



Siemens TS-31

Siemens Energy & Automation, Inc.
Bellefontaine, Ohio 43311 U.S.A.

Item: TS-31 Universal Test Set

For use with: Type SJD6, SHJD6, SCJD6, SLD6, SHLD6, SCLD6, SMD6, SHMD6, SCMD6, SND6, SHND6, SCND6, SPD6, SHPD6, SKMIII, SHKIII, SKPIII, SHPIII, STD6, SHTD6, SHHTD6, SB & STD Circuit Breakers.

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Universal Test Kit (TS-31)



! DANGER

Hazardous voltage.
Will cause death or serious injury.

Turn off and lock out all power supplying the circuit breaker prior to cover(s) removal or while cover(s) are removed and when installing any internal or external accessory.

Replace the cover(s) and shield(s) before power supplying this device is turned on.

! SAFETY INSTRUCTIONS

Caution: Remove electrical loads from the circuit breaker to be tested prior to performing tests. Failure to do so can produce erroneous results and possible electrical malfunction.

TS-31 PROCEDURES

OPERATING INSTRUCTIONS

- A. Remove electrical loads from circuit breaker.
- B. Plug the TS-31 test set into a grounded 120 VAC receptacle and turn it on. You will be greeted by the identifying turn-on message:

Siemens Energy & Automation, Inc. TS-31 Test Set. Press any key to continue.

- C. Remove any external accessory attached via ribbon cables from the breaker's test port before connecting the TS-31. Select the appropriate ribbon cable assembly and connect it between the TS-31 and the circuit breaker, making sure of alignment and polarity. After pressing ENTER, the TS-31 will prompt:

Enter catalog number

- D. Type in the catalog number of the circuit breaker if a JD, LD, MD, or PD FRAME. If the unit being tested is an SB ENCASED BREAKER, type in the catalog number of the trip unit. If the unit being tested is an STD CIRCUIT BREAKER, type in the equivalent SB CIRCUIT BREAKER trip unit catalog number shown on Table in section O.

After entering the catalog number information, press the ENTER key. If an invalid catalog number has been entered, the TS-31 will respond with:

XXX...NOT found.
Press any key to continue.

and you will be asked to enter another catalog number.

- E. If a valid catalog number has been entered, the TS-31 will prompt for the breaker switch settings. The TS-31 will respond with:

Enter Continuous Current Setting in %:

Enter Long Time Delay in Seconds:

For breakers with short time functions you will be asked:

Enter Short Time Pickup:

Enter Short Time Delay: 1-Fixed 2-I²t:

Enter Short Time Delay in Seconds:

For breakers with instantaneous functions you will be asked:

Enter Instantaneous Pickup Settings:

For breakers with ground fault functions you will be asked:

**Select Ground Fault Type: 1-Residual
2-Gnd Return 3-Unsure**

Enter Ground Fault Pickup Setting in %:

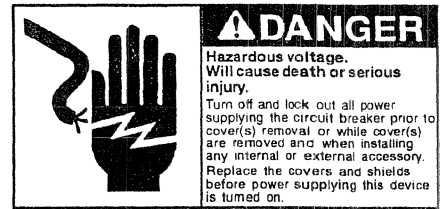
Enter Ground Fault Delay: 1-Fixed 2-I²t:

Enter Ground Fault Delay in Seconds:

In each case, enter the breaker's switch settings. For example, if the breaker is set for a continuous current of 70%, type 70 and then press ENTER. Entry of erroneous data in the above steps will result in false tests and results.

- F. After entering the breaker switch settings, you must select the test you wish to perform. The TS-31 will request:

**Enter test: L-Long S-Short I-Inst.
G-Gnd Fault C-CT Cont.?**



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- "L" - Long time or overload test
- "S" - Short time test
- "I" - Instantaneous test
- "G" - Ground fault test
- "C" - Current transformer continuity test

- G. After entering the desired test, you will be prompted for the phase to be tested. The TS-31 will display:

Enter Phase to Test:

Enter one of the following letters:

- "A" - Phase A or Left Pole
- "B" - Phase B or Center Pole
- "C" - Phase C or Right Pole
- "N" - Neutral

- H. The TS-31 will report the type of test you selected and give you a chance to abort the test. For example, if "I" was pressed in step F, the TS-31 will display:

Instantaneous Test Press ENTER to continue or A to Abort.

If you press the letter "A" to abort, you will be given new options. See step K.

