

Beaver low voltage Power Factor Correction Capacitors are designed for long life and are made with the highest quality materials. Our fixed capacitor units are cUL certified, they are assembled in Canada and built to meet CSA standards.

APPLICATIONS

Individual Motors
Motor Control Centres
Distribution Networks

RATINGS

Volts: 208, 240, 480 or 600
Frequency: 60 Hz
Phase: 3

Interrupting Rating

- * Standard fused 200 kA
- * Non-fused 10 kA

Operating temperature

- * 40°C to +40°C

Service Life 10 years

Also available

- * Volts: 380, 400 or 415s
- * Frequency: 50 Hz
- * Phase: Single
- * Non standard kVAR ratings
- * Automatic systems

FEATURES

Enclosure

- * Heavy 16 gauge steel
- * Powder coated ASA 61 finish
- * Wall and floor mount R1 thru R6
- * ½" and ¾" knockouts
- * CSA 3R
- * "L" shaped cover with front access screws, gasketed

Ground Terminal

- * CSA AL9CU 2-14

Line Terminations

- * Suitable for CU or AL
- * Oversized lugs

Fusing

- * Up to 200 amps; HRC Class C
- * Over 200 amps; BS88

WARRANTY

One Year

3-PHASE DRY TYPE CAPACITOR CELLS

Maximum Permissible Voltage

- * Vn +20% up to 8 hours daily
- * Vn +25% up to 30 minutes daily
- * Vn +30% up to 5 minutes daily
- * Vn +40% up to 1 minute daily

Dielectric Fill

- * Thermosetting polymer resin
- * No fluids, no PCBs
- * Flash point +212°C
- * Fire point +260°C

Dielectric Film

- * Self healing metalized polypropylene

Pressure Sensitive Interrupter

- * 3-phase internal

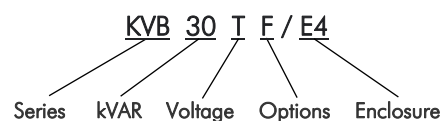
Discharge Resistors

- * Reduces residual voltage to less than 50 volts within one minute of de-energization

Losses

- * Less than ½ watt per kVAR

Part Numbering System



Series	KVB	Three phase capacitor	Options	F	Fused
kVAR	0.5-200			B	Blown fuse indicators
				S	Single phase
				H	Harmonic cells
				C	Contactors
				T	Timer
				G	Capacitor status indicator
				X	Special feature
Voltage			Enclosure	Blank	CSA 3R Outdoor
				E4	CSA 4/12 Watertight/Dust-tight
				E4X	CSA 4X Watertight stainless steel
Frequency	Blank	60 Hz			
	50	50 Hz			

Provide 3-12 months of electrical utility bills or detailed motor data. Beaver's Engineering team will help you to calculate desired power factor.

Orig. PF	Desired Power Factor																				
	0.80	0.81	0.82	0.83	0.84	0.85	0.86	0.87	0.88	0.89	0.90	0.91	0.92	0.93	0.94	0.95	0.96	0.97	0.98	0.99	1.00
0.50	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
0.51	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
0.52	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
0.53	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
0.54	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
0.55	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
0.56	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
0.57	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
0.58	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
0.59	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
0.60	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
0.61	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
0.62	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
0.63	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
0.64	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
0.65	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
0.66	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
0.67	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
0.68	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
0.69	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
0.70	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
0.71	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
0.72	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
0.73	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
0.74	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
0.75	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
0.76	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
0.77	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
0.78	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
0.79	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
0.80	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
0.81		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
0.82			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
0.83				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
0.84					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
0.85						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
0.86							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
0.87								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
0.88									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
0.89										0.000	0.028	0.057	0.086	0.117	0.149	0.184	0.221	0.262	0.309	0.370	0.512
0.90											0.000	0.029	0.058	0.089	0.121	0.156	0.193	0.234	0.281	0.342	0.484
0.91												0.000	0.030	0.060	0.093	0.127	0.164	0.205	0.253	0.313	0.456
0.92													0.000	0.031	0.063	0.097	0.134	0.175	0.223	0.284	0.426
0.93														0.000	0.032	0.067	0.104	0.145	0.192	0.253	0.395
0.94															0.000	0.034	0.071	0.112	0.160	0.220	0.363
0.95																0.000	0.037	0.078	0.126	0.186	0.329
0.96																	0.000	0.041	0.089	0.149	0.292
0.97																		0.000	0.048	0.108	0.251
0.98																			0.000	0.061	0.203
0.99																				0.000	0.142

