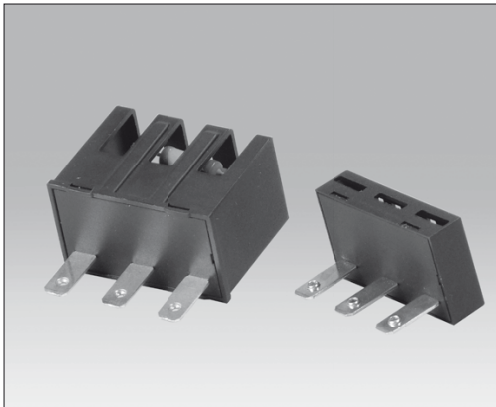


DISCHARGE DEVICES



Resistor Modules

Capacitors with CAPAGRIP K and CAPAGRIP II terminals are equipped with discharge resistors for a discharge from their highest nominal voltage rating to less than 50 V within < 60 seconds. For capacitors with CAPAGRIP L, and M, as well as with D terminals we offer separate resistor modules. The correct size of the module to be applied can be selected from the data charts on pages 49f based on applied voltage, required discharge period, and capacitance to be discharged.

Alternatively, the resistors to be used for a given capacitance and operating voltage can be calculated by means of the following formula:

three-phase:
$$R \leq \frac{t}{k \times C_T \times \ln \frac{U_B \times \sqrt{2}}{U_E}}$$

single-phase:
$$R \leq \frac{t \times 1.5}{C_{total} \times \ln \frac{U_B \times \sqrt{2}}{U_E}}$$

k = 1 k = 3

t ... Discharge period in (s)	U _B ... Operating voltage
C _T ... Partial capacitance of one phase	U _E ... Maximum permissible voltage after period t
C _{total} ... Total capacitance	R ... Module resistance value

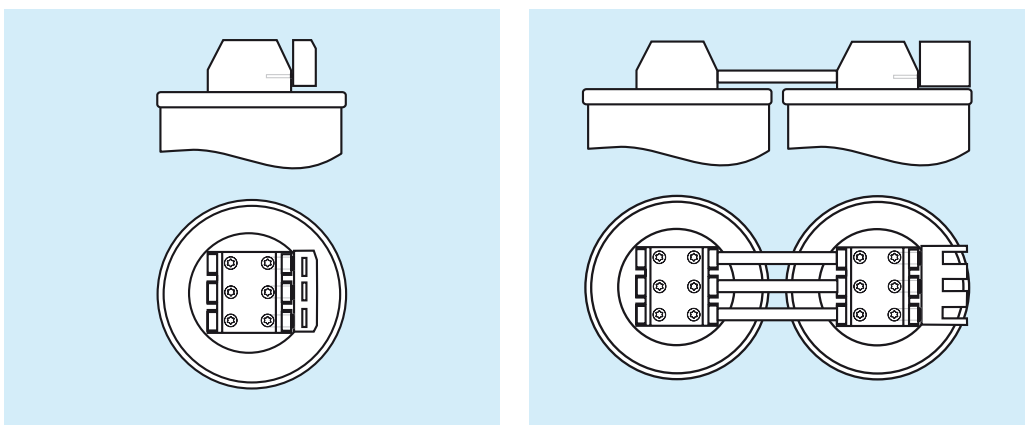
In all cases, the closest smaller discharge module available shall be applied.

The discharge resistors may become very hot (up to 200°C) during continuous operation!
For design L/M only: Remove the lid of the discharge module if applying protective caps to the capacitors!



Sets for CAPAGRIP™ L & M Capacitors (Protection: IP20)

CAPAGRIP™ resistor modules can be connected to single capacitors as well as to groups of parallel units. Both type 1 and 2 are equally compatible with CAPAGRIP™ L or M terminals.