- I. To proceed, press ENTER again to start the test. Press any other key to STOP the test. Once a test has been started, the TS-31 will respond with:

Trip Test. Press Any Key to Abort. Time Remaining: xx.xxx Sec.

Be careful at this time. Any key press will abort the test.

- J. The test may take anywhere from a fraction of a second to minutes to complete, depending on which procedure was selected. If the test passes, the TS-31 will display:

Test Passed. xx.xxx Sec. Press any key to continue.

If the test fails, the display will show one of the following messages, depending on the type of failure:

Test Failed-- Trip Time Too Short. xx.xxx Sec. Press any key to continue.

Test Aborted-- Exceeded Max. Trip Time. Press any key to continue.

If the circuit breaker tripped during the test, RESET the circuit breaker before continuing.

- K. The TS-31 will prompt for the next instructions. The display will show:

Change: 1-Test 2-Catalog 3-Settings:

Enter one of the following numbers:

- "1" - Select a new test
- "2" - Enter a new catalog number
- "3" - Enter new switch settings

If you enter "1", you will be sent to step F. Choosing "2" will send the program back to step C. Entering "3" sends you back to step E, which will be slightly different the second time through. On the second line after the prompt for the setting, a number or text in brackets will appear. This will indicate the last setting you entered. If you DON'T wish to change a setting, just press ENTER. If you DO wish to change a setting, type in the new setting and press ENTER.

- L. If you pressed "C" when asked,

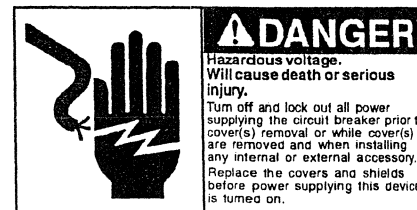
Enter test: L-Long S-Short I-Inst. G-Gnd. Fault C-CT Cont.?

you will first be prompted by:

Current Transformer Test Press ENTER to Continue or A to Abort.

and then asked the phase to test. A message will then appear stating the test results. For example:

CT Resistance Test. Phase X PASSED Press any key to continue.



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- M. There are additional ERROR messages which may appear on the display during operation which were not covered previously:

**Test Not Running-- Check Test Cable.
Press any key to continue.**

The test set has sensed that current is not flowing properly in the breaker under test and there is either an open or short circuit between the TS-31 and the breaker trip unit.

**XXXXXX is NOT available on a XXXXXXXX.
Press any key to continue.**

This message will appear if you enter a type of test that is not available on the breaker being tested. For example:

**Ground Fault is NOT Available on a SJD69300.
Press any key to continue.**

You will get this message if you enter "G" (for a ground fault test) in step F because that catalog number does not have ground fault.

**XX is NOT a Valid Setting.
Press any key to continue.**

This message will appear if you enter a setting value that does not exist. For example, a SMD69700ANGT has continuous current settings of 20, 30, 40, 50, 60, 70, 80, 90 & 100 percent. If you were to enter any value other than those listed, the above message would appear.

**Test Exceeds Capability of TS-31.
Press any key to continue.**

This message means that a test requires more current to run than the TS-31 can produce. The settings on the breaker should be lowered and the new settings should be entered into the TS-31 (step K, option 3). Then rerun the desired test.

- N. The TS-31 will warn you of possible fault coverage conflicts. These conflicts may occur if, for example, the short time and instantaneous pickup settings overlap or interfere with one another. In this case, the following sequence of messages will appear:

You've chosen the Short Time test, but the following may trip first:

**Instantaneous
Press any key to continue.**

**Do you wish to proceed with the test?
[Y/N]**

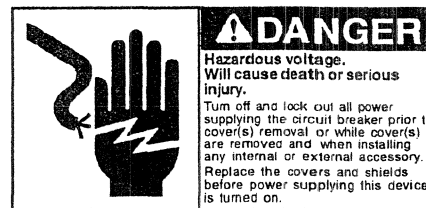
These messages indicate that something other than the desired function may trip the breaker. You then have the option of continuing with the test or aborting it.

