CapCheck® III

DISTRIBUTION & SUBSTATION TYPE

Capacitor Checker

Operating & Instruction Manual

HD ELECTRIC COMPANY
A Textron Company

1475 Lakeside Drive • Waukegan, Illinois 60085 U.S.A. • 847.473.4980
fax 847.473.4981 • website: www.HDElectricCompany.com

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CAP CHECK III INSTRUMENT PANEL

1. Current Transformer Size Selection Switch
2. Current Transformer Operation Switch
3. Plug for Current Transformer
4. AC Milliamps Digital Meter
5. Plug for Energizing Leads
6. Test Voltage Range Selection Switch
7. AC Volts Digital Meter
8. ON/OFF Switch
9. Variable Transformer (Variac)

CAUTION: Make certain capacitors are shorted and de-energized **COMPLETELY** prior to testing. **ALWAYS** be certain capacitor bank to be tested is out of service. Allow at least 5 minutes for capacitors to fully discharge.

CAUTION: Rigorous hotstick work precautions are required when operating the Cap Check III. Insulating gloves as well as hotsticks are strongly suggested.

CAUTION: Make certain leads **NEVER** cross phases or drape across bushings, live transformers, etc. Cordage must remain free and clear of all objects, including the human body, **AT ALL TIMES**.

CAUTION: Make certain maximum capacitor KVAR and voltage do not exceed the Cap Check III testing limits. Maximum KVAR for the Cap Check III can be noted on the Pass/Fail Limit Rating Chart located at the end of the manual.

CAUTION: Make certain the Cap Check III voltage (Variac) is set to zero (0) prior to turning the instrument on and energizing capacitors.

CAUTION: Always turn the Variac to zero after testing capacitors and before turning the Cap Check III off. This action will discharge the capacitor.

NOTE: Familiarize yourself with the Cap Check II instrument panel layout as diagrammed on the previous pages, prior to conducting your first test.

ADDITIONAL SAFETY NOTES

Please note that your Company may have additional safety rules and procedures, which should be employed while using this equipment. You must check to make certain that all safety considerations are properly addressed when using this equipment. These are recommended safety rules and are to be used as guidelines in establishing and integrating your own safe procedures.

OPERATING PRINCIPLE

The Cap Check operates by measuring the current flowing through the capacitor under test. The operating convenience of this tester comes from the fact that a bank of paralleled capacitors is energized but currents are measured individually without opening any connections. Of course, the current drawn by the paralleled group must not exceed the capacity of the power supply.

SET UP PROCEDURE

IMPORTANT: THE PROCEDURES DESCRIBED ARE GENERAL AND MUST BE REVIEWED AND MODIFIED AS NECESSARY TO CONFORM TO THE USER'S SAFETY RULES, STANDARDS AND REGULATIONS.

ALWAYS REMEMBER THAT THE DISTRIBUTION EQUIPMENT UNDER TEST OPERATES AT HIGH VOLTAGE. THE CAPACITOR BANKS MUST BE DE-ENERGIZED AND COMPLETELY DISCHARGED BEFORE THE TESTING AT THE RELATIVELY LOW VOLTAGE IS PERFORMED.

Every group of paralleled capacitors must be discharged. If these parallel groups are not equipped with shorting switches this must be accomplished in accordance with the user's standard safe operating procedures.

SET UP AND TESTING

To obtain correct results it is necessary that the Cap Check energizing leads be connected across the single parallel group of capacitors being tested. If shorting switches are installed, these can limit the energized capacitors to those under test. If switches are not available it will be necessary to use jumpers. The energizing leads may then be attached to the phase lead and the neutral. It is also possible to attach the energizing leads to each of the paralleled sections, but this defeats the timesaving feature of the Cap Check.

Other arrangements of jumpers or switching can be devised to suit the network under test.

When the system consists of paralleled series-parallel groups it probably will not be necessary to switch or jumper the parallel leg – as a matter of fact, that leg must not be shorted or too much of it jumped to avoid drawing excessive power from the tester.