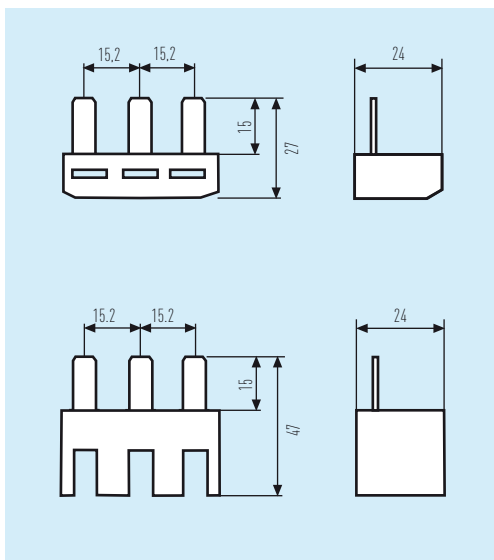


DISCHARGE DEVICES



for latest edition and updates
check www.powercapacitors.info

Type 1

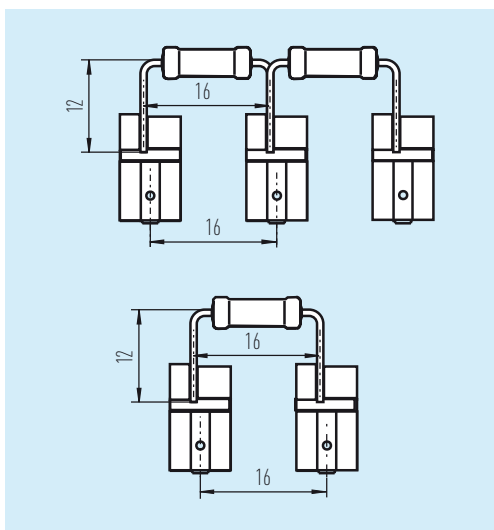


Type 2

U_{max} (V)	R_N (k Ω)	module type	selection code	order code
1000	3 Y 300	2	(1)	275.106-10300
1000	3 Y 180	2	(2)	275.106-10180
850	3 Y 120	2	(3)	275.106-10120
760	3 × 300	1	(4)	275.100-10300
720	3 × 180	2	(5)	275.105-10180
600	3 × 180	1	(6)	275.100-10180
600	3 × 120	2	(7)	275.105-10120
480	3 × 120	1	(8)	275.100-10120
530	3 × 100	2	(9)	275.105-10100
480	3 × 82	2	(10)	275.105-10082
400	3 × 82	1	(11)	275.100-10082
440	3 × 68	2	(12)	275.105-10068

Sets for Design D1/D3 Capacitors (Protection: IP00)

3ph



1ph

U_{max} (V)	R_N (k Ω)	module type	selection code	order code
three phase				
750	2 × 300	D3	(13)	275.110-10301
630	2 × 200	D3	(14)	275.110-10201
600	2 × 180	D3	(15)	275.110-10181
480	2 × 120	D3	(16)	275.110-10121
single phase				
750	300	D1	(17)	275.111-10301
600	180	D1	(18)	275.111-10181

Selection Charts

The selection charts state the maximum capacitance per voltage level which can be discharged with each resistor module:

1. Select the line of your **operating** voltage. Mind that in detuned systems, the actual voltage at the capacitor is higher than the rated mains voltage.
2. Look for the column with the capacitance which is closest to your capacitor. Look up BLACK figures if you want to discharge below 50 V within no more than 60 seconds. Look up BLUE figures if you want a discharge below 75 V within 3 minutes. Go for GREY figures if 5 min discharge is sufficient.
3. Determine the resistor module to be ordered in the head of the column.