- O. For STD CIRCUIT BREAKERS, enter the following SB trip unit catalog number at the TS-31 prompt:

Enter Catalog Number

STD TRIP UNIT CATALOG NUMBER	SB TRIP UNIT CATALOG NUMBER TO ENTER INTO TS-31
STD xxTLI	SBxxTLI
STD xxTLS	SBxxTLS
STD xxTL SI	SBxxTL SI
STD xxTL IG	SBxxTL IG
STD xxTL SG	SBxxTL SG
STD xxTL SIG	SBxxTL SIG
STD xxTPO1	SBxxTPO1
STD xxTPO1G	SBxxTPO1G
STD xxTPO2	SBxxTPO2
STD xxTPO2G	SBxxTPO2G

where: XX represents the 2 digit trip unit rating (04, 08, 12, 16, 20, 25, 32, 40 & 50)



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TESTING PARAMETERS - MCCB

MCCB LONG TIME TRIP OUT

Setting % of In	2.2 sec.	3 sec.	4 sec.	7 sec.	12 sec.	20 sec.	25 sec.	27 sec.
20%-100%	24.4 to 55.0	33.3 to 75.0	44.4 to 100	77.8 to 175	133 to 300	222 to 500	278 to 625	300 to 675

NOTE: Ground fault settings of 40% or lower may cause erroneous LONGTIME trip readings. Should lower than expected readings occur, set the GROUND FAULT PICK-UP to a higher setting for testing purposes only.

MCCB I²T SHORT TIME TRIP OUT

Pick-Up Setting	0.18 sec.	0.2 sec. (JL)	0.22 sec.	0.28 sec.	0.36 sec.	0.45 sec.
1.5	1.280 to 2.934	1.422 to 3.254	1.564 to 3.574	1.991 to 4.534	2.560 to 5.814	3.200 to 7.254
2	0.720 to 1.674	_____	0.880 to 2.034	1.120 to 2.574	1.440 to 3.294	1.800 to 4.104
3	0.320 to 0.744	_____	0.391 to 0.934	0.498 to 1.174	0.640 to 1.494	0.800 to 1.854
4	0.180 to 0.459	0.200 to 0.504	0.220 to 0.549	0.280 to 0.684	0.360 to 0.864	0.450 to 1.067
5	0.115 to 0.313	_____	0.141 to 0.371	0.179 to 0.457	0.230 to 0.572	0.288 to 0.702
6	0.080 to 0.234	_____	0.098 to 0.274	0.124 to 0.334	0.160 to 0.414	0.200 to 0.504
7	0.059 to 0.186	0.065 to 0.201	0.072 to 0.216	0.091 to 0.260	0.118 to 0.318	0.147 to 0.385
8	0.045 to 0.155	_____	0.055 to 0.178	0.070 to 0.212	0.090 to 0.257	0.113 to 0.307
9	0.036 to 0.134	_____	0.043 to 0.152	0.055 to 0.178	0.071 to 0.214	0.089 to 0.254
10	0.029 to 0.119	0.032 to 0.126	0.035 to 0.133	0.045 to 0.155	0.058 to 0.184	0.072 to 0.216

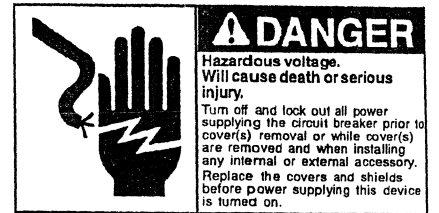
MCCB FIXED SHORT TIME TRIP OUT

ST Delay Setting	ST Trip Out Time
0.05 sec.	0.040 to 0.114
0.1 sec.	0.080 to 0.174
0.2 sec.	0.160 to 0.294
0.3 sec.	0.240 to 0.414
0.5 sec.	0.400 to 0.654

MCCB GROUND FAULT TRIP OUT

Setting % of In	0.1 sec.	0.2 sec.	0.4 sec.
20%	0.193 to 1.754	0.386 to 3.490	0.772 to 6.962
25%	0.123 to 1.129	0.247 to 2.240	0.494 to 4.462
30%	0.086 to 0.790	0.171 to 1.561	0.343 to 3.104
40%	0.048 to 0.452	0.096 to 0.886	0.193 to 1.754
55%	0.050 to 0.168	0.100 to 0.318	0.200 to 0.618
70%	0.050 to 0.168	0.100 to 0.318	0.200 to 0.618

All values are in seconds.