After the test of all parallel groups is completed the tester voltage should be turned down to minimum and the supply should be de-energized. This action will discharge the capacitors which were last tested.

DESIGN OF THE PROCEDURE

The objectives to be considered when establishing a test procedure must put safety first and then consider the convenience and efficiency of the work crew. The basic consideration will be to minimize the number of jumper shifts during the course of testing.

PROCEDURE REVIEW

HD Electric Company will be happy to discuss special problem networks or to review proposed test sequences, but the responsibility for the safe design of these procedures and the safe operation of the test set lies with the using authority.

PREPARATION FOR TESTING

(REFER TO DIAGRAM ON PAGE 3)

Remove the top and bottom lids from the Cap Check III case. Set the instrument on a firm, safe and secure surface.

Plug the yellow Energizing Lead with two clamps and a 4-pin connector into the Voltage Output Plug (#5) located on the upper right corner of the instrument panel. Make certain the plug is secure and locked into place.

If the Current Transformer is to be used, plug the Current Transformer Energizing Lead with a 3-pin connector into the Current Input Plug (#3) on the upper left corner of the instrument panel.

Be certain the ON/OFF Switch (#8), located on the middle right side of the panel, is in the OFF position and the Variac (#9) is set to zero (0).

Attach the yellow power cord to the Cap Check III using the twist-lock connection located underneath the base of the Cap Check. Then plug the power cord into a known rated voltage, 60Hz, 2 Amp power source.

Identify the capacitor voltage rating and KVAR to be tested as noted on the capacitor. Locate the capacitor voltage and KVAR on the Cap Check III Pass/Fail Limit Rating Chart located at the end of the manual.

Again, be certain the maximum Cap Check III voltage and KVAR are not being exceeded.

Note the test voltage range on the chart and select the required test voltage range with the Test Voltage Range Selection Switch (#6) located below the Voltage Output Plug on the right side of the instrument panel.

For up to 120 Volts, the switch should be set to the 50-120 setting. For above 120 Volts, the switch should be set to the 240-480 setting.

Be certain the Test Voltage Range Selection Switch is set correctly before proceeding.

If the Current Transformer is to be used, set the Current Transformer Operation Switch (#2), located below the Current Input Plug, to the CT setting on the left.

NOTE: If a single capacitor is to be tested, the test may be conducted without using the current transformer. In this case, set the Current Transformer Operation Switch to the DIRECT setting on the right. In this mode, the energizing lead and clamps will sense current and register a reading on the AC Milliamps Digital Meter (#4).

Be certain the Current Transformer Operation Switch is set correctly before continuing.

If a Current Transformer is used, select the current transformer size on the Current Transformer Size Selection Switch (#1) located on the upper left of the instrument panel. Set to 2 inch or 4 inch Current Transformer size. 2 inch applies to a small current transformer with a 2 inch opening.

Make certain the Current Transformer Size Selection Switch is at the proper setting.

NOTE: Never switch between the CT setting and DIRECT setting while the Cap Check III is ON. Always turn the Variac to zero (0) and turn the unit OFF before changing the Current Transformer Operation Switch setting.
NOTE: Do not attempt to zero the AC Milliamps Digital Meter.
NOTE: The Volts Digital Meter has been factory set. Do not attempt to adjust the settings for the meter.

You are now ready to begin testing.

TESTING PROCEDURE

NOTE: Always apply the previously mentioned safety precautions and always make certain the capacitors to be tested are COMPLETELY discharged and removed from service.
CAUTION: Always attach one energizing lead clamp to the capacitor at a time. NEVER attach both clamps at the same time.

STEP 1. Attach the Energizing Lead Clamps to the capacitor bushings. If multiple capacitors are being tested, be certain the maximum KVAR of the Cap Check III is not being exceeded and all capacitors under test are being subjected to the applied voltage. Also note that the capacitors will have to be physically disconnected from the circuit so as to be able to apply the Cap Check test voltage to the capacitor and the capacitor ONLY.