DISCHARGE DEVICES

Selection Matrix for CAPAGRIP™ Resistor Modules (3ph. star connected)

capacitor voltage (V)		C _{max} to be discharged (μF)											
U _{max}	U _{AC}	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
230	325	3×36	3×59	3×89	3×107	3×178	3×178	3×267	3×267	3×320	3×391	3×391	3×471
		3×136	3×227	3×341	3×409	3×682	3×682	3×1022	3×1022	3×1227	3×1496	3×1496	3×1804
		3×227	3×379										
280	395	3×32	3×54	3×81	3×97	3×161	3×161	3×242	3×242	3×290	3×354	3×354	3×426
		3×120	3×200	3×301	3×361	3×601	3×601	3×902	3×902	3×1082	3×1319	3×1319	3×1591
		3×200	3×334										
400	565	3×27	3×46	3×69	3×82	3×137	3×137	3×206	3×206	3×247	3×302	3×302	3×364
		3×99	3×165	3×247	3×297	3×495	3×495	3×742	3×742	3×891	3×1086	3×1086	3×1310
		3×165	3×275										
415	585	3×27	3×45	3×68	3×81	3×135	3×135	3×203	3×203	3×244	3×297		3×358
		3×97	3×162	3×243	3×292	3×486	3×486	3×729	3×729	3×875	3×1067		3×1287
		3×162	3×270										
440	620	3×26	3×44	3×66	3×79	3×132	3×132	3×198	3×198	3×238	3×290		3×350
		3×95	3×158	3×236	3×284	3×473	3×473	3×709	3×709	3×851	3×1037		3×1251
		3×158	3×263										
480	680	3×26	3×43	3×64	3×77	3×128	3×128	3×192	3×192	3×230	3×281		
		3×91	3×151	3×227	3×272	3×454	3×454	3×681	3×681	3×817	3×996		
		3×151	3×252										
525	740	3×25	3×41	3×62	3×74	3×124	3×124	3×185		3×222			
		3×87	3×145	3×218	3×262	3×436	3×436	3×654		3×785			
		3×145	3×242										
600	850	3×24	3×39	3×59	3×71	3×118	3×118	3×177					
		3×82	3×137	3×206	3×247	3×412	3×412	3×618					
		3×137	3×229										
690	975	3×22	3×37	3×56	3×67	3×112							
		3×78	3×130	3×195	3×234	3×390							
		3×130	3×217										
760	1075	3×22	3×36	3×54	3×65								
		3×75	3×125	3×188	3×225								
		3×125	3×209										
800	1130	3×21	3×36	3×53									
		3×74	3×123	3×184									
		3×123	3×205										
850	1200	3×21	3×35	3×52									
		3×72	3×120	3×180									
		3×120	3×200										
1000	1415	3×20	3×33										
		3×68	3×114										
		3×114	3×189										

C_{max} for discharge < 50 V within 1 min
 C_{max} for discharge < 75 V within 3 min
 C_{max} for discharge < 75 V within 5 min*

*Recommended for thyristor-switched equipment.
 NOTE: Warning about 5 min discharge time should be placed on the equipment.

DISCHARGE DEVICES

Selection matrix for Capacitors with D3/D1 Terminals

capacitor voltage		C _{max} to be discharged (µF)					
U _{rms}	U _{AC}	(13)	(14)	(15)	(16)	(17)	(18)
230	325	3×36	3×53	3×59	3×89	107	178
		3×136	3×204	3×227	3×341	409	682
280	395	3×32	3×48	3×54	3×81	97	161
		3×120	3×180	3×200	3×301	361	601
400	565	3×27	3×41	3×46	3×69	82	137
		3×99	3×148	3×165	3×247	297	495
415	585	3×27	3×41	3×45	3×68	81	135
		3×97	3×146	3×162	3×243	292	486
440	620	3×26	3×40	3×44	3×66	79	132
		3×95	3×142	3×158	3×236	284	473
480	680	3×26	3×38	3×43	3×64	77	128
		3×91	3×136	3×151	3×227	272	454
525	740	3×25	3×37	3×41		74	124
		3×87	3×131	3×145		262	436
600	850	3×24	3×35	3×39		71	118
		3×82	3×124	3×137		247	412
690	975	3×22				67	
		3×78				234	

C_{max} for discharge <50V within 1 min

C_{max} for discharge <75V within 3 min