0.052	0.078	0.104	0.130	0.156	0.183	0.209	0.236	0.263	0.290	0.318	0.347	0.376	0.407	0.439	0.474	0.511	0.552	0.599	0.660	0.802	
79	0.026	0.052	0.078	0.104	0.130	0.156	0.183	0.209	0.236	0.264	0.292	0.320	0.350	0.381	0.413	0.447	0.484	0.525	0.573	0.634	0.776	
80	0.000	0.026	0.052	0.078	0.104	0.130	0.157	0.183	0.210	0.238	0.266	0.294	0.324	0.355	0.387	0.421	0.458	0.499	0.547	0.608	0.750	
81		0.000	0.026	0.052	0.078	0.104	0.131	0.157	0.184	0.212	0.240	0.268	0.298	0.329	0.361	0.395	0.432	0.473	0.521	0.581	0.724	
82			0.000	0.026	0.052	0.078	0.105	0.131	0.158	0.186	0.214	0.242	0.272	0.303	0.335	0.369	0.406	0.447	0.495	0.556	0.698	
83				0.000	0.026	0.052	0.079	0.105	0.132	0.160	0.188	0.216	0.246	0.277	0.309	0.343	0.380	0.421	0.469	0.530	0.672	
84					0.000	0.026	0.053	0.079	0.106	0.134	0.162	0.190	0.220	0.251	0.283	0.317	0.354	0.395	0.443	0.503	0.646	
85						0.000	0.026	0.053	0.080	0.107	0.135	0.164	0.194	0.225	0.257	0.291	0.328	0.369	0.417	0.477	0.620	
86							0.000	0.027	0.054	0.081	0.109	0.138	0.167	0.198	0.230	0.265	0.302	0.343	0.390	0.451	0.593	
87								0.000	0.027	0.054	0.082	0.111	0.141	0.172	0.204	0.238	0.275	0.316	0.364	0.424	0.567	
88									0.000	0.027	0.055	0.084	0.114	0.145	0.177	0.211	0.248	0.289	0.337	0.397	0.540	
89										0.000	0.028	0.057	0.086	0.117	0.149	0.184	0.221	0.262	0.309	0.370	0.512	
90											0.000	0.029	0.058	0.089	0.121	0.156	0.193	0.234	0.281	0.342	0.484	
91												0.000	0.030	0.060	0.093	0.127	0.164	0.205	0.253	0.313	0.456	
92													0.000	0.031	0.063	0.097	0.134	0.175	0.223	0.284	0.426	
93														0.000	0.032	0.067	0.104	0.145	0.192	0.253	0.395	
94															0.000	0.034	0.071	0.112	0.160	0.220	0.363	
95																0.000	0.037	0.078	0.126	0.186	0.329	
96																	0.000	0.041	0.089	0.149	0.292	
97																		0.000	0.048	0.108	0.251	
98																			0.000	0.061	0.203	
99																				0.000	0.142	
100																					0.000	

Example: Total KW input of load from wattmeter reading 100 KW at a power factor of 60%. The leading reactive KVAR necessary to raise the power factor to 90% is found by multiplying the 100 KW by the factor found in the table, which is .849. Then 100 KW x 0.849 = 84.9 KVAR. Use 85 KVAR

INSTRUCTIONS FOR INSTALLATION & OPERATION OF FIXED INDUSTRIAL POWER FACTOR CORRECTION CAPACITOR EQUIPMENT

These summarized instructions are included to assist in the installation and operation of Ultravar Industrial Power Factor Correction Capacitors. They provide only the manufacturer's recommended procedures. Since local electrical codes and insurance underwriters requirements vary in many respects, it is impossible to adequately provide for every installation within this instruction. A complete set of instructions is sent with every shipment.

It is therefore imperative that such individual requirements be checked and complied with, rather than rely solely on this guideline as a means of satisfying such regulations.

DESCRIPTION

Type AM assemblies consist of individual capacitors with three external discharge resistors, an internal pressure-activated circuit interrupter, external current limiting fuses, and a heavy duty terminal block, provided for customer phase connections. Units are suitable for both indoor and outdoor use and may be floor or wall mounted.