Instructions:

- Find the present power factor in "Orig. PF."
- Read across to the "Desired Power Factor" column.
- Multiply the value by kW demand.
- Round to nearest capacitor size.

Example:

If the present demand is 262 kW and was operating at 82% PF and the desired power factor is 95%, you would:

- Find 0.82 in the "Orig. PF" column.
- Read across to the 0.95 "Desired Power Factor" column.
- $0.369 \times 262 = 96.7$ kVAR which rounds up to 100 kVAR

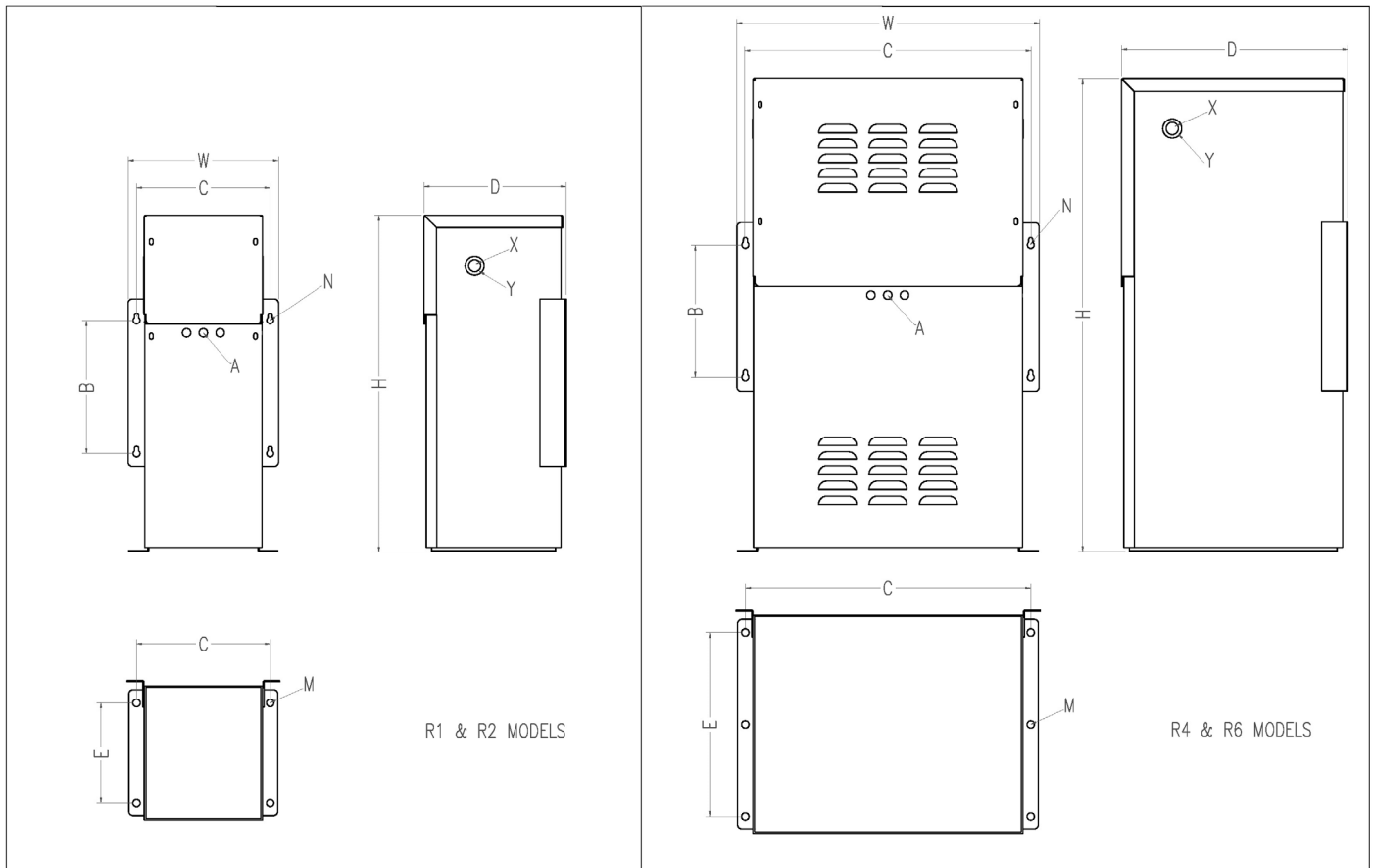
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Nanose Bay (Nanaimo), BC
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Enclosure Dimensions