STEP 2. If it is being used, apply the Current Transformer to one energizing clamp, lead or bushing. It does not matter which energizing lead is used to sense the current.

STEP 3. Once the Energizing Lead Clamps and Current Transformer are in place, turn the Cap Check ON using the ON/OFF Switch. Using the Variac, apply the test voltage as previously determined using the Cap Check III Pass/Fail Limit Rating Chart located at the end of the manual.

STEP 4. Note the reading on the AC Milliamps Digital Meter and compare it to the current range noted on the Pass/Fail Limit Rating Chart to determine if the capacitor is good or bad.
If multiple capacitors are being tested, leave the bank of capacitors energized to the test voltage and move the Current Transformer to the next capacitor to obtain the milliampere reading for each individual capacitor.

STEP 5. When the test is complete, turn the Variac back to zero (0) and turn the Cap Check III OFF.

STEP 6. Remove the Current Transformer from the capacitor and then remove the Energizing Lead Clamps one at a time.

Conduct further testing of other capacitors or capacitor banks following this same procedure.

CAP CHECK III PASS / FAIL LIMIT RATING

NAMEPLATE DATA			TEST CURRENT		MAXIMUM ENERGIZED
V	KVAR	V TEST	MIN	MAX	BANK LOAD, KVAR
2200	15	50	138	186	1050
2200	25	50	232	313	
2200	50	50	467	628	
2200	100	50	937	1260	
2200	150	50	1407	1891	
2400	15	50	115	157	200
2400	25	50	194	263	
2400	50	50	392	528	
2400	100	50	787	1058	
2400	150	50	1182	1588	
2400	200	50	1577	2118	
2400	15	120	284	375	50
2400	25	120	475	625	
2400	50	120	953	1250	
4000	50	50	139	188	550
4000	100	50	281	375	
4000	150	50	424	563	
4000	200	50	566	750	
4000	15	120	99	135	200
4000	25	120	168	225	
4000	50	120	338	450	
4000	100	120	680	900	
4160	50	50	129	173	600
4160	100	50	262	347	
4160	150	50	394	520	
4160	200	50	526	693	
4160	15	120	94	125	250
4160	25	120	156	208	
4160	50	120	315	416	
4160	100	120	632	832	
4800	50	50	96	130	800
4800	100	50	196	260	
4800	150	50	295	391	
4800	200	50	395	521	
4800	15	120	69	94	300
4800	25	120	116	156	
4800	50	120	236	313	
4800	100	120	474	625	
6640	15	300	92	122	250

CAP CHECK III PASS / FAIL LIMIT RATING *continued*

NAMEPLATE DATA			TEST CURRENT		MAXIMUM ENERGIZED
V	KVAR	V TEST	MIN	MAX	BANK LOAD, KVAR
6640	15	120	37	49	600
6640	25	120	61	82	
6640	50	120	122	163	
6640	100	120	245	327	
6640	150	120	367	490	
6640	200	120	490	653	
7200	15	300	76	104	50
7200	25	120	52	69	750
7200	50	120	104	139	
7200	100	120	208	278	
7200	150	120	313	417	
7200	200	120	417	556	
7200	300	120	625	833	
7200	400	120	833	1111	
7300	100	120	203	270	750
7300	150	120	304	405	
7300	200	120	405	540	
7300	300	120	608	811	
7620	15	300	70	93	50
7620	25	300	116	155	
7620	50	120	93	124	800
7620	100	120	186	248	
7620	150	120	279	372	
7620	200	120	372	496	
7620	300	120	558	744	
7960	15	300	64	85	350
7960	25	300	107	142	
7960	50	120	85	114	900
7960	100	120	170	227	
7960	150	120	256	341	
7960	200	120	341	455	
8320	15	300	59	78	100
8320	25	300	98	130	
8320	50	120	78	104	1000
8320	100	120	156	208	
8320	150	120	234	312	
8320	200	120	312	416	
9960	200	50	91	121	3450
9960	300	50	136	181	