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TESTING PARAMETERS - ICCB

ICCB LONG TIME TRIP OUT

Setting % of In	2.5 sec.	4 sec.	5.5 sec.	8 sec.	10 sec.
50%	111 to 250	178 to 400	244 to 550	356 to 800	444 to 1000
60%	77 to 173	123 to 277	170 to 382	247 to 555	309 to 694
65%	66 to 148	105 to 236	145 to 325	210 to 473	263 to 591
70%	57 to 127	91 to 204	125 to 280	181 to 408	227 to 510
75%	49 to 111	79 to 177	109 to 244	158 to 355	198 to 444
80%	43 to 97	69 to 156	95 to 214	139 to 312	174 to 390
85%	38 to 86	61 to 138	85 to 190	123 to 276	154 to 346
90%	34 to 77	55 to 123	75 to 169	110 to 246	137 to 308
95%	31 to 69	49 to 110	68 to 152	98 to 221	123 to 277
100%	28 to 62	44 to 100	61 to 137	89 to 200	111 to 250

ICCB LONG TIME TRIP OUT

Setting % of In	14 sec.	17 sec.	21 sec.	25 sec.	30 sec.
50%	622 to 1400	756 to 1700	933 to 2100	1111 to 2500	1333 to 3000
60%	432 to 972	525 to 1180	648 to 1458	772 to 1736	926 to 2083
65%	368 to 828	447 to 1005	552 to 1242	657 to 1479	789 to 1775
70%	317 to 714	385 to 867	476 to 1071	567 to 1275	680 to 1530
75%	277 to 622	336 to 755	415 to 933	494 to 1111	593 to 1333
80%	243 to 546	295 to 664	365 to 820	434 to 976	521 to 1171
85%	215 to 484	261 to 588	323 to 726	384 to 865	461 to 1038
90%	192 to 432	233 to 524	288 to 648	343 to 771	412 to 925
95%	172 to 387	209 to 470	259 to 581	308 to 692	369 to 831
100%	156 to 350	189 to 425	233 to 525	278 to 625	333 to 750

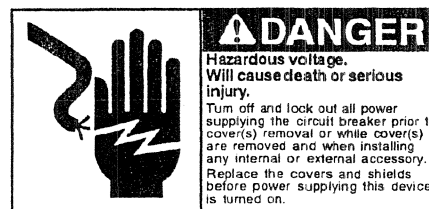
ICCB I²T SHORT TIME TRIP OUT

Pick-Up Setting	0.07 sec.	0.1 sec.	0.15 sec.	0.2 sec.	0.3 sec.
1.5	0.885 to 2.045	1.264 to 2.898	1.896 to 4.321	2.528 to 5.743	3.793 to 8.587
2	0.498 to 1.174	0.711 to 1.654	1.067 to 2.454	1.422 to 3.254	2.133 to 4.854
2.5	0.319 to 0.771	0.455 to 1.078	0.683 to 1.590	0.910 to 2.102	1.365 to 3.126
3	0.221 to 0.552	0.316 to 0.765	0.474 to 1.121	0.632 to 1.476	0.948 to 2.187
4	0.124 to 0.334	0.178 to 0.454	0.267 to 0.654	0.356 to 0.854	0.533 to 1.254
5	0.080 to 0.233	0.114 to 0.310	0.171 to 0.438	0.228 to 0.566	0.341 to 0.822
6	0.055 to 0.178	0.079 to 0.232	0.119 to 0.321	0.158 to 0.410	0.237 to 0.587
7	0.041 to 0.145	0.058 to 0.185	0.087 to 0.250	0.116 to 0.315	0.174 to 0.446
8	0.031 to 0.124	0.044 to 0.154	0.067 to 0.204	0.089 to 0.254	0.133 to 0.354
9	0.025 to 0.109	0.035 to 0.133	0.053 to 0.173	0.070 to 0.212	0.105 to 0.291

ICCB FIXED SHORT TIME TRIP OUT

ST Delay Setting	ST Trip Out Time
0.07 sec.	0.056 to 0.138
0.1 sec.	0.080 to 0.174
0.15 sec.	0.120 to 0.234
0.2 sec.	0.160 to 0.294
0.3 sec.	0.240 to 0.414

All values are in seconds.