Size R1, R2, R4 & R6



All enclosures are NEMA Type 3R rated

SIZE CODE	CELLS	H in/mm	D in/mm	W in/mm	C in/mm	E in/mm	B in/mm	A in/mm	M in/mm	N in/mm	X in/mm	Y in/mm
R1	1	20/508	8.45/215	9/229	8/203	6/152	7.88/200	0.5/13	0.44/11	0.4/10	0.5/13	0.75/19
R2	2	28/711	8.45/215	13/330	12/305	6/152	7.88/200	0.5/13	0.44/11	0.4/10	0.5/13	0.75/19
R4	4	28/711	13.45/342	13/330	12/305	11/279	7.88/200	0.5/13	0.44/11	0.4/10	0.5/13	0.75/19
R6	6	28/711	13.45/342	18/457	17/432	11/279	7.88/200	0.5/13	0.44/11	0.55/14	0.5/13	0.75/19

208 Volt			480 Volt			600 Volt		
kVAR	Size Code	Weight lbs/kg	kVAR	Size Code	Weight lbs/kg	kVAR	Size Code	Weight lbs/kg
15	R1	25/11.5	30	R1	25/11.5	30	R1	25/11.5
30	R2	45/20.5	60	R2	45/20.5	60	R2	45/20.5
60	R4	62/28	120	R4	62/28	120	R4	62/28
90	R6	85/38.5	180	R6	85/38.5	180	R6	85/38.5

Note: All specifications subject to change without notice.

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Nanose Bay (Nanaimo), BC
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Suggested Overcurrent Protection Values*

208 Volts			240 Volts			480 Volts			600 Volts		
kVAR	Rated Current	OC Rating	kVAR	Rated Current	OC Rating	kVAR	Rated Current	OC Rating	kVAR	Rated Current	OC Rating
5	14	30	5	12	25	5	6	15	5	4.8	10
7.5	21	50	10	24	50	7.5	9	20	7.5	7	15
10	28	60	15	36	80	10	12	25	10	9.6	20
12.5	35	80	20	48	100	12.5	15	35	12.5	12	25
15	42	80	25	60	125	15	18	40	15	14	30
20	55	100	30	72	175	17.5	21	50	17.5	17	35
22.5	62	150	35	84	200	20	24	50	20	19	45
25	69	150	40	96	225	25	30	70	25	24	50
30	83	200	45	108	250	30	36	80	30	29	60
35	97	200	50	120	250	35	42	100	35	34	80
40	111	250	60	144	350	40	48	110	40	39	90
45	125	300	70	168	400	45	54	125	45	44	100
50	139	300				50	60	125	50	48	110
55	153	350				55	66	150	55	53	125
60	166	400				60	72	175	60	58	125
65	180	500				65	78	175	65	63	150
70	194	500				70	84	200	70	68	150
75	208	500				75	90	200	75	72	175
						80	96	225	80	77	175
						90	108	250	90	87	200
						100	120	250	100	96	225
						125	150	350	125	121	300
						150	180	400	150	144	350
						200	241	600	200	193	450

*** 26-210 Overcurrent protection (see Appendix B)**

An overcurrent device, rated or set as low as practicable without causing unnecessary opening of the circuit, but not exceeding 250% of the rated current of the capacitor, shall be provided in each ungrounded conductor of a capacitor feeder or branch circuit, unless a deviation has been allowed in accordance with Rule 2-030.