CAP CHECK III PASS / FAIL LIMIT RATING *continued*

NAMEPLATE DATA			TEST CURRENT		MAXIMUM ENERGIZED
V	KVAR	V TEST	MIN	MAX	BANK LOAD, KVAR
9960	100	120	109	145	1400
9960	150	120	163	218	
9960	200	120	218	290	
9960	300	120	327	435	
10300	100	120	102	136	1500
10300	150	120	153	204	
10300	200	120	204	271	
10800	200	120	185	247	1700
13200	25	480	62	83	150
13200	50	480	124	165	
13200	100	480	248	331	
13200	50	300	77	103	250
13200	100	300	155	207	
13200	150	120	93	124	2500
13200	200	120	124	165	
13280	50	300	77	102	250
13280	100	300	153	204	
13280	150	300	230	306	
13280	100	120	61	82	2550
13280	150	120	92	122	
13280	200	120	122	163	
13280	300	120	184	245	
13800	25	480	57	76	150
13800	50	480	113	151	
13800	50	300	71	95	250
13800	100	300	142	189	
13800	100	120	57	76	2750
13800	150	120	85	113	
13800	200	120	113	151	
14400	25	480	52	69	150
14400	50	480	104	139	
14400	100	480	208	278	
14400	50	300	65	87	300
14400	100	300	130	174	

CAP CHECK III PASS / FAIL LIMIT RATING *continued*

NAMEPLATE DATA			TEST CURRENT		MAXIMUM ENERGIZED
V	KVAR	V TEST	MIN	MAX	BANK LOAD, KVAR
14400	100	120	52	69	3000
14400	150	120	78	104	
14400	200	120	104	139	
14400	300	120	156	208	
15200	150	120	70	93	3350
16000	200	120	84	113	3700
17000	300	300	280	374	400
19920	200	120	54	73	5750
19920	300	120	82	109	
19920	50	480	54	73	350
19920	100	480	109	145	
19920	150	300	102	136	550
19920	200	300	136	181	
19920	300	300	204	272	
21600	150	300	87	116	650
21600	200	300	116	154	
21600	50	480	46	62	400
21600	100	480	93	123	
21600	150	480	139	185	
21600	200	480	185	247	
22130	100	480	88	118	400
22130	150	480	132	176	
22130	200	480	176	235	
22500	50	480	43	57	450
22500	100	480	85	114	
22500	150	480	128	171	
22500	200	480	171	228	
25000	100	480	69	92	550
25000	150	480	104	138	
25000	200	480	138	184	

NOTE: Maximum Energized Bank Load, KVAR refers to the capacitors which the Cap Check II can energize as a group. The operating manual includes information on load calculations for series-parallel connected banks.

When more than one test voltage is listed for a capacitor nameplate rating, select the highest value while considering the Cap Check bank capacity rating.

LIMITED WARRANTY AND LIMITATION OF LIABILITY

This warranty applies to all products sold by HD Electric Company (the "Products"); provided, however, that the term Products does not include any third party products purchased through HD Electric Company, for which no warranties are made (the "Third Party Products"). Third Party Products may be subject to a separate manufacturer's warranty; [should you have any question regarding whether a separate warranty applies, please contact HD Electric Company].

NOTICE: READ THIS LIMITATION OF WARRANTY AND LIABILITY BEFORE BUYING OR USING THE PRODUCTS CONTAINED HEREIN.

It is impossible to eliminate all risks associated with the use of the Products. Risks of serious injury or death, including risks associated with electrocution, arcing and thermal burns, are inherent in work in and around energized electrical systems. Such risks arise from the wide variety of electrical systems and equipment to which Products may be applied, the manner of use or application, weather and environmental conditions or other unknown factors, all of which are beyond the control of HD Electric Company.

HD Electric Company does not agree to be an insurer of these risks, and shall have no liability for any claims arising from such risks.

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