Type IC single unit assemblies consist of the individual capacitor, current limiting fuses, an internal pressure-activated circuit interrupter (600 volt and below), internal discharge resistors and a terminal enclosure with gasketed cover. The units may be floor, wall, or ceiling mounted through the use of mounting brackets ordered with the equipment. Units are suitable for both indoor and outdoor use.

Type IC multiple unit assemblies consist of the individual capacitors, current limiting fuses, aluminum bus bars (to parallel the units), solderless connectors for cable connections, a terminal enclosure with gasketed cover and mounting frame. The assembly may be floor, wall, or ceiling mounted without the need for accessory brackets. Units are suitable for both indoor and outdoor use. Assemblies of the same unit capacity may be stacked to a maximum of three high.

Type OFC assemblies consist of individual capacitors with three external discharge resistors, an internal pressure-activated circuit interrupter, an optional 4 foot cable (sized for KVAR requirements) or a heavy duty terminal block is provided for customer phase connections. Units are suitable for both indoor and outdoor use and may be pole or wall mounted.

RECEIVING

All equipment is checked by quality control and is shipped in good condition. Due to possible damage incurred in transit, all equipment should be carefully checked for damaged bushings, leaks, or large dents. If damage is severe, the carrier should be notified immediately and an inspection report requested. A formal claim should then be filed and the nearest Ultravar Sales Office notified for replacement assistance.

SAFETY INSTRUCTIONS

All power must be switched off and must be allowed to discharge before performing any work on capacitor equipment. Capacitors rated 600 volts and below include discharge resistors which reduce the voltage to 50 volts or less within one minute after power is removed. For ratings above 600 volts, the required discharge time is five minutes.

After the indicated discharge time, the capacitor should be shorted with an insulated grounding rod or equivalent. The capacitor terminals should be connected together and to the case and grounded before handling.

FIRE PREVENTION

Although every effort is made to prevent the possibility of a case rupture, such a failure can occur. Since the dielectric fluids used in some of these capacitors are Class IIIB combustible liquids, they can ignite should they be exposed to certain conditions (i.e. sufficient heat and oxygen). The dielectric fluids used in any of the impregnated capacitors have a flash point greater than 300°F (150°C). In the event the case should rupture or bushings break, the installation should be such as to guard against ignition of escaping fluids, and to limit any damage to property that could occur due to a fire. Also, the location of these capacitors should be such that they are not subjected to physical damage. Specific details regarding the fluids used in these capacitors are available on MSDS sheets by contacting the factory.

INSTALLATION

1. General

Capacitors should be located in an area where there is sufficient ventilation. Refer to instruction under heading TEMPERATURE. The assembly is gasketed and protected with a finish that is resistant to normal environmental conditions. If possible, an assembly should not be located in an area which would subject it to continuous salt air, steam, abrasive dust, or corrosive vapors.

The capacitor's nameplate rating should be checked to insure that it is the proper rating for the intended system. The maximum RMS voltage, including harmonics, should not exceed 110% of the nameplate rating. A lower voltage may be applied; however, it should be noted that the nameplate KVAR will be reduced by a factor of the square of the operating voltage divided by the nameplate voltage. For example, a 240 volt capacitor operated at 208 volts will provide .75 of the rated nameplate KVAR. $(208 / 240)^2 = .75$

2. Location

Capacitors to be connected directly at motors may be located as depicted in Figures 1, 2, and 3 on page 21. For an assembly located at a position other than directly across the motor terminals, a separate disconnect is required by the National Electrical Code.

3. Wire Size

The continuous current rating of wire used to connect the capacitors must be at least 135% of the rated capacitor line current. The formula for the capacitor line current is:

$$\begin{array}{l} \text{3 Phase} \quad I = \frac{\text{KVAR} \times 1000}{\text{Volts} \times 1.73} \qquad \text{1 Phase} \quad I = \frac{\text{KVAR} \times 1000}{\text{Volts}} \end{array}$$

4. Connection

Type AM assemblies are connected to the line at the phase terminal block. Type ICC assemblies are connected to the line at the provided connectors. All three phase capacitor units are delta connected internally. No concern need be given to proper phase rotation or polarity. The capacitor should be grounded by connecting a ground wire to the ground lug or to the mounting bolt at the bracket.