If desired kVAR or voltage rating is not shown, contact our Burnaby office at the number below or send us an email at info@beavelectrical.com

Suggested Capacitor Ratings*

Based on NEMA Premium Efficiency Motors

HP	3600 RPM (2 pole)		1800 RPM (4 pole)		1200 RPM (6 pole)		900 RPM (8 pole)	
	Capacitor kVAR	% Current Reduction	Capacitor kVAR	% Current Reduction	Capacitor kVAR	% Current Reduction	Capacitor kVAR	% Current Reduction
3	1	13	1.5	22	2	28	2	28
5	1.5	12	2	18	2.5	22	3	25
7.5	2.5	13	2.5	15	3	18	5	28
10	2.5	10	4	18	4	18	5	22
15	3	8	5	15	5	15	7.5	22
20	5	10	7.5	16	7.5	16	10	22
25	5	8	10	17	10	18	12.5	22
30	7.5	10	12.5	17	12.5	19	12.5	19
40	10	10	15	17	15	16	17.5	20
50	12.5	10	17.5	16	17.5	14	20	18
60	15	9	20	14	20	14	20	15
75	17.5	9	25	14	25	14	30	19
100	20	7	30	12	35	16	40	19
125	25	8	40	14	40	15	50	18
150	30	8	50	15	50	16	60	18
200	40	8	60	13	70	16	80	19
250	45	7	65	11	90	17	90	17
300	50	7	75	11	120	18	120	18
400	55	6	100	11	150	17	160	19
500	60	5	120	11	180	17	180	17

* Actual motor efficiency, power factor and loading will affect kVAR calculations, contact Beaver Engineering for review.

Standard data		
Voltage	μF/kVAR	Amps/kVAR
208	61.30	2.78
240	46.00	2.41
480	11.50	1.20
600	7.37	0.96
Based on nominal voltage @ 60 Hz = Nominal kVAR, μF and current		