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TESTING PARAMETERS - ICCB

Setting % of In	ICCB I ² T GROUND FAULT TRIP OUT				
	0.1 sec.	0.2 sec.	0.3 sec.	0.4 sec.	0.5 sec.
20%	0.193 to 1.754	0.386 to 3.490	0.579 to 5.226	0.772 to 6.962	0.965 to 8.699
21%	0.175 to 1.593	0.350 to 3.167	0.525 to 4.742	0.700 to 6.317	0.875 to 7.892
22%	0.159 to 1.453	0.319 to 2.888	0.478 to 4.322	0.638 to 5.757	0.797 to 7.192
23%	0.146 to 1.331	0.292 to 2.643	0.438 to 3.956	0.583 to 5.269	0.729 to 6.582
24%	0.134 to 1.224	0.268 to 2.429	0.402 to 3.635	0.536 to 4.841	0.670 to 6.046
25%	0.123 to 1.129	0.247 to 2.240	0.370 to 3.351	0.494 to 4.462	0.617 to 5.574
26%	0.114 to 1.045	0.228 to 2.073	0.342 to 3.100	0.457 to 4.127	0.571 to 5.154
27%	0.106 to 0.971	0.212 to 1.923	0.318 to 2.876	0.423 to 3.828	0.529 to 4.781
28%	0.098 to 0.904	0.197 to 1.790	0.295 to 2.675	0.394 to 3.561	0.492 to 4.447
29%	0.092 to 0.844	0.183 to 1.669	0.275 to 2.495	0.367 to 3.321	0.459 to 4.147
30%	0.086 to 0.790	0.171 to 1.561	0.257 to 2.333	0.343 to 3.104	0.429 to 3.876
31%	0.080 to 0.741	0.161 to 1.463	0.241 to 2.186	0.321 to 2.909	0.401 to 3.631
32%	0.075 to 0.696	0.151 to 1.374	0.226 to 2.053	0.301 to 2.731	0.377 to 3.409
33%	0.071 to 0.656	0.142 to 1.293	0.213 to 1.931	0.283 to 2.569	0.354 to 3.206
35%	0.063 to 0.585	0.126 to 1.152	0.189 to 1.719	0.252 to 2.286	0.315 to 2.852
37%	0.056 to 0.525	0.113 to 1.033	0.169 to 1.540	0.225 to 2.047	0.282 to 2.554
38%	0.053 to 0.499	0.107 to 0.980	0.160 to 1.461	0.214 to 1.942	0.267 to 2.423
40%	0.048 to 0.452	0.096 to 0.886	0.145 to 1.320	0.193 to 1.754	0.241 to 2.188
41%	0.046 to 0.431	0.092 to 0.844	0.138 to 1.257	0.184 to 1.670	0.230 to 2.084
44%	0.040 to 0.377	0.080 to 0.735	0.120 to 1.094	0.159 to 1.453	0.199 to 1.812
45%	0.038 to 0.361	0.076 to 0.704	0.114 to 1.047	0.152 to 1.390	0.191 to 1.733
48%	0.033 to 0.319	0.067 to 0.621	0.100 to 0.922	0.134 to 1.224	0.167 to 1.525
50%	0.031 to 0.296	0.062 to 0.574	0.093 to 0.851	0.123 to 1.129	0.154 to 1.407
55%	0.050 to 0.168	0.100 to 0.318	0.150 to 0.468	0.200 to 0.618	0.250 to 0.768
56%	0.050 to 0.168	0.100 to 0.318	0.150 to 0.468	0.200 to 0.618	0.250 to 0.768
60%	0.050 to 0.168	0.100 to 0.318	0.150 to 0.468	0.200 to 0.618	0.250 to 0.768
62%	0.050 to 0.168	0.100 to 0.318	0.150 to 0.468	0.200 to 0.618	0.250 to 0.768
68%	0.050 to 0.168	0.100 to 0.318	0.150 to 0.468	0.200 to 0.618	0.250 to 0.768
70%	0.050 to 0.168	0.100 to 0.318	0.150 to 0.468	0.200 to 0.618	0.250 to 0.768
80%	0.050 to 0.168	0.100 to 0.318	0.150 to 0.468	0.200 to 0.618	0.250 to 0.768
90%	0.050 to 0.168	0.100 to 0.318	0.150 to 0.468	0.200 to 0.618	0.250 to 0.768
100%	0.050 to 0.168	0.100 to 0.318	0.150 to 0.468	0.200 to 0.618	0.250 to 0.768

ICCB FIXED GROUND FAULT TRIP OUT

GF Delay Setting	GF Trip Out Time
0.1 sec.	0.050 to 0.168
0.2 sec.	0.100 to 0.318
0.3 sec.	0.150 to 0.468
0.4 sec.	0.200 to 0.618
0.5 sec.	0.250 to 0.768

All values are in seconds.