5. Temperature

Power Factor Capacitors are designed to operate in an ambient temperature range of -40°C (-40°F) to +46°C(+115°F). The environment where the assembly is installed should be ventilated as capacitors generate heat which, if not removed, will reduce the life of the capacitors.

FUSES and PRESSURE INTERRUPTERS

The type AM and ICS single and multiple units are provided with both internal pressure interrupters and current limiting fuses. Type ICC units are protected by properly sized current limiting fuses. The fuse interrupting capacity for ICS is 200,000 amps; for AM is 100,000 amps; for ICC is 50,000 amps. The combination of external current limiting fuses and internal pressure interrupters (except ICC) provide maximum protection in preventing case rupture.

Factory installed fuses are rated from 165% to 250% of the rated capacitor line current. This safety factor allows for maximum operating conditions including momentary current surges. Should a fuse operate, the capacitor should be checked physically to see if it has bulged or swollen. If the unit appears in good condition, further tests may be made by measuring the current drawn by the capacitor when connected to a properly protected circuit. Additional testing details may be obtained from NEMA Standard Publication CP1. Should testing show that the capacitor is a good unit, the system should be checked for the possible existence of high transient or harmonic currents.

INDICATING LIGHTS

Types AM and ICS: Blown fuse indicating lights are available as an option. The lights are normally "off" but when lit indicate a fuse has operated. In the AM type units, the neon light monitors the fuse and the internal pressure activated interrupter. If either the fuse or the pressure interrupter operates, the light will illuminate indicating that a unit has been removed from the circuit. This feature is optional on type ICS. A bulged capacitor usually indicates that the pressure interrupter has operated.

Type ICC: Blown fuse lights are available as an option. The lights are normally off but when lit indicate that a fuse has operated. To operate the lights an external 120 volt AC supply must be wired to a terminal block located in the wiring compartment.

MAINTENANCE

Periodic checking of the capacitor assembly should be made to determine if any fuses are blown, any capacitors appear bulged, and all connections are tight. Under normal conditions, the capacitor should not require any maintenance during its operating life.

If a fluid leak should occur, the nearest Sales Office should be notified for disposition or replacement instructions.

In an ICC multiple unit assembly, replacement of a capacitor is made by unbolting the fuse/bus connections and the fasteners attaching the capacitors to the wiring hood, removing the wiring hood, and unbolting the capacitor cell from the mounting frame.

DISPOSAL

The disposal of defective capacitors containing dielectric fluid is governed by local and state regulations because they contain free (liquid) oil. To ensure proper disposal, contact a local hazardous waste disposal firm to determine what options are available. The preferred disposal methods are recycling or incineration. Additional information on proper disposal can be obtained by referring to the MSDS for the dielectric fluids.

Ultravar Power Factor Correction
 GE Capacitor and Power Quality Products
 381 Broadway, Fort Edward, New York 12828-1000

**Fixed Power Factor Capacitor
 Specification Guide**

Company Name		
Address		
City	State	Zip
Contact	Title	
TEL	FAX	

Description

- UL C-UL
- CSA

- A.M.P ICC
- MVA ICS
- HSICS

Basic Catalog # _____
 KVAR _____
 Volt _____
 Hz _____
 # Phases _____

Options

- Blown Fuse Lights
- Loss-of-KVAR Light (ICS)
- Hand-Off-Auto Switches
- Harmonic Filters (HSICS only)
- Copper Bus (ICS-ICC-HSICS)
- Wall Mount
- Ceiling Mount
- Other _____

Contact your local representative.

Special Requirements

Represented by:

Ultravar™ offers other power quality products. For additional information on TVSS, line & load reactors, high voltage capacitor equipment and harmonic solutions, contact your Sales Representative or the address below.

Represented by:

Ultravar

*GE Capacitor and Power Quality Products
381 Broadway, Ft. Edward, NY 12828*