Useful capacitor formulas

Reduced voltage

Actual kVAR = Rated kVAR

$$\left(\frac{\text{actual voltage}}{\text{rated voltage}} \right)^2$$

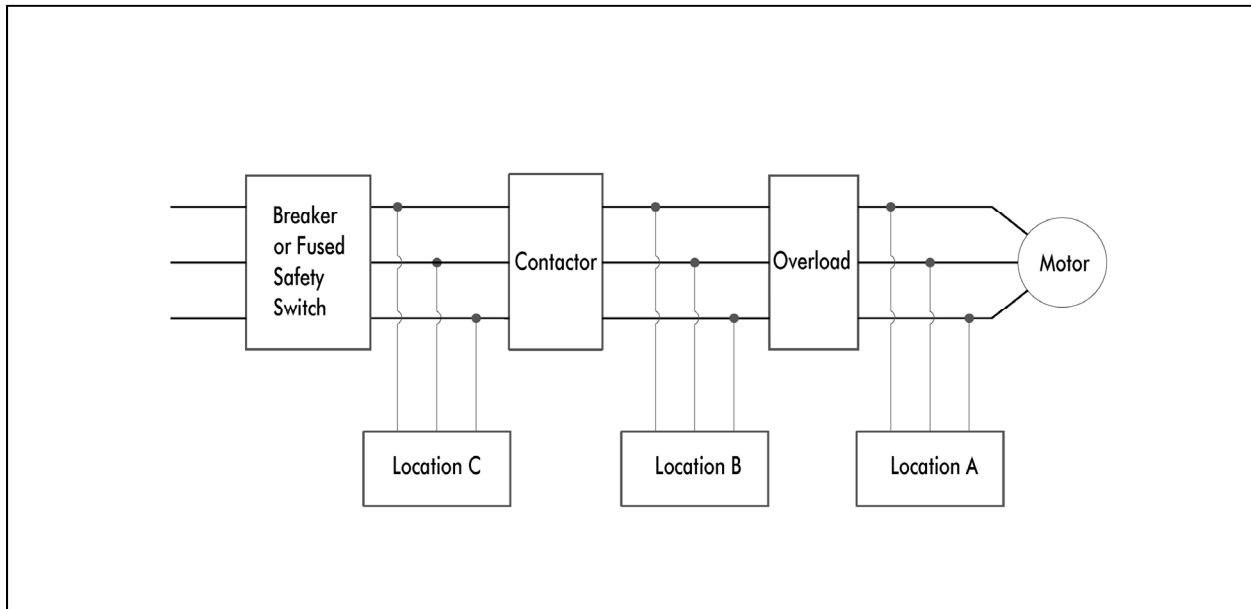
Reduced frequency

50Hz kVAR rating = (60Hz kVAR rating) (0.83)

Connection Locations

When applying capacitors to motor circuits, capacitors should be connected on the load side of the motor starter (See Figure below). In such installations, it may be desirable to change or adjust the overload protector size by the amount of the current reduction attendant with capacitor installed at location A.

Caution: When applying capacitors to motors which are subject to plugging, jogging, reversing, open transition compound starting (or on many multi-step or multi-speed motors), it is strongly recommended that the capacitor be connected between the motor starter and the disconnect (Location C). This will result in the capacitor being energized even though the motor is not operating. The disconnect provides the appropriate means for the required removal capability per the Code (if it is not serving a branch circuit).



1. Installation at Location A.

Motor side of thermal overload protectors when new motor installation is made and overloads can be sized or adjusted in accordance with reduced current draw (refer to chart on previous page for estimated current reduction), or on existing motors when change of thermal overload is not required.

2. Installation at Location B.

Between the starter and thermal overloads on existing motor applications when overload rating is higher than permitted by code [NEC 430-32(a)].

3. Installation at location C.

On the line side of the starter when separate disconnect means exist. This is a required location when motors are to be jogged, plugged, or reversed; for multi-speed motors; for all starters having open transition; and for starters that in any way disconnect the capacitor momentarily during the cycle and then reconnect the unit.

Note:

1. The length of the capacitor feeder cable should be such that no strain is applied to the power lead connector. Power leads shall be firmly clamped in connectors by tightening connector bolts. Wire lead strands should not move in connector when the lead is moved from side to side by hand. Improper (loose) connections will cause terminal overheating and possible early failure of capacitor unit.
2. If VFD/ASD, soft starter or reduced voltage starter is used, contact Beaver Electrical Machinery for recommendations.



AUTOMATIC POWER FACTOR CORRECTION CAPACITOR SYSTEM



How it works?

A power factor controller measures the current value of power factor, and automatically steps ON and OFF capacitor banks to achieve programmed target power factor.



The QuickShip program

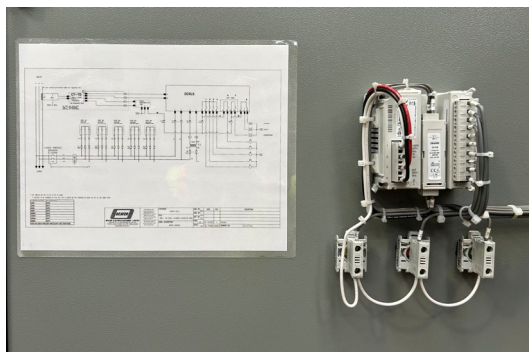
Available qualifying ratings:

- * 3-step configuration (max. 90 kVAR @600 Vac)
- * 5-step configuration (max. 150 kVAR @600 Vac)
- * 5-step double cell configuration (max. 300 kVAR @600 Vac)

For any other rating requirements contact Beaver Electrical Machinery.

MAIN FEATURES

- CSA Type 3R enclosure
- Automatic Power Factor Controller
- Touch safe design
- Harmonic rated cells
- Capacitor rated contactors
- Surge arrester
- Rogowski coils
- Green NORMAL status light
- Red FAULT status light
- Yellow UNDER COMPENSATION status light
- Blown fuse indication
- Conforms to CSA standards
- cULus certified



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